United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
University of Florida,
Institute of Food and
Agricultural Sciences,
Agricultural Experiment
Stations and Soil Science
Department, and
Florida Department of
Agriculture and
Consumer Services

Soil Survey of Orange County, Florida

How To Use This Soil Survey

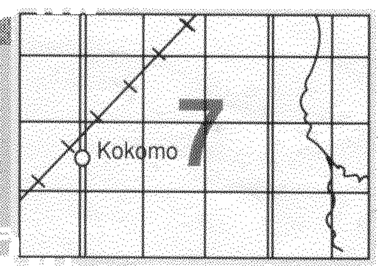
General Soil Map

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

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

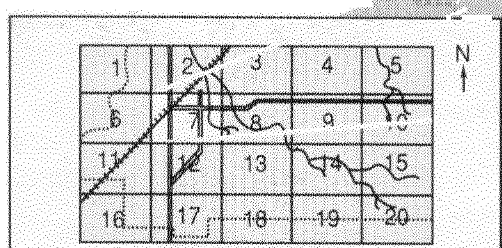
Detailed Soil Maps

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



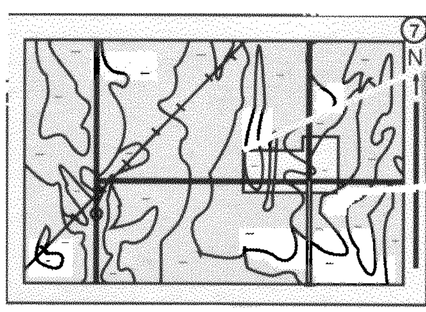
MAP SHEET

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



INDEX TO MAP SHEETS

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



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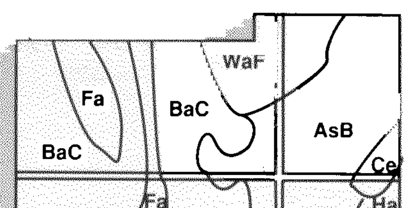


AREA OF INTEREST

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

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

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

Major fieldwork for this soil survey was completed in 1956. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This soil survey was made cooperatively by the Soil Conservation Service, the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations and Soil Science Department, and the Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the Orange County Soil and Water Conservation District. The Orange County Board of Commissioners contributed financially to the acceleration of the survey.

Some of the boundaries on the soil maps of Orange County do not match those on the soil maps of adjacent counties, and some of the soil names and descriptions do not fully agree. The differences are the result of improvements in the classification of soils, particularly modification or refinements in soil series concepts. Also, there may be differences in the intensity of mapping or in the extent of the soils within the county.

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

This survey supersedes the soil survey of Orange County published in 1960 *(25)*.

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

Cover: By its name, Orange County symbolizes the agricultural prominence of its principal crop. This grove is in an area of Candler fine sand, 0 to 5 percent slopes.

Contents

Soil Series

Issued August 1989

Index to Map Units

Summary of Tables

Foreword

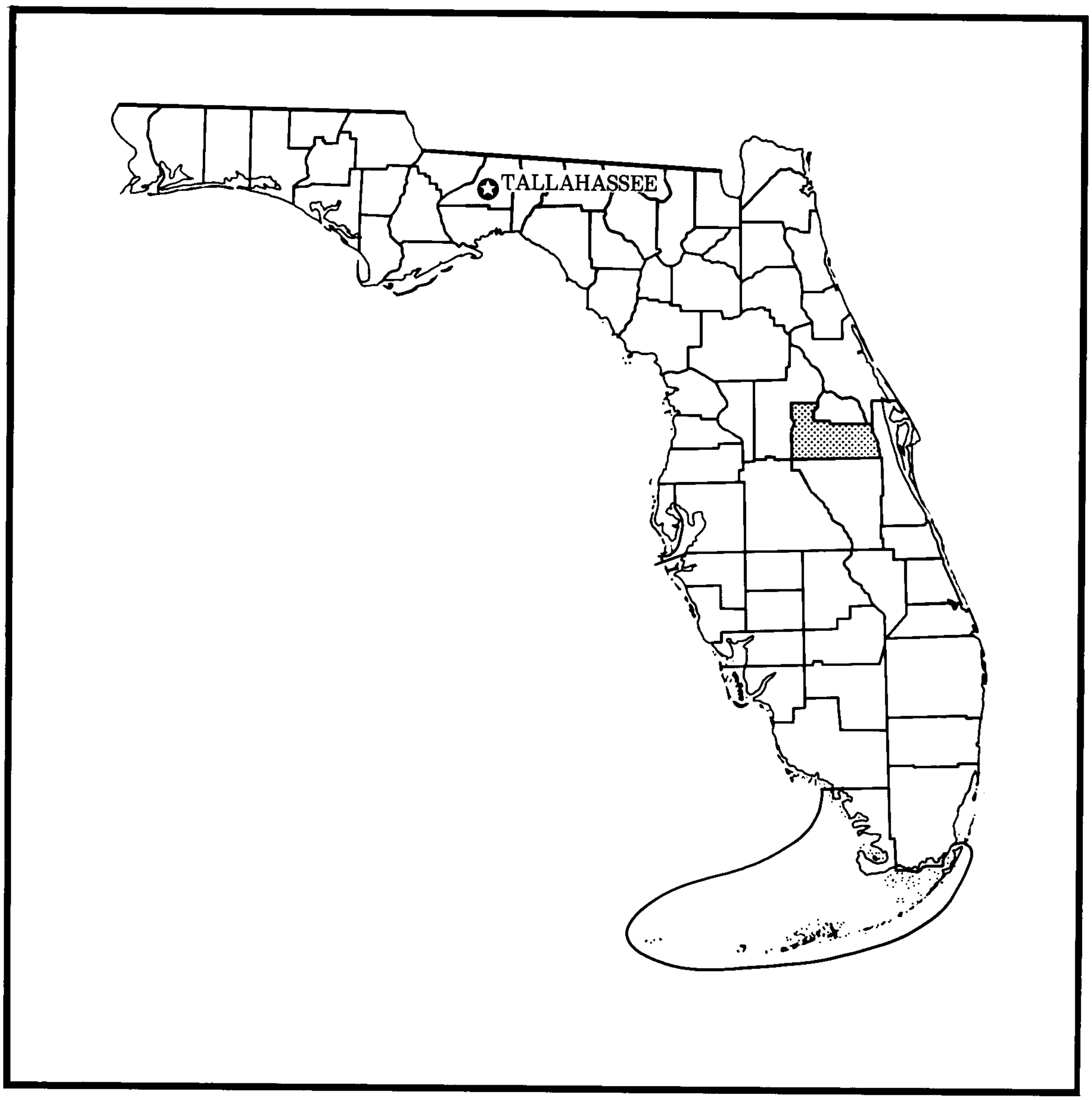
This soil survey contains information that can be used in land-planning programs in Orange County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

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

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

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

James W. Mitchell
State Conservationist
Soil Conservation Service



Location of Orange County in Florida.

Soil Survey of Orange County, Florida

By James A. Doolittle and Gregg Schellentrager, Soil Conservation Service

Soils recorrelated by Thomas E. Calhoun, James A. Doolittle, Adam G. Hyde, and Robert W. Johnson, Soil Conservation Service

Soils surveyed by R.E. Leighty, D.T. Brewer, and W.R. Smith, Florida Agricultural Experiment Station; and R. Baldwin, R.M. Craig, O.E. Cruz, W.G. Diamond, G.H. Evenson, E.D. Matthews, F. Matanzo, D.S. Taylor, and H.O. White, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with
University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations and Soil Science Department, and Florida Department of Agriculture and Consumer Services

ORANGE COUNTY is in the north-central part of peninsular Florida. It extends about 48 miles from east to west and a maximum of 30 miles from north to south. Orange County is bounded on the north by Seminole and Lake Counties, on the west by Lake County, on the south by Osceola County, and on the east by the St. Johns River, which separates Orange County from Brevard County. The county is somewhat rectangular. Orlando, the county seat, is in the north-central part of the county.

The total land area is 910 square miles, or 582,713 acres. In addition, about 33,578 acres is covered by the many lakes in the county.

General Nature of the County

In this section, environmental and cultural factors that affect the use and management of the soils in Orange County are discussed. These factors are climate; history and development; geology, physiography, and ground water; land use; and recreation.

Climate

The climate of Orange County is subtropical. The temperatures are modified greatly by winds that sweep across the peninsula from the Atlantic Ocean and the Gulf of Mexico. The summers are long, warm, and humid, but thundershowers that occur almost every afternoon prevent temperatures from becoming extremely high *(38)*. Winters are short and mild; many of the days are bright and sunny, and there is little precipitation. Cold spells accompanied by cold winds can be expected only a few times during the year and last only a few days. Occasionally, thin ice forms. Generally, the cold spells are preceded by rain.

Data on climate of Orange County are given in tables 1 and 2. This information was compiled from records at the Weather Service Office, Orlando Jetport at McCoy International Airport *(37, 38, 39, 40)*.

The average annual temperature is 71.8 degrees F. (Fahrenheit). In winter the average temperature is 61.1 degrees, and in summer it is 81.1 degrees. The temperature rarely exceeds 95 degrees, but a reading of 102 degrees has been recorded. Killing frosts have occurred as late as March 23 and as early as November 10. The average frost-free season lasts for 314 days, or from February 3 to December 14. The most recent lowest temperature recorded in Orlando was 20 degrees on December 26, 1983, but a reading of 19 degrees was recorded in Zellwood in February 1947. Generally, the temperature drops to below freezing for only a few hours before dawn.

Many kinds of vegetables can be grown during fall and winter, but tender vegetables and some fruits may be damaged by frosts that occur about every other year. Because of the differences in elevation, the temperature varies a few degrees in places that are not far apart. Sometimes cold air settles in depressions or in flat areas and damages or kills citrus trees or other crops. In the winters of 1894-95 and 1983-84 most of the citrus trees were killed by a severe frost.

Cattle and other animals graze on the native and improved pastures throughout the year. It is not necessary to build shelters for livestock if vegetative shelter areas are available.

Rainfall is fairly abundant. The rainy season extends from June through September. About 57 percent of the precipitation falls during that period. During the rest of the year, the rainfall is distributed fairly uniformly. Most of the precipitation occurs in summer. During this season, the precipitation comes mainly in the form of thunderstorms that occur on the average of every other day and generally last for only 1 or 2 hours. Moderately high winds, which occasionally accompany the thunderstorms, occur for short periods.

Between August and November, tropical storms occasionally sweep across the county. Most of these develop over the Caribbean Sea near the West Indies. The heavy rains that accompany such storms are generally more damaging to crops than the wind, but the wind may destroy buildings, tall vegetation, and the fruit on citrus trees. Generally, the damage is confined to a storm path that is between 40 and 75 miles wide.

History and Development

About 400 years ago, the area that now makes up Orange County was inhabited by the Muskogan, Tomokan, Caloosa, Creek, and Seminole Indians *(3, 13)*. They were nonagricultural people who supported themselves mainly by hunting and fishing. Several large towns in central Florida, particularly along the St. Johns River, were inhabited by the Indians. Most of these tribes disappeared from this area between 1700 and 1760. They were decimated by disease, and the tribes also were reduced in number by successive raids of Spanish and English explorers and settlers. From 1780 to 1820, the tribes were further diminished by the second rule of the area under the Spanish flag *(3, 16)*.

In 1820, the area was ceded to the United States. In March 1821, General Andrew Jackson became Provisional Governor of Florida. During the first legislative council, which was held in 1824, four new counties, including one named Mosquito County, were formed. At that time, Mosquito County included all of the area from near St. Augustine southward to Monroe County and westward to Alachua County *(3, 13, 16)*. About 700 residents populated this vast region. In 1843, the county seat of Mosquito County was located at Enterprise (presently Benson Springs). On January 30, 1845, an Act was approved to change the name of Mosquito County to Orange County because of the prevalence of orange trees. Orange County passed through numerous territorial changes before being reduced to its present area.

During the period of 1824 to 1846, 10 forts were established to protect the settlers. These forts were mostly stockades and were built along the St. Johns River. The Indians used the river as a thoroughfare for their canoes.

Most of the early settlers were cattlemen. Cattle raising was the principal industry in Orange County until it was replaced by the citrus industry. The citrus industry actually began in 1875 with the development of the first citrus nursery and commercial grove. Other agricultural industries in Orange County include ornamental plants, vegetables, dairy, and poultry. In 1982, Orange County ranked fourth in the State for total market value of agricultural products sold *(11)*.

In 1856, the county seat was moved from Enterprise to Orlando, which was named in honor of one of the early settlers, Orlando Reeves *(3, 13, 16)*. At that time, the population of the county was about 650. In 1920, the population was 19,890 as compared to 114,950 in 1950. The urban population accelerated when a major aircraft company opened a plant in Orlando, and in 1965 when construction of one of the world's largest entertainment complexes started near Orlando. In 1973, Orange County ranked 7th in the State with a population of 408,361. By 1983, the population of the county had increased to 507,572 *(11, 41, 42)*.

Throughout its history, the development of the county has depended on three major elements: a pleasant climate, employment opportunities, and recreational opportunities.

Geology, Physiography, and Ground Water

T.M. Scott, geologist, Department of Natural Resources, Florida Geological Survey, Bureau of Geology, helped to prepare this section.

Orange County is located in the north-central part of peninsular Florida, east and southeast of the crest of the Ocala Uplift, or the Ocala High *(9)*. The area is underlain by extensive deposits of Eocene age carbonates covered by younger dolomite, limestone, sand, clay, and shell beds. The dissolution of limestone and the marine processes are the dominant forces responsible for the development of the surface features observed in the county.

Two major, generalized physiographic divisions occur in Orange County *(19)*. They are the Central Highlands and the Coastal Lowlands. The Central Highlands form the western one-third of the county, and the Coastal Lowlands form the eastern two-thirds. The highland area includes such physiographic features as the Marion Upland; the Mount Dora Ridge, the Lake Wales Ridge, and the Orlando Ridge; and the Central Valley. The Coastal Lowlands include the Eastern Valley, the Wekiva Plain, and the Osceola Plain.

Geology

Orange County is underlain by Upper Eocene limestone units of the Ocala Group *(5, 43)*. These sedimentary deposits are very fine or fine grained, are chalky and porous, and have a cream color. These limestone units contain many large foraminifera and abundant mollusks. The surface of the limestone generally dips eastward from the outcrop area west of Orange County under an increasing thickness of younger materials. The surface is irregular because of the dissolution of the limestone. This is graphically illustrated on the cross section A-A' and B-B' of Orange County (fig. 1).

The sedimentary deposits that are immediately underlain by the upper Eocene limestone units are of the Hawthorn Group. The highly variable, diverse, lithologic character of the Hawthorn Group includes interbedded and interfingering sand, clayey sand, sandy clay, phosphatic sediment, dolomite, and limestone. The carbonate part generally occurs in the lower Hawthorn Group and contains highly variable amounts of sand, clay, and phosphorite or sand and clay. Phosphorite can also be present. Sedimentary deposits of the Hawthorn Group underlie the entire area except in scattered areas where these deposits have been removed by erosion prior to deposition of younger units. Scattered outcrops of sandy, phosphatic carbonates of the Hawthorn Group occur in springs on the Wekiva Plain northwest of Orlando.

Dolomite commonly occurs in the Eocene age units and in the Hawthorn Group. The Eocene dolomites are in shades of brown, are porous to dense, and are hard and crystalline. The dolomites of the Hawthorn Group are a buff color and crystalline. These dolomites, which consist of varying amounts of sand, clay, and phosphorite, are impure.

Clayey sand covers large areas of western Orange County and is under much of the higher areas of the Central Highlands (elevations up to 310 feet near Lake Apopka). Lithologically, the clayey sand contains silt, fine to coarse sand, and gravel bound by a matrix of clay. Color of the clayey sand varies from green and gray to orange and red. Outcrops of this material can be seen in some roadcuts and in borrow pits in the western part of the county. This clayey sand sediment has been called unnamed coarse clastics, Miocene coarse clastics, Citronelle Formation, and Fort Preston Formation. The formational identity of the unit or units is still uncertain.

Unconsolidated sand blankets the county. This sand consists of medium to fine sand and silt and does not contain clay or shell fragments. The surface expression of this lithologic type is generally flat to slightly undulating except in areas of dune formation where the relief may be more pronounced. Formational equivalents of the sand have not been resolved. Puri and Vernon's geologic map shows them as marine and estuarine terrace deposits *(19)*. They are underlain in some areas by a shelly sand and clay, in other areas by the Hawthorn Group, and in a few scattered areas by limestone of Eocene age.

Shell beds of Miocene age through Pleistocene age are in the eastern part of the county. They represent ancient lagoonal and estuarine environments and contain a highly variable association of lithologies. The lithologies included in this unit are coquina, shelly sands, shelly clays, and sands and clays. This shell lithologic unit is generally below an elevation of 35 feet above mean sea level and forms most of the Coastal Lowlands. The shell lithology is under the medium to fine sand lithologic unit. It pinches out westward toward the highlands under the sand. The shell lithologic unit is mined in some areas for road material and is commonly used for surfacing semi-improved roads.

The surface expression of this lithologic type is generally a low-lying, nearly flat, occasionally swampy terrain that has many small, shallow, karst depressions. Cabbage palms are very abundant in areas where this unit is at or very near the surface.

Most peat deposits in Orange County are relatively small. One of the larger deposits adjoins Lake Apopka. Other smaller deposits are scattered throughout the county. The thickness of these deposits in Orange County is 1 foot or more.

Soil suitability for various uses is normally based on evaluations of properties of the soil alone. Interpretations in this soil survey are made to determine what effects these properties will have on use. Many geologic features that are not expressed in the soil can significantly affect the suitability of a site for a particular use. Individual sites should be evaluated by onsite examination and testing. In many cases, special planning, design, and construction techniques can be used to overcome geologic problems if they are identified and evaluated.

Physiography

W.A. White has divided Florida into three geomorphic zones *(9, 43)*. These zones are the northern, or proximal zone; the central, or midpeninsular zone; and the

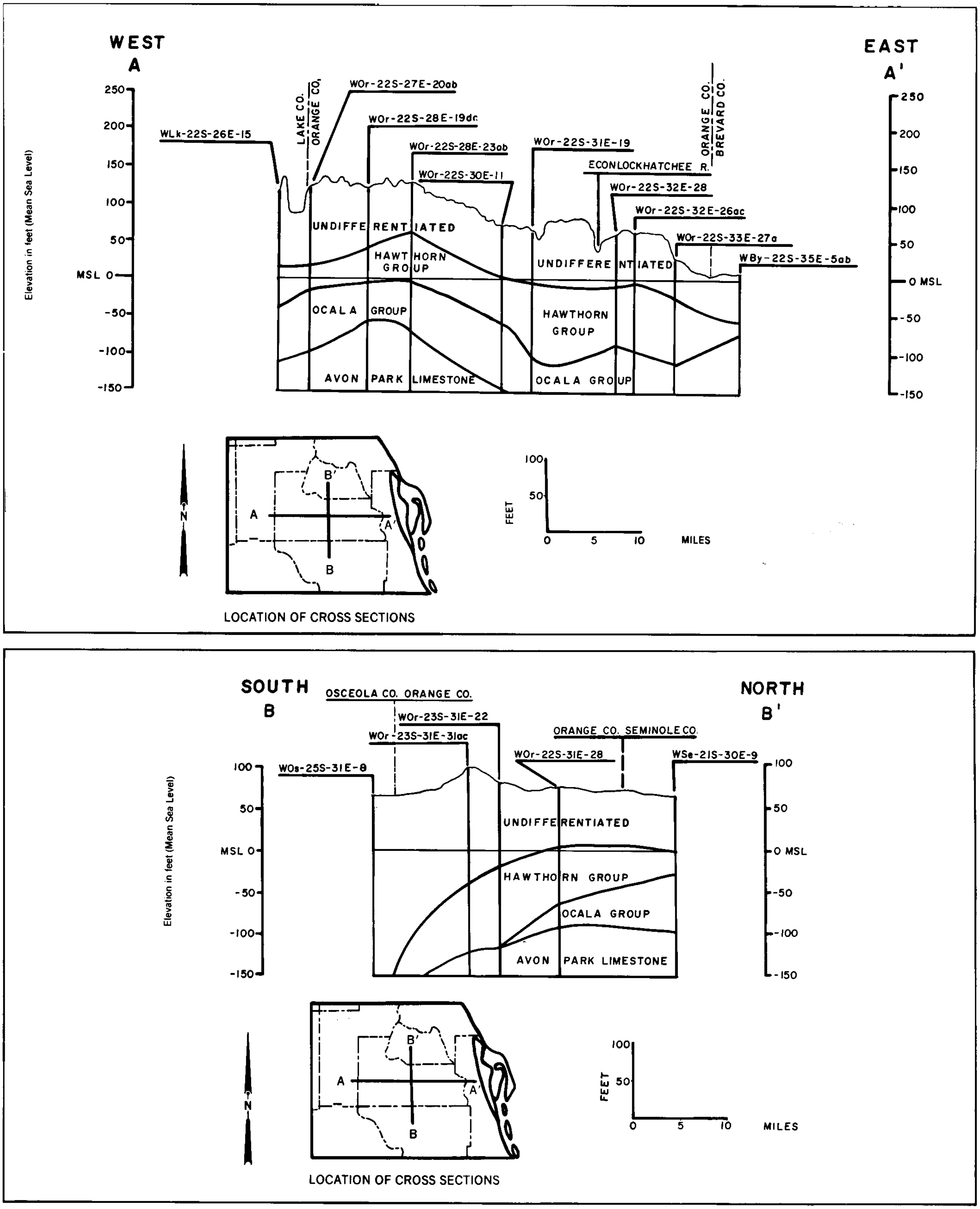


Figure 1.—Geological cross sections A-A' and B-B' in Orange County. Numbers preceded by a "W" are well numbers.

southern, or distal zone. Orange County is in the central, or midpeninsular zone. This zone is characterized as having discontinuous highlands that form subparallel ridges. The ridges roughly parallel the present coastline (fig. 2), as depicted by W.A. White *(43)*, and are separated by broad valleys or plains.

In the eastern part of Orange County, the Eastern Valley forms a broad, level area that is occupied by the St. Johns River flood plain. Some believe that the Eastern Valley represents an ancient lagoon; however, according to White *(43)*, part of the Eastern Valley represents a beach ridge plain, which has been lowered by dissolution of carbonate (shell) deposits.

The Osceola Plain is generally nearly level. There are a few very gently sloping, low ridges; but over large areas, the changes in elevation are so gradual as to be barely perceptible. The Osceola Plain has many intermittent ponds, swamps, and marshes, and a few permanent lakes. Most of the areas are connected by sluggish streams or by wide, shallow sloughs. Those in the eastern part of the plain drain into the Econlockhatchee River or into Tootoosahatchee Creek, James Creek, and Taylor Creek, or into the other tributaries of the St. Johns River, which flows northward along the eastern boundary of the county. The flood plains of these streams are only a few feet below the

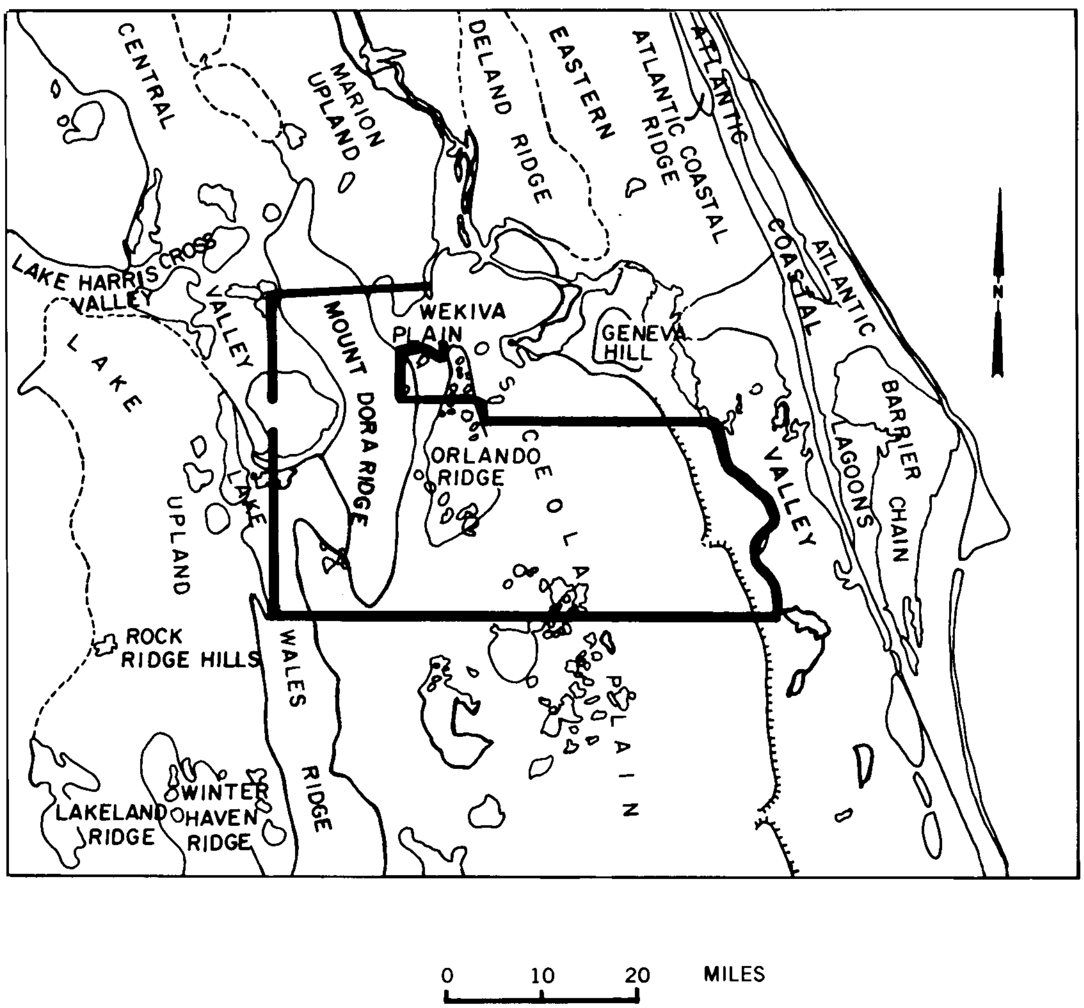


Figure 2.—Physiographic map of Central Florida, Orange County, Florida, and the surrounding area.

adjoining uplands. The south-central part of the plain drains into the canals and other tributaries of the Kissimmee River, which flows southward from the county into Lake Okeechobee.

North and west of the Osceola Plain are the nearly level to rolling Marion Upland, Mount Dora Ridge, Orlando Ridge, and Lake Wales Ridge. Most soils in this part of the county have slopes that are between 0 and 8 percent, but in some areas that are near sinkholes, the soils have slopes of nearly 25 percent.

The ridges may represent erosional remnants of the "Hawthorn Delta." The elevation of the ridge areas ranges from 50 feet to 310 feet *(12)*. These ridges represent a relatively mature karst surface that has a wide range in elevation, has numerous lakes, but has only a few continuous streams. Most of the drainage water seeps into the lakes. Rock Springs and Wekiva Springs, in the northwestern part of the county, form the source of one branch of the Wekiva River, a tributary of the St. Johns River. Lake Apopka, which lies along the western boundary of the county, drains into a branch of the Ocklawaha River, which is also a tributary of the St. Johns River.

The Central Valley lies west of the Mount Dora Ridge. White *(43)* refers to the Central Valley as an elongated lowland that is parallel with the ridges that bound it and the length of the peninsula. He further states that it represents an unprotected soluble area that has been reduced to its present elevation. In Orange County, the Central Valley is occupied by Lake Apopka. Extensive peat deposits are near Lake Apopka.

Ground Water

The ground water of Orange County occurs under two conditions: artesian and nonartesian. Artesian conditions exist wherever the water is confined below an impermeable layer. Under artesian conditions, water will rise above the point at which it is first encountered. Nonartesian conditions exist wherever the water is unconfined; therefore, it is not under pressure.

In Orange County, the nonartesian aquifer is composed mainly of sand and shells with varying amounts of clay. This aquifer provides only limited quantities of water. Wells developed in this aquifer are used mainly to water lawns and livestock and for limited domestic supplies. The quality of water varies greatly, depending on the chemical composition of the aquifer; and the water may be soft or hard, depending on the content of calcium carbonate. Iron content may be high. The pH is variable, which often makes the water corrosive.

Two types of artesian aquifers are in Orange County: secondary artesian aquifers and the Floridan Aquifer. Secondary artesian aquifers are in the undifferentiated sediments and more extensively in the Hawthorn Group. Generally, secondary artesian aquifers yield less water than the Floridan Aquifer but yield more water than the nonartesian aquifers. In Orange County, secondary artesian aquifers provide water that is less mineralized than that of the Floridan Aquifer but provide water that is more mineralized than that of the nonartesian aquifers. The quality of the water varies with depth, location, and local geologic and hydrologic conditions. The secondary artesian aquifers are the least likely to be polluted because the overlying, somewhat impervious beds protect them from surface pollution.

The Floridan Aquifer underlies all of Florida. In Orange County, the Floridan Aquifer includes the Lake City Limestone, the Avon Park Limestone, the Ocala Group, and parts of the Hawthorn Group. The aquifer consists of alternating layers of limestone and dolomite or dolomitic limestone. It is one of the most productive aquifers in the world.

Numerous solution cavities and solution channels are in the Floridan Aquifer. Some of the cavities can be quite large. A well in Orlando intersected a 90 foot cavern. These caverns and cavities are often interconnected and water flows through them.

The major part of the ground water recharge in Orange County comes from annual rainfall. However, some water enters the Floridan Aquifer by underground flow from outside the region. Discharge of ground water from the Floridan Aquifer occurs by spring outflow, seepage into the St. Johns River systems, by outflow to other areas, and by pumping in the area.

The quality of water in the Floridan Aquifer varies greatly throughout the area. Geology is the major factor influencing the water quality, but poor quality water is often introduced into the Floridan Aquifer through drainage wells, which are common in Orange County. Saltwater is in some parts of the St. Johns River Valley because it has not been flushed out of the aquifer since the last encroachment of the sea.

Yields of up to several thousand gallons per minute from the Floridan Aquifer have been measured; however, lower yield figures are more common. The Floridan Aquifer does produce more potable water than the nonartesian or secondary artesian aquifers. Most of the domestic and commercial supplies in the county are drawn from the Floridan Aquifer.

Land Use

Celeste Botha, soil conservationist, Soil Conservation Service, helped to prepare this section.

Rapid changes in land use characterize Orange County. By 1984, about 20 percent of the county, or 123,247 acres, had been converted to urban use, and this trend appears to be increasing. The urbanized area extends outward from Orlando along major transportation arteries. Patches of urbanized land surround other cities and towns, including Apopka, Zellwood, Plymouth, Winter Garden, Ocoee, and Clarcona on the west; Bithlo, Christmas, and the unincorporated area known as Cape Orlando on the east; and around the entertainment complexes south of Orlando. Residential and tourist-related developments are the dominant urban use.

Urbanization is increasing, particularly in the areas west and north of Orlando, resulting in pressure to develop lands that are presently used for citrus. However, extensive areas of citrus remain in general soil map units 1 and 3, described in the section "General Soil Map Units." The remaining agricultural areas are the "mucklands," which are north of Lake Apopka, and the flatwoods, which are in eastern Orange County. The eastern one-third of the county is mostly used as pasture.

Riparian corridors along the St. Johns, Wekiva, and Econlockhatchee Rivers provide valuable habitat for wildlife and recreational opportunities.

Recreation

Celeste Botha, soil conservationist, Soil Conservation Service, helped to prepare this section.

Orange County is one of the most well known and varied recreation and entertainment centers in the Nation. More than 7.5 million visitors are attracted to the area each year.

Activities range from commercial tourist attractions to sports attractions. Major theme parks and many other attractions are located in the county. Several excellent golf courses are in the area.

Water sports facilities are available and plentiful on many of the more than 1,100 lakes in the county. Within Orange County are 13 county parks, 85 city parks, the Wekiwa Springs State Park, the Rock Springs Run State Reserve, the Tosahatchee State Preserve, and several historical parks or attractions. A major league baseball team conducts its spring training here. The Orange County Civic Center hosts many cultural events, and the area is an active participant in the arts.

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; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification *(32)* used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

Map Unit Composition

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

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

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

Use of the Ground-Penetrating Radar

A ground-penetrating radar (GPR) system *(7, 8, 15, 21)* was used to document the type and variability of soils that occur in the detailed soil map units. The GPR system was successfully used on all soils to detect the presence, determine the variability, and measure the depth to major soil horizons or other soil features. About 518 random transects were made with the GPR in Orange County. Information from notes and ground-truth observations made in the field was used along with radar data from this study to classify the soils and to determine the composition of map units. The map units, as described in the section entitled "Detailed Soil Map Units," are based on this data and on data in the previous survey.

Confidence Limits of Soil Survey Information

Confidence limits are statistical expressions of the probability that the composition of a map unit or a property of the soil will vary within prescribed limits. Confidence limits can be assigned numerical values based on a random sample. In the absence of specific data to determine confidence limits, the natural variability of soils and the way soil surveys are made must be considered. The composition of map units and other information is derived largely from extrapolations made from a small sample. The map units contain dissimilar inclusions. Also, information about the soils does not extend below a depth of about 6 feet. The information presented in the soil survey is not meant to be used as a substitute for onsite investigations. Soil survey information can be used to select alternative practices or general designs that may be needed to minimize the possibility of soil-related failures. It cannot be used to interpret specific points on the landscape.

Specific confidence limits for the composition of map units in Orange County were determined by random transects made with the GPR across mapped areas. The data are presented in the description of each soil under "Detailed Soil Map Units" and summarized in table 3. Soil scientists made enough transects and took enough samples to characterize each map unit at a specific confidence level. For example, map unit 34 was characterized at an 80 percent confidence level based on the transect data. The resulting composition would read: In 80 percent of the areas mapped as Pomello fine sand, 0 to 5 percent slopes, Pomello soil and similar soils make up 78 to 94 percent of the delineation. In the remaining 20 percent of the areas of this map unit, the percentage of Pomello soil and similar soils may be higher than 94 percent or lower than 78 percent. Inversely, dissimilar soils make up 6 to 22 percent of most mapped areas.

The composition of miscellaneous areas and urban map units was based on the judgment of the soil scientist and was not determined by a statistical procedure.

Table 3 presents the average composition of the map units and expresses the probability that the average composition will fall within the given range. The map unit is named for the taxon of the dominant soil or soils. The proportion of similar and dissimilar soils is also given. Each soil listed by name in the table is described in the section "Soil Series and Their Morphology."

The percent composition of the map units is given in table 3. Those taxonomic units (soil series) identified on the transects of the selected map units are divided into two categories: named soils and similar soils and dissimilar soils. The soils listed in the named soils and similar soils column are in the same soil management group. The soils listed in the dissimilar soils column are different in use and management from the named and similar soils of the map unit. Each soil listed in the table is described in the section "Soil Series and Their Morphology."

General Soil Map Units

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

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

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

A few of the boundaries on the general soil maps of Orange County do not match those on the general soil maps of adjacent counties, and some of the named soils and descriptions do not fully agree. The differences are the result of improvements in the classification of soils, particularly modification or refinements in soil series concepts. Also, there may be differences in the intensity of mapping or in the extent of the soils within the survey area.

Soils of the Uplands and Low Ridges

This group consists of nearly level to strongly sloping, excessively drained, moderately well drained, and somewhat poorly drained soils. These soils are on the uplands, on low ridges and knolls on the uplands, and on low ridges adjacent to the flatwoods. Most areas have been modified for urban use or for growing citrus crops. These soils are scattered throughout the western half of the county. Four general soil map units are in this group.

1. Candler

Nearly level to strongly sloping, excessively drained soils that are sandy throughout

The soils in this map unit are in broad upland areas and on ridges. Lakes, ponds, and sinkholes are common in some areas. These soils are extensive in the northwest part of Orange County on the Mount Dora Ridge and the Lake Wales Ridge. They extend from the Lake County line to just south of the city of Lake Apopka and south of Johns Lake to the Osecola County line.

The natural vegetation is bluejack oak, live oak, and turkey oak. The understory includes chalky bluestem, lopsided indiangrass, hairy panicum, and pineland threeawn.

This map unit makes up about 9 percent of Orange County. It is about 70 percent Candler soils and 30 percent soils of minor extent.

Typically, Candler soils have a surface layer of very dark grayish brown fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of about 30 inches, is yellowish brown fine sand. The lower part, to a depth of about 74 inches, is brownish yellow fine sand. The subsoil to a depth of about 80 inches is yellow fine sand that has strong brown loamy sand lamellae. The lamellae are about one-sixteenth to a quarter of an inch thick and from 2 to 6 inches long.

Of minor extent in this map unit are Apopka, Lake, Lochloosa, Millhopper, Tavares, and St. Lucie soils.

Most soils in this map unit are used for citrus crops. In some areas, they are used for improved pasture or for homesite and urban development.

2. Candler-Urban land-Tavares

Nearly level to strongly sloping, excessively drained and moderately well drained soils that are sandy throughout; many areas have been modified for urban use

The soils in this map unit are in broad upland areas and on ridges. Lakes, ponds, and sinkholes are common in some areas. These soils are scattered in the western half of Orange County on the Mount Dora Ridge and the Orlando Ridge. Candler soils are nearly level to strongly sloping and are excessively drained. Tavares soils are nearly level to gently sloping and are moderately well drained.

The existing natural vegetation is bluejack oak, live oak, and turkey oak. The understory consists of chalky bluestem, lopsided indiangrass, hairy panicum, pineland threeawn, and annual forbs.

This map unit makes up about 2 percent of Orange County. It is about 32 percent Candler soils, 26 percent Urban land, 19 percent Tavares soils, and 23 percent soils of minor extent.

Typically, Candler soils have a surface layer of very dark grayish brown fine sand about 4 inches thick. The subsurface layer, to a depth of about 67 inches, is very pale brown fine sand. The subsoil to a depth of about 80 inches is very pale brown fine sand that has thin, continuous yellowish brown loamy sand lamellae. The lamellae are about one-sixteenth to a quarter of an inch thick and from 2 to 35 inches long.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Typically, Tavares soils have a surface layer of dark gray fine sand about 6 inches thick. The upper part of the underlying material, to a depth of about 10 inches, is grayish brown fine sand. The middle part, to a depth of about 48 inches, is pale brown fine sand. The lower part to a depth of about 80 inches is very pale brown fine sand that has common dark brown mottles.

Of minor extent in this map unit are Apopka, Lake, Lochloosa, Millhopper, and St. Lucie soils.

Most of the acreage in this map unit is used for houses, large buildings, shopping centers, golf courses, and related urban uses (fig. 3). Part of the cities of Apopka and Orlando have been developed on the soils in this map unit. Natural vegetation thrives only in small areas scattered throughout the map unit. Farming is of little importance because of the extensive urban development. Numerous nurseries produce plants for landscaping.

3. Tavares-Zolfo-Millhopper

Nearly level to gently sloping, moderately well drained and somewhat poorly drained soils; some are sandy throughout and do not have a subsoil; some are sandy throughout and have an organic-stained subsoil; some are sandy to a depth of more than 40 inches and are loamy below

The soils in this map unit are on low ridges and knolls in the upland areas and on the flatwoods, and they are

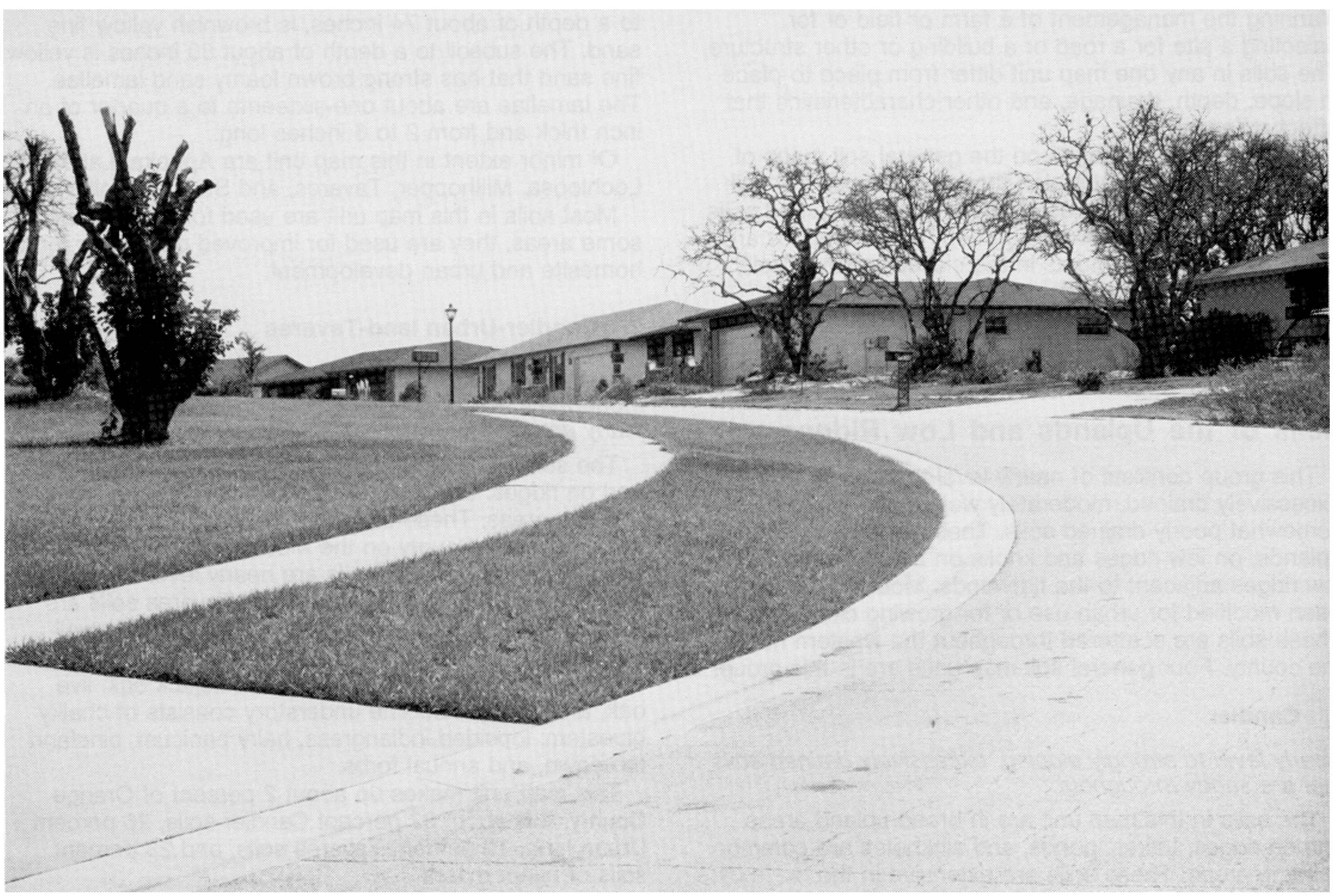


Figure 3.—This housing development is in an area of the Candler-Urban land-Tavares map unit.

in slightly higher areas adjacent to the flatwoods. Scattered sinkholes and numerous lakes and ponds are in this map unit. These soils are extensive in the western half of Orange County on the Mount Dora Ridge, the Orlando Ridge, and Lake Wales Ridge and in scattered areas of the Osceola Plain. Tavares and Millhopper soils are nearly level to gently sloping and are moderately well drained. Tavares soils are on low ridges and knolls in upland areas. Millhopper soils are on low ridges and knolls on the flatwoods. Zolfo soils are nearly level and are somewhat poorly drained. They are in broad, slightly higher areas adjacent to the flatwoods.

The natural vegetation is bluejack oak, turkey oak, live oak, water oak, laurel oak, slash pine, and longleaf pine. The understory includes creeping bluestem, lopsided indiangrass, grassleaf goldaster, and pineland threeawn.

This map unit makes up about 12 percent of Orange County. It is about 37 percent Tavares soils and similar soils, 22 percent Zolfo soils and similar soils, 12 percent Millhopper soils and similar soils, and 29 percent soils of minor extent.

Typically, Tavares soils have a surface layer of very dark gray fine sand about 6 inches thick. The upper part of the underlying material, to a depth of about 16 inches, is brown fine sand. The middle part, to a depth of about 41 inches, is pale brown fine sand. The lower part to a depth of about 80 inches or more is white fine sand. Soils similar to Tavares soils are Archbold and Florahome soils.

Typically, Zolfo soils have a surface layer of dark grayish brown fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of about 23 inches, is grayish brown fine sand. The middle part, to a depth of 38 inches, is light brownish gray fine sand. The lower part, to a depth of about 55 inches, is very pale brown fine sand. The upper part of the subsoil, to a depth of about 71 inches, is brown fine sand. The lower part to a depth of about 80 inches or more is dark brown fine sand. Soils similar to Zolfo soils are Pomello soils that are moderately well drained.

Typically, Millhopper soils have a surface layer of dark grayish brown fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of about 42 inches, is light yellowish brown fine sand. The lower part, to a depth of about 66 inches, is very pale brown fine sand that has yellowish brown mottles. The upper part of the subsoil, to a depth of about 78 inches, is brownish yellow sandy loam. The lower part to a depth of about 80 inches or more is light gray sandy clay loam that has yellowish brown and yellowish red mottles. Soils similar to Millhopper soils are Apopka and Lochloosa soils.

Of minor extent in this map unit are Basinger, Candler, and Smyrna soils.

In most areas, the soils in this map unit are used for citrus crops (fig. 4) or pasture or for homesite and urban development. In some areas, these soils are used for cultivated crops.

4. Urban land-Tavares-Pomello

Nearly level to gently sloping, moderately well drained soils that are sandy throughout; some have an organic-stained subsoil at a depth of 30 to 50 inches; most areas have been modified for urban use

The soils in this map unit are on low ridges and knolls in the upland areas and on the flatwoods. A few short, steep slopes are near scattered sinkholes and numerous lakes, ponds, and wet areas. These soils are in the north-central part of Orange County on the Orlando Ridge. Several small areas of these soils are scattered on the Lake Wales Ridge and Osceola Plain in the western part of Orange County.

The existing natural vegetation is slash pine, bluejack oak, turkey oak, live oak, scattered sand pine, and longleaf pine. The understory includes saw palmetto, creeping bluestem, lopsided indiangrass, grassleaf goldaster, and pineland threeawn.

This map unit makes up about 6 percent of Orange County. It is about 40 percent Urban land, 26 percent Tavares soils and similar soils, 16 percent Pomello soils and similar soils, and 18 percent soils of minor extent.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Typically, Tavares soils have a surface layer of dark gray fine sand about 6 inches thick. The upper part of the underlying material, to a depth of about 10 inches, is grayish brown fine sand. The middle part, to a depth of about 48 inches, is pale brown fine sand. The lower part to a depth of about 80 inches is very pale brown fine sand. Soils similar to Tavares soils are Florahome and Seffner soils.

Typically, Pomello soils have a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 42 inches, is white fine sand. The upper part of the subsoil, to a depth of about 48 inches, is dark reddish brown fine sand. The lower part, to a depth of about 54 inches, is dark brown fine sand. The substratum to a depth of about 80 inches is light gray fine sand. Soils similar to Pomello soils are Zolfo soils.

Of minor extent are Archbold, Basinger, Candler, Lochloosa, Millhopper, and Smyrna soils.

Most of the acreage in this map unit is used for houses, large buildings, shopping centers, golf courses, and related urban uses. Natural vegetation thrives only in a few areas in this map unit. Farming is of little importance because of the extensive urban development. Numerous nurseries produce plants for landscaping. Part of the cities of Orlando, Maitland, and Ocoee have been developed on these soils.

Figure 4.—Oranges are being harvested in an area of the Tavares-Zolfo-Millhopper map unit.

Soils of the Flatwoods, Low Ridges, and Knolls

This group consists of nearly level to gently sloping, poorly drained, moderately well drained, and very poorly drained soils. They are on the flatwoods and on low ridges and knolls on the flatwoods. These soils are scattered throughout the county, but they are most extensive in the eastern half of the county. Four general soil map units are in this group.

5. Smyrna-Pomello-Immokalee

Nearly level to gently sloping, poorly drained and moderately well drained soils that are sandy throughout; some have an organic-stained subsoil at a depth of less than 30 inches; some have an organic-stained subsoil at a depth of 30 to 50 inches

The soils in this map unit are in the broad flatwood areas interspersed with low ridges and knolls. Shallow depressions and poorly defined drainageways are scattered throughout some areas. These soils are scattered throughout the county but are most extensive on the Osceola Plain in an area south and east of Union Park, in an area south of Lake Pickett, and in the area of Christmas extending north to the Seminole County line. Smyrna and Immokalee soils are nearly level and are poorly drained. They are on broad flatwoods. Pomello soils are nearly level to gently sloping and are moderately well drained. They are on low ridges and knolls on the flatwoods.

In areas of Smyrna and Immokalee soils, the natural vegetation is longleaf pine and slash pine. The understory includes saw palmetto, pineland threeawn, inkberry, and running oak. In areas of Pomello soils, the natural vegetation is mostly longleaf pine, sand pine, and slash pine. The understory includes waxmyrtle, saw palmetto, fetterbush, creeping bluestem, chalky bluestem, pineland threeawn, and running oak.

This map unit makes up about 12 percent of Orange County. It is about 42 percent Smyrna soils, 22 percent Pomello soils, 18 percent Immokalee soils, and 18 percent soils of minor extent.

Typically, Smyrna soils have a surface layer of black fine sand about 4 inches thick. The subsurface layer, to a depth of about 17 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 22 inches, is black fine sand. The lower part, to a depth of about 27 inches, is dark brown fine sand. The upper part of the substratum, to a depth of about 53 inches, is pale brown fine sand. The lower part to a depth of about 80 inches is light gray fine sand.

Typically, Pomello soils have a surface layer of gray fine sand about 3 inches thick. The subsurface layer, to depth of about 40 inches, is white fine sand. The upper part of the subsoil, to a depth of about 48 inches, is black fine sand. The lower part, to a depth of about 55 inches, is dark reddish brown fine sand. The substratum to a depth of about 80 inches is pale brown fine sand.

Typically, Immokalee soils have a surface layer of black fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of about 18 inches, is grayish brown fine sand. The lower part, to a depth of about 35 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 41 inches, is black fine sand. The middle part, to a depth of 48 inches, is dark brown fine sand. The lower part, to a depth of about 67 inches, is brown fine sand. The substratum to a depth of about 80 inches is light brownish gray fine sand.

Of minor extent in this map unit are Archbold, Basinger, Ona, Pineda, Pompano, Samsula, Tavares, and Wabasso soils.

In most areas, the soils in this map unit have been left in native vegetation. A few areas are used for cultivated crops, improved pasture, or citrus crops or for homesite and urban development.

6. Smyrna-Basinger-St. Johns

Nearly level, poorly drained and very poorly drained soils that are sandy throughout; some have an organic-stained subsoil at a depth of less than 30 inches

The soils in this map unit are in broad, flatwood areas interspersed with many broad sloughs, depressions, and poorly defined drainageways. These soils are extensive on the Osceola Plain. Smyrna and St. Johns soils are poorly drained. These soils are on the broad flatwoods. Basinger soils are very poorly drained. They are in depressions and sloughs and along the edges of freshwater marshes and swamps.

In areas of Smyrna and St. Johns soils, the natural vegetation is longleaf pine and slash pine. The understory includes waxmyrtle, saw palmetto, pineland threeawn, bluestem, inkberry, and running oak. In areas of Basinger soils, the natural vegetation consists of mixed stands of pondcypress, sweetgum, scattered pond pine, and black tupelo. The understory includes blue maidencane, chalky bluestem, and other water-tolerant grasses and sedges.

This map unit makes up about 31 percent of Orange County. It is 44 percent Smyrna soils, 12 percent Basinger soils, 12 percent St. Johns soils, and 32 percent soils of minor extent.

Typically, Smyrna soils have a surface layer of black fine sand about 4 inches thick. The subsurface layer, to a depth of about 17 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 22 inches, is black fine sand. The lower part, to a depth of about 27 inches, is dark brown fine sand. The upper part of the substratum, to a depth of about 53 inches, is pale brown fine sand. The lower part to a depth of 80 inches is light gray fine sand.

Typically, Basinger soils have a surface layer of black fine sand about 7 inches thick. The subsurface layer, to a depth of 32 inches, is gray fine sand. The subsoil, to a depth of about 47 inches, is dark brown and light brownish gray fine sand. The substratum to a depth of about 80 inches is pale brown fine sand.

Typically, the upper part of the surface layer of St. Johns soils is black fine sand about 7 inches thick. The lower part, to a depth of 12 inches, is very dark gray fine sand. The subsurface layer, to a depth of about 24 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 30 inches, is black fine sand. The middle part, to a depth of about 36 inches, is dark reddish brown fine sand. The lower part, to a depth of about 44 inches, is brown fine sand. The upper part of the substratum, to a depth of about 58 inches, is light gray fine sand. The lower part to a depth of about 80 inches is pale brown fine sand.

Of minor extent in this map unit are Hontoon, Immokalee, Ona, Pomello, Samsula, St. Lucie, Wabasso, and Zolfo soils.

In most areas, the soils in this map unit have been left in native vegetation (fig. 5). Some areas are used for native pasture, and a few areas are used for improved pasture grasses.

7. Urban land-Smyrna-Pomello

Nearly level to gently sloping, poorly drained and moderately well drained soils that are sandy throughout; some have an organic-stained subsoil at a depth of less than 30 inches; some have an organic-stained subsoil at a depth of 30 to 50 inches; most areas have been modified for urban use

The soils in this map unit are in broad, flatwood areas interspersed with low ridges and knolls. Shallow depressions and poorly defined drainageways are scattered throughout some areas. These soils are

Figure 5.—The soils in the Smyrna-Basinger-St. Johns map unit are mainly used as pasture. Smyrna and St. Johns soils are in the broad flatwood areas, and Basinger soils are in the ponded depressions.

scattered throughout the western half of the county on the Osceola Plain. Smyrna soils are nearly level and are poorly drained. They are on the broad flatwoods. Pomello soils are nearly level to gently sloping and are moderately well drained. They are on low ridges and knolls on the flatwoods.

The existing natural vegetation is longleaf pine and slash pine. The understory includes saw palmetto, lopsided indiangrass, creeping bluestem, pineland threeawn, inkberry, and running oak.

This map unit makes up about 7 percent of Orange County. It is about 33 percent Urban land, 28 percent Smyrna soils, 10 percent Pomello soils, and 29 percent soils of minor extent.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Typically, Smyrna soils have a surface layer of black fine sand about 5 inches thick. The subsurface layer, to a depth of about 18 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 22 inches, is black fine sand. The lower part, to a depth of about 28 inches, is dark brown fine sand. The upper part of the substratum, to a depth of about 50 inches, is grayish brown fine sand. The lower part to a depth of about 80 inches is pale brown fine sand.

Typically, Pomello soils have a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 42 inches, is white fine sand. The upper part of the subsoil, to a depth of about 48 inches, is dark reddish brown fine sand. The lower part, to a depth of about 54 inches, is dark brown fine sand.

The substratum to a depth of about 80 inches is light gray fine sand.

Of minor extent in this map unit are Archbold, Basinger, Ona, Pompano, Samsula, Tavares, Wabasso, and Zolfo soils.

Most of the acreage in this map unit is used for houses, large buildings, shopping centers, and related urban uses (fig. 6). Most of the natural vegetation has been removed. Farming is of little importance because of the extensive urban development.

8. Malabar-Felda

Nearly level, poorly drained soils; some are sandy to a depth of more than 40 inches and are loamy below; some are sandy to a depth of 20 to 40 inches and are loamy below

The soils in this map unit are in low, broad to narrow, poorly defined drainageways on the flatwoods that are interspersed with sloughs and broad flats. These soils are dominantly in the eastern part of the county adjacent to the St. Johns River flood plain. Malabar soils are in low, narrow to broad sloughs and poorly defined

Figure 6.—The diversified recreational facilities and an ideal climate have promoted urban development throughout the county. This development is in an area of the Urban land-Smyrna-Pomello map unit.

drainageways on the flatwoods. Felda soils are in low, broad, poorly defined drainageways on the flatwoods.

The natural vegetation is slash pine and cabbage palm. The understory includes saw palmetto, waxmyrtle, pineland threeawn, sand cordgrass, blue maidencane, bluestem, low panicum, and weeds and grasses.

This map unit makes up about 5 percent of Orange County. It is about 74 percent Malabar soils, 10 percent Felda soils, and 16 percent soils of minor extent.

Typically, Malabar soils have a surface layer of black fine sand about 3 inches thick. The subsurface layer, to a depth of about 18 inches, is grayish brown fine sand. The upper part of the subsoil, to a depth of 30 inches, is light yellowish brown fine sand. The middle part, to a depth of about 42 inches, is light gray fine sand. The lower part, to a depth of about 58 inches, is gray fine sandy loam. The substratum to a depth of about 80 inches is gray loamy sand.

Typically, Felda soils have a surface layer of black fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of about 10 inches, is grayish brown fine sand. The lower part, to a depth of about 22 inches, is light brownish gray fine sand. The upper part of the subsoil, to a depth of about 31 inches, is gray sandy loam. The lower part, to a depth of about 53 inches, is gray sandy clay loam. The substratum to a depth of about 80 inches is greenish gray loamy sand.

Of minor extent in this map unit are Floridana, Holopaw, Pineda, and Wabasso soils.

In most areas, the soils in this map unit have been left in natural vegetation. A few areas are used for improved pasture or cultivated crops or for homesite and urban development.

Soils of the Swamps, Sloughs, and Flood Plains

This group consists of nearly level, poorly drained and very poorly drained soils. They are on flood plains and in poorly defined drainageways, freshwater swamps, and depressions. These soils are scattered throughout the county. Three general soil map units are in this group.

9. Samsula-Hontoon-Basinger

Nearly level, very poorly drained soils that are subject to ponding; in some soils, the organic material is 16 to 51 inches thick underlain by sandy material; in some, the organic material is more than 51 inches thick; some are sandy throughout

The soils in this map unit are in freshwater swamps, depressions, sloughs, and broad, poorly defined drainageways on the flatwoods. Lakes and ponds are common in some areas. These soils are scattered throughout the county, but they are most extensive on the Osceola Plain south of the Bee Line Expressway, in the Lake Hart and Lake Mary Jane areas, and adjacent to Lake Apopka, Bay Lake, and Lake Sheen.

The natural vegetation consists of mixed stands of cypress, red maple, sweetgum, and black tupelo. The understory includes cutgrass, maidencane, Jamaica sawgrass, sedges, ferns, and other water-tolerant grasses.

This map unit makes up about 7 percent of Orange County. It is about 45 percent Samsula soils, 26 percent Hontoon soils, 10 percent Basinger soils, and about 19 percent soils of minor extent.

Typically, Samsula soils have a surface layer of black and dark reddish brown muck about 34 inches thick. The next layer, to a depth of about 40 inches, is black fine sand. The underlying material to a depth of about 80 inches is light gray fine sand.

Typically, the upper part of the surface layer of Hontoon soil is black muck about 16 inches thick. The lower part to a depth of 80 inches or more is very dark brown muck.

Typically, Basinger soils have a surface layer of black fine sand about 6 inches thick. The subsurface layer, to a depth of about 25 inches, is gray fine sand. The subsoil, to a depth of about 35 inches, is dark reddish brown and grayish brown fine sand. The substratum to a depth of about 80 inches is light gray fine sand.

Of minor extent in this map unit are Holopaw, Immokalee, Ona, St. Johns, Sanibel, and Smyrna soils.

In most areas, the soils in this map unit have been left in natural vegetation. Some areas have been drained and are used for improved pasture. In other areas, fill material has been added and the areas are used for homesite and urban development.

10. Gator-Terra Ceia

Nearly level, very poorly drained soils that are subject to ponding; in some soils, the organic material is 16 to 51 inches thick underlain by loamy material; in some, the organic material is more than 51 inches thick; some areas are drained by ditches and canals equipped with water control structures

The soils in this map unit are in freshwater swamps and marshes. Large ditches and canals are common in most areas. Water control structures have been installed in these ditches and canals. These soils are north of Lake Apopka in the Central Valley, which is in the western part of Orange County.

The existing natural vegetation is buttonbush, Carolina willow, primrose willow, common cattail, maidencane, Jamaica sawgrass, and other water-tolerant grasses.

This map unit makes up about 2 percent of Orange County. It is about 46 percent Gator soils, 36 percent Terra Ceia soils, and 18 percent soils of minor extent.

Typically, Gator soils have a surface layer of black muck about 28 inches thick. The upper part of the underlying material, to a depth of about 37 inches, is dark olive gray fine sandy loam. The lower part to a depth of 80 inches or more is light gray sandy clay loam that has few to common light gray calcium carbonate accumulations.

Typically, Terra Ceia soils have a surface layer of black muck about 9 inches thick. Below that layer, to a depth of about 74 inches, is dark brown muck. The underlying material to a depth of about 80 inches is light gray sandy clay loam.

Of minor extent in this map unit are Canova, Felda, and Okeelanta soils.

In most areas, the soils in this map unit that have been artificially drained are used for cultivated crops, mainly cabbage, celery, endives (fig. 7), lettuce, and radishes. In other areas, fill material has been added and these areas are used for urban development. In some areas, the soils have been left in native vegetation.

11. Floridana-Felda-Chobee

Nearly level, very poorly drained and poorly drained soils; some are sandy to a depth of 20 to 40 inches and have a loamy subsoil; some are loamy throughout; most areas are subject to frequent flooding

The soils in this map unit are on the flood plains of the St. Johns and Wekiva Rivers and their major tributaries. Many areas are isolated by meandering stream channels. Excess water ponds in low-lying areas for very long periods after heavy rains. Floridana and Chobee soils are very poorly drained, and Felda soils are poorly drained.

The natural vegetation is baldcypress, water oak, Coastal Plain willow, red maple, sweetgum, and scattered cabbage palm. The understory includes buttonbush, maidencane, sawgrass, smartweed, sedges, and other water-tolerant plants.

This map unit makes up about 7 percent of Orange County. It is about 39 percent Floridana soils, 28 percent Felda soils, 16 percent Chobee soils, and 17 percent soils of minor extent.

Figure 7.—The soils in the Gator-Terra Ceia map unit are used mainly for cultivated crops, such as this crop of endives that is being harvested.

Typically, Floridana soils have a surface layer of black fine sand about 14 inches thick. The subsurface layer, to a depth of 28 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 41 inches, is dark gray sandy clay loam. The lower part, to a depth of about 53 inches, is grayish brown sandy clay loam. The substratum to a depth of about 80 inches is light gray loamy fine sand.

Typically, Felda soils have a surface layer of very dark gray fine sand about 3 inches thick. The upper part of the subsurface layer, to a depth of about 10 inches, is dark gray fine sand. The lower part, to a depth of 24 inches, is gray fine sand. The upper part of the subsoil, to a depth of 36 inches, is gray sandy clay loam. The lower part, to a depth of 47 inches, is grayish brown fine sandy loam. The substratum to a depth of about 80 inches is light gray fine sand.

Typically, Chobee soils have a surface layer of black fine sandy loam about 12 inches thick. The upper part of the subsoil, to a depth of about 38 inches, is dark gray sandy clay loam. The lower part, to a depth of about 56 inches, is grayish brown sandy clay loam. The substratum to a depth of about 80 inches is light gray fine sand.

Of minor extent in this map unit are Emeralda, Gator, Holopaw, Pineda, and Pompano soils.

In most areas, the soils in this map unit have been left in natural vegetation. A few areas are used for improved pasture.

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. Table 3 gives the average composition of selected map units as determined by the Ground-Penetrating Radar and other transect methods. The map units in this section are based on this data and on data in the previous survey. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Candler fine sand, 0 to 5 percent slopes, is one of several phases in the Candler series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Candler-Apopka fine sands, 5 to 12 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Samsula-Hontoon-Basinger association, depressional, is an example.

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

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

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. 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, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

A few of the boundaries on the soil maps of Orange County do not match those on the soil maps of adjacent counties, and some of the soil names and descriptions do not fully agree. The differences are the result of improvements in the classification of soils, particularly modification or refinements in soil series concepts. Also, there may be differences in the intensity of mapping or in the extent of the soils within the survey area.

1—Arents, nearly level. Arents consists of material dug from several areas that have different kinds of soil. This fill material is the result of earth moving operations. This soil is used to fill such areas as sloughs, marshes, shallow depressions, swamps, and other low-lying areas above their natural ground levels during land-leveling operations; or it is used as a cover for sanitary landfills. The slopes are smooth to concave and range from 0 to 2 percent.

In many areas, this soil has a surface layer about 30 to 50 inches thick. It is very dark gray, dark gray, dark grayish brown, and yellowish brown fine sand or sand mixed with discontinuous grayish brown and light brownish gray loamy-textured fragments. Fragments and thin discontinuous lenses of a dark color sandy subsoil are also scattered throughout the matrix. Below that layer is undisturbed soil that extends to a depth of 80 inches. The upper part of the undisturbed soil, to a depth of 52 inches, is generally black fine sand. The middle part, to a depth of 72 inches, is light gray or gray fine sand. The lower part is black or very dark brown sand.

Included with this soil in mapping are small areas of soils that are similar to Arents soil except they have slopes of more than 2 percent, which is a result of stockpiling. Also included are areas that are used as sanitary landfills and contain up to 50 percent solid waste materials stratified with layers of soil material. These areas are delineated as "Sanitary landfill" on the soil map. In some areas, the fill material contains fragments of shells, whole shells, and a few rock fragments. The included soils make up less than 10 percent of the map unit.

Most soil properties are variable. A seasonal high water table varies with the amount of fill material and artificial drainage in any mapped area. In most years, a seasonal high water table is at a depth of 24 to 36 inches for 2 to 4 months. It recedes to a depth of about 60 inches or more during extended dry periods. Soil reaction ranges from slightly acid to moderately alkaline. Onsite investigation is recommended for all uses.

The soil in this map unit is used mainly for urban development. In a few areas, it is used for improved pasture. The existing vegetation is slash pine and various scattered weeds. Some small areas have natural vegetation consisting of cabbage palm, saw palmetto, waxmyrtle, Brazilian pepper, greenbrier, and various weeds and grasses. The suitability of the soil in this map unit varies according to the individual site.

Arents has not been assigned to a capability subclass or to a woodland group.

2—Archbold fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on low ridges and knolls on the flatwoods. The slopes are smooth to convex.

In 90 percent of areas mapped as Archbold fine sand, 0 to 5 percent slopes, Archbold soil and similar soils make up 83 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 17 percent of the mapped areas.

Typically, this soil has a surface layer of dark gray fine sand about 2 inches thick. The underlying material to a depth of about 80 inches is white fine sand. In the mapped areas are similar soils, but they have light yellowish brown, pale brown, or brown sand or fine sand in the underlying material.

Dissimilar soils included in mapping are Pomello soils in small areas. Also included are some dissimilar soils that have a subsoil within 30 inches of the surface.

In most years, a seasonal high water table is at a depth of 42 to 60 inches for about 6 months, and it recedes to a depth of 60 to 80 inches for the rest of the year. It is at a depth of 24 to 40 inches for about 1 month to 4 months during wet periods. It recedes to a depth of more than 80 inches during extended dry periods. The permeability is very rapid throughout. The available water capacity is very low. Natural fertility and the organic matter content are very low.

In most areas, this Archbold soil has been left in natural vegetation. In a few areas, it is used for improved pasture or for homesite and urban development. The natural vegetation is scattered slash pine, sand pine, and sand live oak. The understory includes pineland threeawn, pricklypear cactus, saw palmetto, and various weeds and grasses.

In its natural state, this soil is poorly suited to most cultivated crops. It is fairly well suited to citrus crops in areas that are relatively free of freezing temperatures and where intensive management practices are used. Management practices should include the installation of an irrigation system and regular applications of fertilizer and lime. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. It is generally feasible to irrigate crops if water is readily available.

This soil is poorly suited to improved pasture grasses. Intensive management practices are needed to overcome soil limitations, which include droughtiness and low fertility. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are better adapted to this soil than most other grasses. Management practices should include regular applications of fertilizer and lime, proper stocking, and pasture rotation.

The potential of this soil for the production of pine trees is moderately high. Seedling mortality and equipment use are the main concerns in management. Sand pine and slash pine are adapted trees to plant on this soil.

This soil is well suited to dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed.

This soil has severe limitations for septic tank absorption fields and for recreational uses. Water control measures should be used for septic tank absorption fields. When installing a septic tank absorption field on this soil, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The sandy surface layer should be stabilized for recreational uses.

This soil has severe limitations for sewage lagoons, trench sanitary landfills, and shallow excavations. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored.

This Archbold soil is in capability subclass VIs. The woodland ordination symbol for this soil is 3S.

3—Basinger fine sand, depressional. This soil is nearly level and very poorly drained. It is in shallow depressions and sloughs and along the edges of freshwater marshes and swamps. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are concave and range from 0 to 2 percent.

In 90 percent of areas mapped as Basinger fine sand, depressional, Basinger soil and similar soils make up 73 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 27 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 7 inches thick. The subsurface layer, to a depth of 32 inches, is gray fine sand. The subsoil, to a depth of about 47 inches, is dark brown and light brownish gray fine sand. The substratum to a depth of about 80 inches is pale brown fine sand. In the mapped areas are similar soils, but they have a surface layer more than 7 inches thick. In some places are similar soils, but they have a surface layer of muck or mucky fine sand less than 16 inches thick, and some have loamy fine sand in the lower part of the underlying material.

Dissimilar soils included in mapping are Floridana, Samsula, and Smyrna soils in small areas.

Under natural conditions, the water table is above the surface for 6 to 9 months or more each year and is within 12 inches of the surface for the rest of the year. The permeability is rapid throughout. The available water capacity is low in the surface and subsurface layers and in the substratum and it is medium in the subsoil. Natural fertility and the organic matter content are low.

In most areas, this Basinger soil has been left in natural vegetation. In a few areas, it is used for improved pasture, vegetable crops, and citrus crops. In other areas where fill material has been applied, the soil is used for homesite and urban development. The natural vegetation is mixed stands of pondcypress, sweetgum, and scattered pond pine. The understory includes chalky bluestem, blue maidencane, sedges, and other water-tolerant grasses.

Under natural conditions, this soil is not suited to most cultivated crops or pasture because of ponding. In most areas, a drainage system is difficult to establish because suitable drainage outlets are not available. However, this soil is moderately suited to vegetable crops if a water control system is installed to remove excess water rapidly and if soil-improving measures and other management practices, such as crop rotation and seedbed preparation, are used. Seedbed preparation should include the bedding of rows. Soil-improving cover crops and crop residue should be used to protect the soil from wind erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this soil is not suited to citrus trees. It is poorly suited to this use even if intensive management practices are used and if the water control system is adequate.

This soil is fairly suited to improved pasture grasses if intensive management practices and soil-improving measures are used and if a water control system is installed. Pangolagrass and improved bahiagrass grow well if properly managed. Water control measures are needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is low. Slash pine and pond pine are adapted trees to plant on this soil. A water control system should be installed before trees are planted. Equipment use, seedling mortality, and plant competition are the main concerns in management.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. To raise the level of the land surface for septic tank absorption fields, local roads and streets, small commercial buildings, and playground use, fill material should be added. The sidewalls of shallow excavations should be shored. Mounding of the septic tank absorption field may be needed.

This Basinger soil is in capability subclass VIIw. The woodland ordination symbol for this soil is 2W.

4—Candler fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and excessively drained. It is on the uplands. The slopes are nearly smooth to convex.

In 95 percent of areas mapped as Candler fine sand, 0 to 5 percent slopes, Candler soil and similar soils make up 81 to 97 percent of the mapped areas. Dissimilar soils make up 3 to 19 percent of the mapped areas.

Typically, this soil has a surface layer of very dark grayish brown fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of about 30 inches, is yellowish brown fine sand. The lower part, to a depth of about 74 inches, is brownish yellow fine sand. The subsoil to a depth of about 80 inches is yellow fine sand that has strong brown loamy sand lamellae about one-sixteenth to a quarter of an inch thick and 2 to 6 inches long. Similar soils are in the mapped areas, but these soils do not have lamellae. In some places are similar soils, but they have 5 to 10 percent silt and clay in the subsurface layer. Similar soils are also in lower positions on the landscape, but these soils are well drained.

Dissimilar soils included in mapping are Apopka and Millhopper soils in small areas. Also included are some dissimilar soils on the upper side slopes that have a sandy clay loam subsoil within 20 to 40 inches of the surface.

A seasonal high water table is at a depth of more than 80 inches. The permeability is rapid in the surface and subsurface layers, and it is rapid to moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers and low in the subsoil. Natural fertility and the organic matter content are low.

In most areas, this Candler soil is used for citrus crops. In a few areas, it is used for improved pasture or for homesite and urban development. The natural vegetation is scattered slash pine, sand pine, longleaf pine, bluejack oak, Chapman oak, scrub live oak, and turkey oak. The understory includes indiangrass, chalky bluestem, hairy panicum, pineland threeawn, and annual forbs.

The sandy texture and droughtiness of this soil are very severe limitations to use for cultivated crops. Intensive management practices are needed if cultivated crops are to be grown on this soil. Droughtiness and rapid leaching of plant nutrients limit the choice of plants that can be grown and reduce the potential yield of crops. A crop-rotation system is needed to keep close-growing cover crops on the soil at least three-fourths of the time. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Optimum yields can be obtained from only a few crops without an irrigation system. It is generally feasible to irrigate crops if water is readily available.

This soil is suited to citrus trees in areas that are relatively free of freezing temperatures. A ground cover of close-growing plants between the tree rows is needed to protect the soil from blowing. Optimum yields can be obtained in some years without irrigation, but a specially designed irrigation system, which maintains optimum soil moisture, is needed to obtain maximum yields.

This soil is moderately suited to improved pasture grasses. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are well suited to this soil, but yields are reduced by periodic droughtiness. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor. Irrigation improves the quality of pasture and hay.

The potential of this soil for the production of pine trees is moderate. Seedling mortality, equipment use, and plant competition are the main concerns in management. The very low available water capacity adversely affects seedling survival in areas where understory plants are numerous. The sandy surface texture limits the use of equipment. Sand pine, slash pine, and longleaf pine are adapted trees to plant on this soil.

This soil has slight limitations for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed. When installing a septic tank absorption field on this soil, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

This soil has slight limitations for small commercial buildings, and land shaping may be needed in the more sloping areas.

This soil has severe limitations for recreational uses, trench sanitary landfills, sewage lagoons, and shallow excavations. The sandy surface layer should be stabilized for recreational uses, and land shaping may be needed in the more sloping areas. The sealing or lining of a trench sanitary landfill or sewage lagoon with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored. The proximity to a stream or aquifer recharge area should be considered in the placement of a trench sanitary landfill or sewage lagoon to prevent contamination of the water supplies.

This Candler soil is in capability subclass IVs. The woodland ordination symbol for this soil is 8S.

5—Candler fine sand, 5 to 12 percent slopes. This soil is sloping and strongly sloping and excessively drained. It is on the uplands.

In 95 percent of areas mapped as Candler fine sand, 5 to 12 percent slopes, Candler soil and similar soils make up 88 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 12 percent of the mapped areas.

Typically, this soil has a surface layer of dark grayish brown fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of about 25 inches, is pale brown fine sand. The lower part, to a depth of about 61 inches, is yellow fine sand. The subsoil to a depth of about 80 inches is very pale brown fine sand that has strong brown loamy sand lamellae about one-sixteenth of an inch thick and 2 to 4 inches long. In the mapped areas are some similar soils, but these soils have lamellae at a depth of more than 80 inches. In some places are similar soils, but they have 5 to 10 percent silt and clay in the subsurface layer. In some parts of the landscape are some similar soils, but they are well drained.

Dissimilar soils included in mapping are Apopka, Millhopper, and Tavares soils in small areas. Also included are some dissimilar soils on the upper side slopes that have a sandy clay loam subsoil within 20 to 40 inches of the surface.

A seasonal high water table is at a depth of more than 80 inches. The permeability is rapid in the surface and subsurface layers, and it is rapid to moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers, and it is low in the subsoil. Natural fertility and the organic matter content are low.

In most areas, this Candler soil is used for citrus crops. In a few areas, it is used for improved pasture or for homesite and urban development. The natural vegetation is scattered slash pine, sand pine, longleaf pine, bluejack oak, Chapman oak, scrub live oak, and turkey oak. The understory includes indiangrass, chalky bluestem, hairy panicum, pineland threeawn, and annual forbs.

Under natural conditions, this soil is not suited to most cultivated crops because of droughtiness, rapid leaching of plant nutrients, and steepness of slope. This soil is suited to citrus trees in areas that are relatively free of freezing temperatures. A ground cover of close-growing plants between tree rows is needed to protect the soil from blowing. A specially designed and properly managed irrigation system helps to maintain optimum soil moisture and thus ensure maximum yields.

This soil is moderately suited to improved pasture grasses. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are well suited to this soil, but yields are reduced by periodic droughtiness. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor. Irrigation improves the quality of pasture and hay.

The potential of this soil for the production of pine trees is moderate. Seedling mortality, equipment use, and plant competition are the main concerns in management. The very low available water capacity adversely affects seedling survival in areas where understory plants are numerous. The sandy surface texture and slope limit the use of equipment. Sand pine, slash pine, and longleaf pine are adapted trees to plant on this soil.

This soil has moderate limitations for septic tank absorption fields, dwellings without basements, and local roads and streets. Land shaping is needed in the more sloping areas. When installing a septic tank absorption field on this soil, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

This soil has severe limitations for sewage lagoons, trench sanitary landfills, shallow excavations, small commercial buildings, and recreational uses because of slope, seepage, and sandy texture of the soil. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The proximity to a stream or aquifer recharge area should be considered in the placement of a trench sanitary landfill or sewage lagoon to prevent contamination of the water supplies. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses and for small commercial buildings. Land shaping is needed in the more sloping areas.

This Candler soil is in capability subclass VIs. The woodland ordination symbol for this soil is 8S.

6—Candler-Apopka fine sands, 5 to 12 percent slopes. The soils in this map unit are sloping and strongly sloping and excessively drained and well drained. These soils are on the uplands. They occur in a regular repeating pattern. Candler soil is sloping and excessively drained. It is on summits and lower side slopes. Apopka soil is strongly sloping and well drained. It is on the upper side slopes.

In 95 percent of the areas of this map unit, Candler-Apopka fine sands, 5 to 12 percent slopes, and similar soils make up 92 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 8 percent of the mapped areas. Generally, the mapped areas consist of about 66 percent Candler soil and similar soils and 31 percent Apopka soil and similar soils. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication. The proportions and patterns of Candler, Apopka, and similar soils, however, are relatively consistent in most delineations of the map unit.

Typically, the surface layer of Candler soil is very dark grayish brown fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of about 38 inches, is yellowish brown fine sand. The lower part, to a depth of about 69 inches, is pale brown fine sand. The subsoil to a depth of about 80 inches is light gray fine sand that has thin, discontinuous strong brown loamy sand lamellae. The lamellae are about one thirty-second to one-sixteenth of an inch thick and are 2 to 39 inches long. In the mapped areas are some similar soils, but they do not have lamellae. Also, in some places are similar soils, but they have 5 to 10 percent silt and clay in the subsurface layer. In some of the lower parts of the landscape are similar soils, but they are well drained.

Typically, the surface layer of Apopka soil is dark grayish brown fine sand about 5 inches thick. The subsurface layer, to a depth of about 69 inches, is very pale brown fine sand. The subsoil to a depth of about 80 inches is reddish yellow sandy clay loam. In some of the lower parts of the landscape are similar soils, but they are moderately well drained. In the mapped areas are some similar soils, but they have a subsoil within 40 inches of the surface, and in some places are similar soils, but they have 5 to 10 percent silt and clay in the subsurface layer.

Dissimilar soils included in mapping are Lochloosa and Tavares soils in small areas.

A seasonal high water table is at a depth of more than 72 inches in Apopka soil and at a depth of more than 80 inches in Candler soil. The permeability of Candler soil is rapid in the surface and subsurface layers, and it is rapid to moderately rapid in the subsoil. The permeability of Apopka soil is rapid in the surface and subsurface layers, and it is moderate in the subsoil. The available water capacity of Candler soil is very low in the surface and subsurface layers, and it is low in the subsoil. The available water capacity of Apopka soil is very low in the surface and subsurface layers, and it is medium to high in the subsoil. Natural fertility and the organic matter content are low in Candler and Apopka soils.

In most areas, the soils in this map unit are used for citrus crops. In a few areas, they are used for improved pasture or for homesite and urban development. The natural vegetation is scattered sand pine, slash pine, longleaf pine, bluejack oak, Chapman oak, live oak, and turkey oak. In addition, scattered loblolly pine is on Apopka soil. The understory includes grassleaf goldaster, eastern bracken, lopsided indiangrass, dwarf huckleberry, creeping bluestem, pineland threeawn, and various weeds and grasses.

The soils in this map unit are generally not suited to most cultivated crops because of droughtiness, rapid leaching of plant nutrients, and steep slopes. These soils are suited to citrus trees in areas that are relatively free of freezing temperatures. A ground cover of close-growing plants between tree rows is needed to protect the soil from blowing. A specially designed and properly managed irrigation system helps to maintain optimum soil moisture and thus ensure maximum yields. Frequent applications of fertilizer and lime are needed.

The soils in this map unit are moderately suited to improved pasture grasses. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are well suited to these soils, but yields are reduced by periodic droughtiness. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor. Irrigation improves the quality of pasture and hay.

The potential of these soils for the production of pine trees is moderate. Seedling mortality, equipment use, and plant competition are the main concerns in management. The very low available water capacity adversely affects seedling survival in areas where understory plants are numerous. The sandy surface texture and slope limit the use of equipment. Sand pine, slash pine, and longleaf pine are adapted trees to plant on Candler soil. Slash pine and loblolly pine are adapted trees to plant on Apopka soil.

The soils in this map unit have moderate limitations for septic tank absorption fields, dwellings without basements, and local roads and streets because of slope. When installing a septic tank absorption field on these soils, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. Land shaping may be needed in the more sloping areas.

These soils have severe limitations for sewage lagoons, trench sanitary landfills, shallow excavations, small commercial buildings, and recreational uses because of slope, seepage, and sandy texture. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The proximity to a stream or aquifer recharge area should be considered in the placement of a trench sanitary landfill or sewage lagoon to prevent contamination of the water supplies. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses and small commercial buildings. Land shaping is needed in the more sloping areas.

Candler soil is in capability subclass VIs. The woodland ordination symbol for Candler soil is 8S. Apopka soil is in capability subclass IVs. The woodland ordination symbol for Apopka soil is 10S.

7—Candler-Urban land complex, 0 to 5 percent slopes. This complex consists of Candler soil that is nearly level to gently sloping and excessively drained and of areas of Urban land. This complex is in the upland areas.

This map unit consists of about 53 percent Candler soil and about 40 percent Urban land. The included soils make up about 7 percent of the map unit. The proportions and the patterns of Candler soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Candler soil is very dark grayish brown fine sand about 4 inches thick. The subsurface layer, to a depth of about 67 inches, is very pale brown fine sand. The subsoil to a depth of about 80 inches is very pale brown fine sand that has thin, discontinuous yellowish brown loamy sand lamellae. The lamellae are about one-sixteenth to a quarter of an inch thick and from 2 to 35 inches long.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Millhopper and Tavares soils. Also included are some soils that are similar to Candler soil but do not have lamellae within 80 inches, have a subsurface layer that is 5 to 10 percent silt and clay, and are well drained in some of the lower parts of the landscape.

A seasonal high water table is at a depth of more than 80 inches. The permeability of Candler soil is rapid in the surface and subsurface layers, and it is rapid to moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers and is low in the subsoil. Natural fertility and the organic matter content are low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Candler soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit have slight limitations for septic tank absorption fields and for dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed. When a septic tank absorption field is installed on these soils, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

The soils in this map unit have slight limitations for small commercial buildings. Land shaping may be needed in the more sloping areas.

These soils have severe limitations for recreational uses, sewage lagoons, trench sanitary landfills, and shallow excavations. The sandy surface layer should be stabilized for recreational uses, and land shaping may be needed in the more sloping areas. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. The soils need to be mulched, irrigated, and fertilized and limed to establish and maintain lawn grasses and other landscape vegetation. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The proximity to a stream or aquifer recharge area should be considered in the placement of a trench sanitary landfill or sewage lagoon to prevent contamination of the water supplies. The sidewalls of shallow excavations should be shored.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

8—Candler-Urban land complex, 5 to 12 percent slopes. This complex consists of Candler soil that is sloping and strongly sloping and excessively drained and of areas of Urban land. This complex is in the upland areas.

This map unit consists of about 53 percent Candler soil and about 40 percent Urban land. The included soils make up about 7 percent of the map unit. The proportions and the patterns of Candler soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Candler soil is light gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 52 inches, is yellow and very pale brown fine sand. The subsoil to a depth of about 80 inches is very pale brown fine sand that has thin, discontinuous yellowish brown loamy sand lamellae. The lamellae are about one-sixteenth to a quarter of an inch thick and from 2 to 35 inches long.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Apopka, Millhopper, and Tavares soils. Also included are some soils that are similar to Candler soil but do not have lamellae within 80 inches, have a subsurface layer that is 5 to 10 percent silt and clay, and are well drained in some of the lower parts of the landscape.

A seasonal high water table is at a depth of more than 80 inches. The permeability of Candler soil is rapid in the surface and subsurface layers and is rapid to moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers and is low in the subsoil. Natural fertility and the organic matter content are low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Candler soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, and other similar uses.

The soils in this map unit have moderate limitations for septic tank absorption fields and for dwellings without basements and local roads and streets because of slope. When a septic tank absorption field is installed on these soils, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. Land shaping is needed in the more sloping areas.

The soils in this map unit have severe limitations for sewage lagoons, trench sanitary landfills, shallow excavations, small commercial buildings, and recreational uses because of slope, seepage, and sandy texture of the soils. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The proximity to a stream or aquifer recharge area should be considered in the placement of a trench sanitary landfill or sewage lagoon to prevent contamination of the water supplies. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses and for small commercial buildings. Land shaping is needed in the more sloping areas. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. The soils need to be mulched, irrigated, and fertilized and limed to establish and maintain lawn grasses and other landscape vegetation.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

9—Canova muck. This soil is nearly level and very poorly drained. It is in freshwater swamps and marshes that are mainly north of Lake Apopka. Large ditches and canals equipped with water control structures dissect the map unit in most places. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are smooth to concave and range from 0 to 1 percent.

In 80 percent of areas mapped as Canova muck, Canova soil and similar soils make up 75 to 96 percent of the mapped areas. Dissimilar soils make up 4 to 25 percent of the mapped areas.

Typically, this soil has an organic layer of black muck about 6 inches thick. The surface layer, to a depth of about 9 inches, is very dark gray fine sand. The subsurface layer, to a depth of 16 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 22 inches, is dark gray sandy clay loam that has about 16 percent tongues of dark gray fine sand 2 to 4 inches long and 1/2 inch to 2 inches wide that extend from the subsurface layer. The lower part, to a depth of about 37 inches, is gray sandy clay loam that has brownish yellow mottles. The substratum to a depth of 80 inches or more is light gray sandy clay loam that has many light gray, soft, calcium carbonate accumulations. In the mapped areas are some similar soils, but they have a surface layer of mucky fine sand. Also, in some areas are similar soils, but they have a subsoil at a depth of more than 20 inches. In places are similar soils, but they have a substratum of fine sand and sandy loam, or both. In a few places are other similar soils, but these soils have a substratum that has a thin, discontinuous layer of limestone at a depth of more than 60 inches.

Dissimilar soils included in mapping are Gator and Okeelanta soils in small areas.

Under natural conditions, the water table is above the surface for 6 to 9 months or more each year. In most areas, the soil in this map unit is artificially drained by tile drains and surface ditches. In drained areas, the water table is controlled at a depth of 10 to 36 inches, or according to the need of the crop. The water table is at or above the surface for short periods after heavy rains. If drained, the organic material, when dry, subsides to about half the original thickness. It subsides further as a result of compaction and oxidation. The loss of the organic material is more rapid during the first 2 years after the soil has been artificially drained. If the soil is intensively cultivated, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss of the organic material. The permeability is rapid in the surface and subsurface layers, and it is moderate to moderately rapid in the subsoil and substratum. The available water capacity is medium to high in the surface layer, very low in the sandy subsurface layer, and medium in the subsoil and substratum. Natural fertility is medium. The organic matter content is high.

In most areas, this Canova soil is used mainly for cultivated crops, such as lettuce, endive, celery, cabbage, and radishes. In a few areas, it is used for improved pasture. The natural vegetation is scattered pondcypress, blackgum, red maple, buttonbush, cattail, blue maidencane, and Jamaica sawgrass. The natural areas provide cover for deer and excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops. However, this soil is suited to most cultivated crops if a water control system is installed and maintained and intensive management practices and soil-improving measures are used. A specially designed water control system is needed to remove excess water rapidly when crops are on the soil and to maintain the water table near the surface to reduce the subsidence of organic material and obtain optimum crop and pasture yields. Proper management practices include seedbed preparation and crop rotation. Soil-improving crops and crop residue should be used to protect the soil from wind erosion and to maintain the content of organic matter. Fertilizer and lime should be applied according to the need of the crop.

In its natural state, this soil is not suited to citrus trees. However, it is fairly suited to citrus trees if intensive management practices and soil-improving measures are used, including incorporating the organic material and the sandy mineral material or removing and backfilling with a suitable soil material. A water control system is needed to remove excess water rapidly and maintain good drainage to a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of fertilizer are needed.

In its natural state, this soil is not suited to improved pasture grasses. However, if a water control system is installed to remove excess surface water after heavy rains, suitability is good. Improved pangolagrass, bahiagrass, and white clover grow well if properly managed. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is high in areas that have adequate surface drainage. A water control system should be installed before trees are planted. Equipment use and seedling mortality are the main concerns in management. Bedding of rows helps to minimize the excessive wetness limitation. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures should be used to minimize the wetness limitation. Organic material should be removed and backfilled with a soil material suitable for urban use. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored, and water control measures should be used. Mounding of the septic tank absorption field may be needed.

This Canova soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 2W.

10—Chobee fine sandy loam, frequently flooded. This soil is nearly level and very poorly drained. It is on the flood plains of the St. Johns River and its major tributaries. This soil is flooded for very long periods following prolonged, intense rains. The slopes are smooth to concave. They are dominantly less than 1 percent but range to 2 percent.

In 90 percent of areas mapped as Chobee fine sandy loam, frequently flooded, Chobee soil and similar soils make up 86 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 14 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sandy loam about 7 inches thick. The upper part of the subsoil, to a depth of about 17 inches, is very dark gray sandy clay loam. The lower part, to a depth of about 50 inches, is dark gray sandy clay loam. The substratum to a depth of 80 inches or more is gray and light gray loamy fine sand. In the mapped areas are similar soils, but they have a surface layer of mucky fine sand. In some places are similar soils, but they have a subsoil at a depth of more than 20 inches.

Dissimilar soils included in mapping are Gator soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for more than 6 months. Flooding occurs frequently during rainy periods. The duration and extent of flooding are variable and are related directly to the intensity and frequency of the rains. Flooding normally lasts from 1 month to 4 months. The permeability is moderately rapid in the surface layer and substratum, and it is slow to very slow in the subsoil. The available water capacity is medium in the surface layer, high in the subsoil, and low in the substratum. Natural fertility and the content of organic matter are medium.

In most areas, this Chobee soil has been left in natural vegetation. In a few areas, it is used for improved pasture. The natural vegetation is baldcypress, Coastal Plain willow, red maple, and sweetgum. The understory includes buttonbush, maidencane, sawgrass, smartweed, sedges, and other water-tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops and citrus crops because it is subject to frequent flooding and is very poorly drained. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, this soil is fairly suited to many vegetable crops. Proper management practices include seedbed preparation and crop rotation. Seedbed preparation should include the bedding of rows. Soil-improving cover crops and crop residue should be used to protect the soil from wind erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this soil is poorly suited to improved pasture grasses. However, if a water control system is installed to remove excess surface water after heavy rains, suitability is good. Pangolagrass and improved bahiagrass grow well if properly managed. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is high. A water control system is needed to remove excess surface water for the production potential to be realized. Equipment use and seedling mortality are the main concerns in management. Slash pine is an adapted tree to plant on this soil. In addition, this soil is suited to baldcypress and hardwoods. Harvesting and planting operations should be scheduled during dry periods.

This soil is well suited to habitat for wetland and woodland wildlife. Shallow water areas are easily developed, and the vegetation provides abundant food and shelter for wildlife, which add to the recreational use of these soils.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses because of flooding and wetness. Major flood control structures and extensive local drainage systems are needed to control flooding. The limitations of this soil for septic tank absorption fields are severe. The installing of a water control system, adding fill material, and mounding the septic tank absorption field can help to minimize the excessive wetness limitation. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. Fill material is needed for local roads and streets, small commercial buildings, and playgrounds.

This Chobee soil is in capability subclass Vw. The woodland ordination symbol for this soil is 6W.

11—Floridana and Chobee soils, frequently flooded. The soils in this map unit are nearly level and very poorly drained. These soils are on the flood plains of the St. Johns River and its major tributaries. They do not occur in a regular repeating pattern. These soils are flooded for very long periods following heavy, intense rains. Many areas are isolated by meandering stream channels. Excess water ponds in low-lying areas for very long periods after heavy rains. The slopes are smooth to concave and range from 0 to 2 percent.

In 95 percent of the areas of this map unit, Floridana and Chobee soils, frequently flooded, and similar soils make up 86 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 14 percent of the mapped areas. Generally, the mapped areas consist of about 74 percent Floridana soil and similar soils and about 24 percent Chobee soil. Some areas are made up of Floridana soil and similar soils, some are Chobee soil, and some are Floridana and Chobee soils. Each of the soils need not be present in every mapped area. The relative proportion of combinations of the soils varies. The individual soils are generally large enough areas to be mapped separately, but in considering the present and predicted use, they were mapped as one unit.

Typically, the surface layer of Floridana soil is black fine sand about 14 inches thick. The subsurface layer, to a depth of 28 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 41 inches, is dark gray sandy clay loam that has pale brown mottles. The lower part, to a depth of 53 inches, is grayish brown sandy clay loam that has light gray mottles. The substratum to a depth of 80 inches is light gray loamy fine sand that has grayish brown mottles. In the mapped areas are similar soils, but they have a surface layer of mucky fine sand. In other places are similar soils, but they have a subsoil at a depth of more than 40 inches. In a few places are similar soils, but these soils are slightly saline.

Typically, the surface layer of Chobee soil is black fine sandy loam about 12 inches thick. The upper part of the subsoil, to a depth of about 38 inches, is dark gray sandy clay loam that has light gray mottles. The lower part, to a depth of 56 inches, is grayish brown sandy clay loam that has dark brown and light gray mottles. The substratum to a depth of about 80 inches is light gray fine sand. In a few places in the mapped areas are similar soils, but they are slightly saline.

Dissimilar soils included in mapping are Gator soils in small areas.

A seasonal high water table is within 10 inches of the surface for more than 6 months in most years. Flooding occurs frequently during rainy periods. The duration and extent of flooding are variable and are related directly to the intensity and frequency of rainfall. Flooding normally lasts from 1 month to 4 months. The permeability of Floridana soil is rapid in the surface and subsurface layers, slow in the subsoil, and moderate in the substratum. The permeability of Chobee soil is moderately rapid in the surface layer and in the substratum and slow or very slow in the subsoil. The available water capacity of Floridana soil is medium in the surface layer and in the subsoil and low in the substratum. The available water capacity of Chobee soil is medium in the surface layer, high in the subsoil, and low in the substratum. Natural fertility and organic matter content of Floridana and Chobee soils are medium.

In most areas, the soils in this map unit have been left in natural vegetation. In a few areas, these soils have been drained and are used for improved pasture. The natural vegetation is baldcypress, scattered cabbage palm, laurel oak, water oak, blackgum, Coastal Plain willow, red maple, and sweetgum. The understory includes buttonbush, maidencane, sawgrass, smartweed, sedges, and other water-tolerant grasses.

Under natural conditions, the soils in this map unit are not suited to cultivated crops and citrus crops because they are subject to frequent flooding and are very poorly drained. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, these soils are fairly suited to many vegetable crops. Proper management practices include seedbed preparation and crop rotation. Seedbed preparation should include the bedding of rows. Soil-improving cover crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

In their natural state, the soils in this map unit are poorly suited to improved pasture. If an adequate water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass and improved bahiagrass grow well if properly managed. Regular applications of fertilizer and lime are needed. Controlled grazing is necessary.

The potential of these soils for the production of pine trees is moderately high or high. Equipment use, plant competition, and seedling mortality are the main concerns in management. A water control system is needed to remove excess surface water for the production potential to be realized. Slash pine is an adapted tree to plant on these soils. In addition, baldcypress and hardwoods are also suitable trees to plant. Harvesting and planting operations should be scheduled during dry periods.

The soils in this map unit have severe limitations for sanitary facilities, building site development, and recreational uses because of flooding and wetness.

Major flood control structures and extensive local drainage systems are needed to control flooding. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage in areas of Floridana soil. Also, the sidewalls of shallow excavations should be shored on Floridana soil. The installing of a water control system, adding fill material, and mounding the septic tank absorption fields can help minimize the excessive wetness limitation. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. Fill material is needed for local roads and streets, small commercial buildings, and playgrounds.

Floridana and Chobee soils are in capability subclass Vw. The woodland ordination symbol for these soils is 6W.

12—Emeralda and Holopaw fine sands, frequently flooded. The soils in this map unit are nearly level and poorly drained. These soils are on the flood plains of the Wekiva River and its major tributaries. They do not occur in a regular repeating pattern. These soils are flooded for very long periods following prolonged, heavy, intense rains. Excess water ponds in low-lying areas for very long periods after heavy rains. The slopes are smooth to concave and range from 0 to 2 percent.

In 90 percent of the areas of this map unit, Emeralda and Holopaw fine sands, frequently flooded, and similar soils make up 76 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 24 percent of the mapped areas. Generally, the mapped areas consist of about 54 percent Emeralda soil and similar soils and about 35 percent Holopaw soil and similar soils. Some areas are made up of Emeralda and Holopaw soils. Each of the soils need not be present in every mapped area. The relative proportion of combinations of the soils varies. The individual soils are generally large enough areas to be mapped separately, but in considering the present and predicted use, they were mapped as one unit.

Typically, the surface layer of Emeralda soil is black fine sand about 7 inches thick. The subsurface layer, to a depth of about 12 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 25 inches, is gray sandy clay that has brown mottles. The lower part, to a depth of about 42 inches, is light gray sandy clay that has brown mottles. The substratum to a depth of 80 inches is light gray sandy clay that has yellowish brown mottles and about 15 percent white calcium carbonate concretions. In the mapped areas are similar soils, but they have a surface layer of fine sandy loam 2 to 4 inches thick. In places are similar soils, but these soils have a sandy clay loam or sandy loam subsoil.

Typically, the surface layer of Holopaw soil is black fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of about 25 inches, is grayish brown fine sand. The lower part, to a depth of about 51 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 65 inches, is dark gray sandy clay loam that has dark brown mottles. The lower part, to a depth of about 71 inches, is gray sandy loam that has dark grayish brown mottles. The substratum to a depth of 80 inches is light gray loamy sand that has dark yellowish brown mottles. In the mapped areas are similar soils, but they have a subsoil within 40 inches of the surface. In some places are other similar soils, but they have a thick, dark surface layer that has a high content of organic matter.

Dissimilar soils included in mapping are Gator and Pompano soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 6 to 9 months in Emeralda soil and for 2 to 6 months in Holopaw soil. The permeability of Emeralda soil is rapid in the surface and subsurface layers and slow in the subsoil and substratum. The permeability of Holopaw soil is rapid in the surface and subsurface layers and in the substratum and moderate in the subsoil. The available water capacity of Emeralda soil is medium in the surface layer, low in the subsurface layer, and medium to high in the subsoil and substratum. The available water capacity of Holopaw soil is very low in the surface and subsurface layers, moderate in the subsoil, and low in the substratum. Natural fertility and organic matter content are low in Emeralda and Holopaw soils.

In most areas, the soils in this map unit have been left in natural vegetation. In a few areas, these soils are used for improved pasture. The natural vegetation is baldcypress, red maple, laurel oak, water oak, sweetgum, cabbage palm, and Coastal Plain willow. The understory includes sand cordgrass, cutgrass, inkberry, cinnamon fern, beaked panicum, waxmyrtle, and other water-tolerant grasses.

Under natural conditions, the soils in this map unit are not suited to cultivated crops, citrus crops, or improved pasture. However, if a water control system is installed to reduce the hazard of flooding, these soils are fairly suited to some vegetable crops and improved pasture. The water control system should remove excess water rapidly and provide subsurface irrigation during the growing season. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer and lime should be applied according to the need of the crop. Improved bahiagrass grows well if properly managed. Management practices should include controlled grazing.

The potential of these soils for the production of pine trees is high. Equipment use and seedling mortality are the main concerns in management. Water control measures are necessary to remove excess surface water and reduce the hazard of flooding. Bedding of rows helps to minimize the wetness limitation. Slash pine is an adapted tree to plant on these soils. In addition, baldcypress and hardwoods are also suitable trees to plant. Harvesting and planting operations should be scheduled during dry periods.

The soils in this map unit have severe limitations for building site development, sanitary facilities, and recreational uses because of flooding and wetness. Major flood control structures and extensive local drainage systems are needed to control flooding. Fill material is needed for local roads and streets, small commercial buildings, septic tank absorption fields, and playgrounds. The sidewalls of shallow excavations should be shored. The mounding of septic tank absorption fields may be necessary to minimize the wetness limitation.

Emeralda and Holopaw soils are in capability subclass VIw. The woodland ordination symbol for Emeralda soil is 11W, and for Holopaw soil it is 10W.

13—Felda fine sand. This soil is nearly level and poorly drained. It is in low, broad, poorly defined drainageways on the flatwoods. The water table is above the surface for brief periods in low-lying areas after a heavy rain. The slopes are smooth to concave and range from 0 to 2 percent.

In 95 percent of areas mapped as Felda fine sand, Felda soil and similar soils make up 90 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 10 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of about 10 inches, is grayish brown fine sand. The lower part, to a depth of about 22 inches, is light brownish gray fine sand. The upper part of the subsoil, to a depth of about 31 inches, is gray sandy loam that has brownish yellow mottles. The lower part, to a depth of about 53 inches, is gray sandy clay loam that has yellowish brown mottles. The substratum to a depth of about 80 inches is greenish gray loamy sand. In the mapped areas are similar soils, but they have a subsoil within 20 inches of the surface.

Dissimilar soils included in mapping are Holopaw soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 2 to 6 months. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderate to moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers, low to moderate in the subsoil, and low in the substratum. Natural fertility and the organic matter content are low.

In most areas, this Felda soil has been left in natural vegetation. In a few areas, it is used for improved pasture or for homesite and urban development. The natural vegetation is cabbage palm, scattered slash pine, waxmyrtle, and laurel oak. The understory includes scattered saw palmetto, pineland threeawn, bluestem, sand cordgrass, blue maidencane, low panicum, and various weeds and grasses.

Under natural conditions, this soil is poorly suited to cultivated crops. However, it is fairly suited to vegetable crops if a water control system is installed to remove excess water rapidly and to provide for subsurface irrigation. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer should be applied according to the need of the crop.

The suitability of this soil for citrus trees is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds provides good surface drainage. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of fertilizer are needed.

Under natural conditions, this soil is fairly suited to improved pasture grasses because of wetness. However, the suitability is good if a water control system is installed to remove excess surface water after heavy rains. Improved bahiagrass and clover grow well if properly managed. Management practices should include controlled grazing and regular applications of fertilizer.

The potential of this soil for the production of pine trees is moderately high. A water control system is needed to remove excess surface water. Equipment use and seedling mortality are the main concerns in management. Slash pine is an adapted tree to plant.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation in undrained areas. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Mounding of the septic tank absorption field can help to minimize excessive wetness. The sidewalls of shallow excavations should be shored, and water control measures should be used. The sandy surface layer should be stabilized for recreational uses.

This Felda soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

14—Felda fine sand, occasionally flooded. This soil is nearly level and poorly drained. It is on the flood plain of the Wekiva River and its major tributaries. This soil is flooded for brief periods following prolonged, intense rains. The slopes are nearly smooth to slightly concave and range from 0 to 2 percent.

In 80 percent of areas mapped as Felda fine sand, occasionally flooded, Felda soil and similar soils make up 79 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 21 percent of the mapped areas.

Typically, this soil has a surface layer of very dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 22 inches, is light brownish gray fine sand. The upper part of the subsoil, to a depth of about 30 inches, is gray sandy clay loam that has common dark brown mottles. The lower part, to a depth of about 42 inches, is light gray sandy loam that has dark yellowish brown mottles. The substratum to a depth of about 80 inches is gray fine sand. In the mapped areas are some small areas of Holopaw soils that are similar to Felda soil. In some places are similar soils, but they have a subsoil within 20 inches of the surface, and in some areas are similar soils, but these soils have a brownish yellow or yellowish brown fine sand subsoil.

Dissimilar soils included in mapping are Wabasso soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 2 to 6 months. Flooding is infrequent under normal weather conditions. Duration of flooding is about 2 to 7 days. The duration and extent of flooding is directly related to the intensity and frequency of the rains. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderate to moderately rapid in the subsoil. The available water capacity is very low in the surface and subsurface layers and in the substratum, and it is medium in the subsoil. Natural fertility and the organic matter content are low.

In most areas, this Felda soil has been left in natural vegetation. In a few areas, it is used for improved pasture. The natural vegetation is laurel oak, red maple, cabbage palm, slash pine, and sweetgum. The understory includes scattered saw palmetto, pineland threeawn, maidencane, and waxmyrtle.

Under natural conditions, this soil is poorly suited to cultivated crops because of flooding and wetness. However, if a water control system is installed to reduce the hazard of flooding, this soil is fairly suited to most vegetable crops. The water control system is also needed to remove excess water rapidly and to provide for subsurface irrigation when crops are on the soil. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer should be applied according to the need of the crop.

Under natural conditions, this soil is not suited to citrus crops because of flooding and wetness. It is poorly suited to citrus crops if a water control system is installed to reduce the hazard of flooding. Planting the trees on beds provides good surface drainage. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of fertilizer are needed.

Under natural conditions, this soil is poorly suited to improved pasture grasses because of flooding and wetness. However, it is fairly suited if a water control system is installed to reduce the hazard of flooding and to remove excess surface water after heavy rains. Improved bahiagrass and clover grow well if properly managed. Management practices should include controlled grazing and regular applications of fertilizer.

The potential of this soil for the production of pine trees is moderately high. A water control system is needed to remove excess surface water and reduce the hazard of flooding. Bedding of rows helps to minimize the wetness limitation. Equipment use and seedling mortality are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of flooding and wetness. Water control measures should be used and fill material is needed to minimize the excessive wetness limitation. The sandy surface layer should be stabilized for recreational uses. The sidewalls of shallow excavations should be shored.

This Felda soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

15—Felda fine sand, frequently flooded. This soil is nearly level and poorly drained. It is on the flood plain of the Econlokhatchee River and of other minor streams. Many areas are isolated by dissected or meandering stream channels. This soil is flooded for very long periods following prolonged, intense rains. The slopes are nearly smooth or slightly concave and range from 0 to 2 percent.

In 90 percent of areas mapped as Felda fine sand, frequently flooded, Felda soil and similar soils make up 82 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 18 percent of the mapped areas.

Typically, this soil has a surface layer of very dark gray fine sand about 3 inches thick. The upper part of the subsurface layer, to a depth of about 10 inches, is dark gray fine sand. The lower part, to a depth of about 24 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 36 inches, is gray sandy clay loam that has common dark brown mottles. The lower part, to a depth of about 47 inches, is grayish brown fine sandy loam that has common dark yellowish brown mottles. The substratum to a depth of about 80 inches is light gray fine sand. In the mapped areas are similar soils, but they have a surface layer of loamy fine sand, fine sandy loam, or sandy clay loam. In some areas are similar soils, but they have a subsoil within 20 inches of the surface, some have a subsoil at a depth of more than 40 inches, and some also have a thin, dark brown fine sand layer at a depth of about 30 inches.

Dissimilar soils included in mapping are Pompano soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 2 to 6 months. Flooding occurs frequently during rainy periods. The duration and extent of flooding are variable and are directly related to the intensity and frequency of the rains. Flooding normally lasts from 1 month to 4 months. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderate in the subsoil. The available water capacity is very low in the surface and subsurface layers and in the substratum, and is medium in the subsoil. Natural fertility and the organic matter content are low.

In most areas, this Felda soil has been left in natural vegetation. In a few areas, it is used for improved pasture. The natural vegetation is red maple, scattered cabbage palm, slash pine, and sweetgum. The understory includes scattered saw palmetto, pineland threeawn, blue maidencane, and waxmyrtle.

Under natural conditions, this soil is not suited to cultivated crops, citrus crops, or improved pasture. However, if a water control system is installed to reduce the hazard of flooding, this soil is fairly suited to some vegetable crops and improved pasture. A water control system is needed to remove excess water rapidly and to provide for subsurface irrigation. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer should be applied according to the need of the crop. Improved bahiagrass is well suited to this soil if properly managed. Management practices should include controlled grazing and regular applications of fertilizer and lime.

The potential of this soil for the production of pine trees is moderately high. A water control system is needed to remove excess surface water and reduce the hazard of flooding. Bedding of rows helps to minimize the wetness limitation. Equipment use and seedling mortality are the main concerns in management. Slash pine is an adapted tree to plant.

This soil is well suited to habitat for wetland and woodland wildlife. Shallow water areas are easily developed, and the vegetation provides abundant food and shelter for wildlife, which add to the recreational use of these soils.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of flooding and wetness. Major flood control structures and extensive local drainage systems are needed to control flooding. The limitations of this soil for septic tank absorption fields are severe. The installing of a water control system, adding fill material, and mounding the septic tank absorption field can help minimize the excessive wetness limitation. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. Fill material is needed for local roads and streets, small commercial buildings, and playgrounds.

This Felda soil is in capability subclass Vw. The woodland ordination symbol for this soil is 10W.

16—Floridana fine sand, frequently flooded. This soil is nearly level and very poorly drained. It is on the flood plains of the St. Johns River and its major tributaries. This soil is flooded for very long periods following prolonged, intense rains. The slopes are smooth to concave and range from 0 to 2 percent.

In 95 percent of areas mapped as Floridana fine sand, frequently flooded, Floridana soil and similar soils make up 97 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 3 percent of the mapped areas.

Typically, the upper part of the surface layer of this soil is black fine sand about 2 inches thick. The lower part, to a depth of about 17 inches, is very dark gray fine sand. The subsurface layer, to a depth of about 28 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 40 inches, is gray sandy clay loam that has light gray and very dark grayish brown mottles. The lower part, to a depth of about 51 inches, is light gray sandy loam. The substratum to a depth of about 80 inches or more is gray loamy sand. In the mapped areas are similar soils, but these soils have a surface layer of mucky fine sand or loamy sand. In other places are some similar soils, but these soils have a subsoil within 20 inches of the surface, and some soils have a subsoil at a depth of more than 40 inches.

Dissimilar soils included in mapping are Gator soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for more than 6 months. Flooding occurs frequently during rainy periods. The duration and extent of flooding are variable and are directly related to the intensity and frequency of the rains. Flooding normally lasts from 1 month to 4 months. The permeability is rapid in the surface and subsurface layers, slow in the subsoil, and moderate in the substratum. The available water capacity is medium in the surface layer and subsoil and is low in the subsurface layer and substratum. Natural fertility and the organic matter content are medium.

In most areas, this Floridana soil has been left in natural vegetation. In some areas, it has been drained and is used for improved pasture. The natural vegetation is baldcypress, red maple, sweetgum, laurel oak, water oak, and Coastal Plain willow. The understory includes buttonbush, maidencane, sawgrass, smartweed, sedges, and other water-tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops and citrus crops because it is subject to frequent flooding and is very poorly drained. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, this soil is fairly suited to many vegetable crops. Proper management practices include seedbed preparation and crop rotation. Seedbed preparation should include the bedding of rows. Soil-improving cover crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this soil is poorly suited to improved pasture grasses. However, if a water control system is installed to remove excess surface water after heavy rains, suitability is good. Pangolagrass and improved bahiagrass grow well if properly managed. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is moderately high. A water control system is needed to remove excess surface water for the production potential to be realized. Equipment use, plant competition, and seedling mortality are the main concerns in management. Slash pine is an adapted tree to plant on this soil. In addition, baldcypress and hardwoods are also suitable trees to plant. Harvesting and planting operations should be scheduled during dry periods.

This soil is well suited to wetland and woodland wildlife. Shallow water areas are easily developed, and the vegetation provides abundant food and shelter for wildlife, which add to the recreational use of these soils.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of flooding and wetness. Major flood control structures and extensive local drainage systems are needed to control flooding. The limitations of this soil for septic tank absorption fields are severe. The installing of a water control system, adding fill material, and mounding the septic tank absorption field can help minimize the excessive wetness limitation. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. Fill material is needed for local roads and streets, small commercial buildings, and playgrounds.

This Floridana soil is in capability subclass Vw. The woodland ordination symbol for this soil is 6W.

17—Floridana mucky fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressions and poorly defined drainageways. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are smooth to concave and range from 0 to 2 percent.

In 90 percent of areas mapped as Floridana mucky fine sand, depressional, Floridana soil and similar soils make up 84 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 16 percent of the mapped areas.

Typically, the upper part of the surface layer of this soil is black mucky fine sand about 10 inches thick. The lower part, to a depth of about 20 inches, is very dark gray fine sand. The subsurface layer, to a depth of about 28 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 55 inches, is gray sandy clay loam that has common light olive brown mottles. The lower part, to a depth of about 64 inches, is gray sandy clay loam. The substratum to a depth of 80 inches or more is gray sandy loam. In the mapped areas are similar soils, but they have a subsoil within 20 inches of the surface. In some places are similar soils, but these soils have a subsoil at a depth of more than 40 inches, and some have a surface layer of fine sand.

Dissimilar soils included in mapping are Felda soils in small areas.

Under natural conditions, this soil is ponded for 6 to 9 months or more each year. In most years, a seasonal high water table is within 10 inches of the surface for more than 9 months. The permeability is rapid in the surface and subsurface layers, and it is slow in the subsoil and substratum. The available water capacity is medium to high in the surface layer, subsoil, and substratum, and it is low in the subsurface layer. Natural fertility is medium. The organic matter content is high.

In most areas, this Floridana soil has been left in natural vegetation. In some areas, it has been drained and is used for improved pasture or for homesite and urban development. The natural vegetation is pondcypress, Carolina ash, blackgum, water oak, red maple, sweetbay, scattered pond pine, and Coastal Plain willow. The understory includes buttonbush, maidencane, sawgrass, smartweed, sedges, and other water-tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops, citrus crops, and improved pasture because of ponding and excessive wetness. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, this soil is fairly suited to many vegetable crops. Proper management practices include seedbed preparation and crop rotation. Seedbed preparation should include the bedding of rows. Soil-improving cover crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil.

Under natural conditions, this soil is not suited to improved pasture. However, if a water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass and improved bahiagrass grow well if properly managed. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is moderately high. Slash pine is an adapted tree to plant on this soil. A water control system is needed before trees are planted. Equipment use and seedling mortality are the main concerns in management.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. Fill material is needed for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sidewalls of shallow excavations should be shored. Mounding of the septic tank absorption field may be needed.

This Floridana soil is in capability subclass VIIw. The woodland ordination symbol for this soil is 2W.

18—Gator muck. This soil is nearly level and very poorly drained. It is in freshwater swamps that are mainly north of Lake Apopka. Large ditches and canals equipped with water control structures dissect the map unit in most places. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are smooth and are less than 1 percent.

In 90 percent of areas mapped as Gator muck, Gator soil and similar soils make up 82 to 98 percent of the mapped areas. Dissimilar soils make up 2 to 18 percent of the mapped areas.

Typically, this soil has a surface layer of black muck about 28 inches thick. The upper part of the underlying material, to a depth of about 37 inches, is dark olive gray fine sandy loam. The lower part to a depth of 80 inches or more is light gray sandy clay loam that has few to common light gray calcium carbonate accumulations. In the mapped areas are similar soils, but they have underlying material of loamy fine sand or fine sand, or both. In other places are similar soils, but these soils have thin, discontinuous layers of limestone in the underlying material.

Dissimilar soils included in mapping are Canova and Terra Ceia soils in small areas.

Under natural conditions, the water table is at or above the surface for most of the year except during extended dry periods. In most areas, the soil in this map unit is artificially drained by tile drains and surface ditches. In drained areas, the water table is controlled at a depth of 10 to 36 inches or according to the need of the crop. The water table is at or above the surface for short periods after heavy rains. If drained, the organic material, when dry, subsides to about half the original thickness. It subsides further as a result of compaction and oxidation. The loss of the organic material is more rapid during the first 2 years after the soil has been artificially drained. If the soil is intensively cultivated, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss of the organic material. The permeability is rapid in the surface layer, and it is moderately slow to slow in the underlying material. The available water capacity is very high in the organic surface layer and is medium in the underlying material. Natural fertility and the organic matter content are high.

In most areas, this Gator soil is used mainly for cultivated crops, such as lettuce, endives, celery, cabbage, and radishes. In a few areas where fill material has been applied, the soil is used for urban development. The natural vegetation is buttonbush, Carolina willow, primrose willow, cattail, maidencane, Jamaica sawgrass, and other water-tolerant grasses. The natural areas provide cover for deer and excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops or citrus crops. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess surface water rapidly, this soil is well suited to many vegetable crops. A specially designed water control system is needed to remove excess water when crops are on the soil, to maintain the water table near the surface, to reduce the subsidence of organic material, and to obtain optimum crop and pasture yields. Proper management practices include seedbed preparation and crop rotation. Soil-improving crops and crop residue should be used to control erosion and to maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

In its natural state, this soil is not suited to improved pasture grasses. However, if a water control system is installed to remove excess surface water after heavy rains, suitability is good. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed, and grazing should be controlled to maintain plant vigor.

This soil is not suited to pine trees.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures should be used to minimize the excessive wetness limitation. Organic material, which has low soil strength, should be removed and backfilled with a soil material suitable for urban uses. Constructing buildings on pilings can help prevent structural damage that is caused by soil subsidence. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored, and water control measures should be used. Mounding of the septic tank absorption field may be needed.

This Gator soil is in capability subclass IIIw, but it has not been assigned to a woodland group.

19—Hontoon muck. This soil is nearly level and very poorly drained. It is in freshwater swamps and in marshes. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are smooth and less than 1 percent.

In 95 percent of areas mapped as Hontoon muck, Hontoon soil and similar soils make up 94 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 6 percent of the mapped areas.

Typically, the upper part of the organic layer of this soil is black muck about 20 inches thick. The middle part, to a depth of about 49 inches, is dark reddish brown muck. The lower part to a depth of 80 inches or more is very dark brown muck. In the mapped areas are similar soils, but they have an organic surface layer that is less than 51 inches thick; and in the lower part of the profile, the texture is fine sand, loamy fine sand, sandy loam, or sandy clay loam.

Dissimilar soils included in mapping are Basinger and Sanibel soils in small areas.

Under natural conditions, this soil is ponded for 6 to 9 months or more each year. In most years, a seasonal high water table is within 10 inches of the surface. In drained areas, the water table is controlled at a depth of 10 to 36 inches or according to the need of the crop. The water table is at or above the surface for short periods after heavy rains. If drained, the organic material, when dry, subsides to about half the original thickness. It then subsides further as a result of compaction and oxidation. The loss of the organic material is more rapid during the first 2 years after the soil has been artificially drained. If the soil is intensively cultivated, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss of the organic material. The permeability is rapid throughout. The available water capacity is very high. Natural fertility and the organic matter content are high.

In most areas, this Hontoon soil has been left in natural vegetation. In some areas, it has been drained and is used for improved pasture. In other areas where fill material has been applied, this soil is used for homesite and urban development. The natural vegetation is mixed stands of pondcypress, red maple, sweetgum, and black tupelo. The understory includes cattail, cutgrass, maidencane, Jamaica sawgrass, and other water-tolerant grasses. The natural areas provide cover for deer and excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops or citrus crops because of ponding and excessive wetness. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess water rapidly, this soil is well suited to many vegetable crops. A specially designed water control system is needed to remove the excess water when crops are on the soil, to maintain the water table near the surface, to reduce the subsidence of organic material, and to obtain optimum crop and pasture yields. Good management practices include seedbed preparation and crop rotation. Soil-improving crops and crop residue should be used to control erosion and to maintain organic matter content. Fertilizer and lime should be applied according to the need of the crop.

In its natural state, this soil is not suited to improved pasture grasses. However, if a water control system is installed to remove excess surface water after heavy rains, suitability is good. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

This soil is not suited to pine trees.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures should be used to minimize the excessive wetness limitation. Organic material, which has low soil strength, should be removed and backfilled with a soil material suitable for urban use. Constructing buildings on pilings can help prevent structural damage that is caused by soil subsidence. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored, and water control measures should be used. Mounding of the septic tank absorption field may be needed.

This Hontoon soil is in capability subclass VIIw, but it has not been assigned to a woodland group.

20—Immokalee fine sand. This soil is nearly level and poorly drained. It is on broad flatwoods. The slopes are smooth and range from 0 to 2 percent.

In 70 percent of areas mapped as Immokalee fine sand, Immokalee soil and similar soils make up 85 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 15 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of about 18 inches, is grayish brown fine sand. The lower part, to a depth of about 35 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 41 inches, is black fine sand. The middle part, to a depth of about 48 inches, is dark brown fine sand. The lower part, to a depth of about 67 inches, is brown fine sand. The substratum to a depth of about 80 inches is light brownish gray fine sand. In the mapped areas are similar soils, but they have a subsoil at a depth of more than 50 inches. In other areas are similar soils, but these soils have a subsoil within 30 inches of the surface.

Dissimilar soils included in mapping are Pineda and Wabasso soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 1 month to 3 months, and it recedes to a depth of 10 to 40 inches for more than 6 months. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderate in the subsoil. The available water capacity is very low in the surface and subsurface layers and in the substratum, and is medium in the subsoil. Natural fertility and the organic matter content are low.

In most areas, this Immokalee soil has been left in natural vegetation. In a few areas, it is used for cultivated crops, improved pasture, or citrus crops or for homesite and urban development. The natural vegetation is slash pine. The understory is saw palmetto, running oak, inkberry, fetterbush, creeping bluestem, lopsided indiangrass, pineland threeawn, chalky bluestem, and waxmyrtle.

Under natural conditions, this soil is poorly suited to cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil-improving measures are used, this soil is fairly suited to many vegetable crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Other management practices include seedbed preparation and regular applications of fertilizer and lime. Seedbed preparation should include the bedding of rows.

The suitability of this soil for citrus trees is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of lime and fertilizers are needed.

This soil has good suitability for improved pasture grasses. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures should be used to remove the excess surface water after heavy rains. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential of this soil for the production of pine trees is moderate. Equipment use, seedling mortality, and plant competition are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Septic tank absorption fields may need to be enlarged because of wetness. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. Fill material is needed for local roads and streets, small commercial buildings, and playgrounds. The sidewalls of shallow excavations should be shored, and water control measures should be used. The sandy surface layer should be stabilized for recreational uses.

This Immokalee soil is in capability subclass IVw. The woodland ordination symbol for this soil is 8W.

21—Lake fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and excessively drained. It is on the uplands. The slopes are nearly smooth to convex.

In 95 percent of areas mapped as Lake fine sand, 0 to 5 percent slopes, Lake soil and similar soils make up 93 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 7 percent of the mapped areas.

Typically, this soil has a surface layer of very dark gray fine sand about 4 inches thick. The upper part of the underlying material, to a depth of about 35 inches, is yellowish brown fine sand. The lower part to a depth of 80 inches or more is brownish yellow fine sand. In the mapped areas are similar soils, but they have less than 5 percent silt and clay in the underlying material. In lower positions on the landscape are other similar soils, but these soils are well drained.

Dissimilar soils included in mapping are Tavares soils in small areas.

A seasonal high water table is at a depth of more than 72 inches. The permeability is rapid. The available water capacity is very low to low. Natural fertility and the organic matter content are low.

In most areas, this Lake soil is used for citrus crops. In a few areas, it is used for improved pasture or for homesite and urban development. The natural vegetation is slash pine, longleaf pine, bluejack oak, Chapman oak, scrub live oak, live oak, and turkey oak. The understory includes scattered saw palmetto, running oak, lopsided indiangrass, pineland threeawn, bluestem, and paspalum.

The sandy texture and droughtiness of this soil are severe limitations for cultivated crops. Intensive management practices are needed if cultivated crops are to be grown on this soil. Droughtiness and rapid leaching of plant nutrients limit the choice of plants that can be grown and reduce the potential yield of crops. A crop-rotation system is needed to keep close-growing cover crops on the soil at least three-fourths of the time. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Optimum yields can be obtained from only a few crops without an irrigation system. It is generally feasible to irrigate crops if water is readily available.

This soil is suited to citrus trees in areas that are relatively free of freezing temperatures. A ground cover of close-growing plants between the tree rows is needed to protect the soil from blowing. Optimum yields can be obtained in some years without irrigation, but a specially designed irrigation system that maintains optimum soil moisture that is needed to obtain maximum yields.

This soil is moderately well suited to improved pasture grasses. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are well suited to this soil, but yields are reduced by periodic droughtiness. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor. Irrigation improves the quality of pasture and hay.

The potential of this soil for the production of pine trees is moderate. Seedling mortality, equipment use, and plant competition are the main concerns in management. The low available water capacity adversely affects seedling survival in areas where understory plants are numerous. The sandy surface texture limits the use of equipment. Slash pine is an adapted tree to plant on this soil.

This soil has slight limitations for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed. When installing a septic tank absorption field on this soil, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

This soil has slight limitations for small commercial buildings. Land shaping may be needed in the more sloping areas.

This soil has severe limitations for recreational uses, trench sanitary landfills, sewage lagoons, and shallow excavations. The sandy surface layer should be stabilized for recreational uses, and land shaping may be needed in the more sloping areas. The sealing or lining of a trench sanitary landfill or sewage lagoon with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies.

This Lake soil is in capability subclass IVs. The woodland ordination symbol for this soil is 10S.

22—Lochloosa fine sand. This soil is nearly level and somewhat poorly drained. It is in the slightly high positions on the flatwoods. The slopes are smooth to convex and range from 0 to 2 percent.

In 95 percent of areas mapped as Lochloosa fine sand, Lochloosa soil and similar soils make up 91 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 9 percent of the mapped areas.

Typically, this soil has a surface layer of dark gray fine sand about 7 inches thick. The upper part of the subsurface layer, to a depth of about 23 inches, is light brownish gray fine sand. The lower part, to a depth of about 29 inches, is light gray fine sand that has strong brown mottles. The subsoil, to a depth of about 64 inches, is light gray sandy clay loam that has strong brown and yellowish red mottles. The substratum to a depth of about 80 inches is gray sandy clay loam that has yellowish red mottles. In the mapped areas are similar soils, but they have a subsoil within 20 inches of the surface. In some places are similar soils, but these soils have a subsoil at a depth of more than 40 inches, and some that are in higher positions on the landscape are moderately well drained.

Dissimilar soils included in mapping are Wabasso soils in small areas.

In most years, a seasonal high water table is within 30 to 60 inches of the surface for 1 month to 4 months. It is at a depth of about 15 inches for 1 week to 3 weeks during periods of heavy rains. It recedes to a depth of more than 60 inches during prolonged dry periods. The permeability is moderately rapid to rapid in the surface and subsurface layers, moderate to moderately slow in the subsoil, and slow to moderately slow in the substratum. The available water capacity is low in the surface and subsurface layers and is medium to high in the subsoil and substratum. Natural fertility and the organic matter content are moderate to moderately low.

In most areas, this Lochloosa soil is used for citrus crops or for homesite and urban development. In a few areas, it is used for cultivated crops or improved pasture, or it has been left in natural vegetation. The natural vegetation is live oak, water oak, and slash pine. The understory includes chalky bluestem, lopsided indiangrass, panicum, pineland threeawn, and waxmyrtle.

Under natural conditions, this soil is moderately suited to cultivated crops because of wetness. However, if a water control system is installed and maintained and soil-improving measures are used, this soil is well suited to most cultivated crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

This soil is moderately suited to citrus trees in areas that are relatively free of freezing temperatures. A water control system is necessary to maintain the water table at a depth of about 4 feet during wet periods. Optimum yields of citrus generally can be obtained without irrigation. Irrigating during periods of low rainfall produces maximum yields. Regular applications of fertilizer and lime help to obtain maximum yields. A close-growing cover crop between tree rows is needed to protect the soil from blowing.

This soil has good suitability for improved pasture grasses. Coastal bermudagrass and improved bahiagrass grow well if properly managed. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential of this soil for the production of pine trees is high. This soil has few limitations for woodland use and management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for sanitary facilities and recreational uses. It has slight limitations for dwellings without basements, small commercial buildings, and local roads and streets. Water control measures should be used to minimize the wetness limitation. Mounding or enlarging the septic tank absorption field may be needed because of wetness. The sandy sidewalls must be sealed or lined if this soil is used as a sewage lagoon. Water control measures should be used for trench sanitary landfills during wet periods. The sandy surface layer should be stabilized for recreational uses. The sidewalls of shallow excavation should be shored.

This Lochloosa soil is in capability subclass IIw. The woodland ordination symbol for this soil is 11A.

23—Malabar fine sand. This soil is nearly level and poorly drained. It is in low, narrow to broad sloughs and poorly defined drainageways. The slopes are smooth to concave and range from 0 to 2 percent.

In 95 percent of areas mapped as Malabar fine sand, Malabar soil and similar soils make up 90 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 10 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 3 inches thick. The subsurface layer, to a depth of about 18 inches, is grayish brown fine sand. The upper part of the subsoil, to a depth of about 30 inches, is light yellowish brown fine sand. The next layer, to a depth of about 42 inches, is light gray fine sand. The lower part, to a depth of about 58 inches, is gray fine sandy loam that has pale brown and brownish yellow mottles. The substratum to a depth of 80 inches or more is gray loamy sand. In the mapped areas are similar soils in which the lower part of the subsoil is within 40 inches of the surface, or they have a brown to dark brown weakly stained layer above the lower part of the loamy subsoil.

Dissimilar soils included in mapping are Wabasso soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 2 to 6 months and between depths of 10 and 40 inches for most of the year. The permeability is rapid in the surface and subsurface layers and in the upper part of the subsoil, slow to very slow in the loamy part of the subsoil, and moderately rapid in the substratum. The available water capacity is low to very low in the surface and subsurface layers and in the upper part of the subsoil, moderate in the lower part of the subsoil, and low in the substratum. Natural fertility and the organic matter content are low.

In most areas, this Malabar soil has been left in natural vegetation. In some areas, it has been drained and is used for cultivated crops or improved pasture or for homesite and urban development. The natural vegetation is slash pine, longleaf pine, cabbage palm, and laurel oak. The understory includes scattered saw palmetto, waxmyrtle, inkberry, pineland threeawn, panicum, maidencane, and other various sedges and grasses.

Under natural conditions, this soil is poorly suited to cultivated crops. However, it is moderately well suited to vegetable crops if a water control system is installed to remove excess surface water rapidly and to provide for subsurface irrigation. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer should be applied according to the need of the crop.

The suitability of this soil for citrus trees is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of fertilizer are needed.

The suitability of this soil for pasture and hay crops is good. Pangolagrass, improved bahiagrass, and clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer and lime, and controlled grazing.

The potential of this soil for the production of pine trees is moderately high. Slash pine is an adapted tree to plant on this soil. A water control system is needed to remove excess surface water. Equipment use and seedling mortality are the main concerns in management.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures should be used and fill material is needed to minimize the excessive wetness limitation. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Mounding of the septic tank absorption field may be needed. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. Fill material is needed for local roads and streets, small commercial buildings, and playgrounds. The sidewalls of shallow excavations should be shored, and water control measures should be used. The sandy surface layer should be stabilized for recreational uses.

This Malabar soil is in capability subclass IVw. The woodland ordination symbol for this soil is 10W.

24—Millhopper-Urban land complex, 0 to 5 percent slopes. This complex consists of Millhopper soil that is nearly level to gently sloping and moderately well drained and of areas of Urban land. This complex is in the upland areas.

This map unit consists of about 53 percent Millhopper soil and about 40 percent Urban land. The included soils make up about 7 percent of the map unit. The proportions and the patterns of the Millhopper soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Millhopper soil is dark gray fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of about 20 inches, is pale brown fine sand. The middle part, to a depth of about 42 inches, is very pale brown fine sand. The lower part, to a depth of about 65 inches, is very pale brown fine sand that has yellowish brown mottles. The subsoil to a depth of about 80 inches is brown sandy clay loam that has yellowish brown and yellowish red mottles.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Seffner and Tavares soils. Also included are some soils that are similar to Millhopper soil but are somewhat poorly drained in the lower parts of the landscape and are well drained in the higher parts of the landscape. These similar included soils have a subsoil within 40 inches of the surface.

A seasonal high water table is at a depth of 40 to 60 inches for 1 month to 4 months, and it recedes to a depth of 60 to 72 inches for 2 to 4 months during most years. The permeability of Millhopper soil is rapid in the surface and subsurface layers, and it is slow to moderate in the subsoil. The available water capacity is low in the surface and subsurface layers and is low to medium in the subsoil. Natural fertility is low. The organic matter content is low to moderately low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Millhopper soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, and other similar uses.

The soils in this map unit have slight limitations for dwellings without basements, small commercial buildings, and local roads and streets. Land shaping may be needed in the more sloping areas.

These soils have severe limitations for trench sanitary landfills, sewage lagoons, and shallow excavations. The sealing or lining of a trench sanitary landfill or sewage lagoon with impervious soil material reduces excessive seepage. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses. Land shaping may be needed in the more sloping areas. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. The soils need to be mulched, irrigated, fertilized, and limed to establish and maintain lawn grasses and other landscape vegetation.

The soils in this map unit have moderate limitations for septic tank absorption fields because of the depth of the water table during wet periods. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

25—Okeelanta muck. This soil is nearly level and very poorly drained. It is in freshwater swamps and in drained areas north of Lake Apopka. Large ditches and canals equipped with water control structures dissect the map unit in most places. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are smooth and are less than 1 percent.

In 95 percent of areas mapped as Okeelanta muck, Okeelanta soil and similar soils make up 86 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 14 percent of the mapped areas.

Typically, the upper part of the surface layer of this soil is black muck about 9 inches thick. The lower part, to a depth of about 25 inches, is dark brown muck. The upper part of the underlying material, to a depth of about 62 inches, is light gray fine sand that has dark gray mottles. The lower part to a depth of 80 inches or more is grayish brown loamy sand. In the mapped areas are similar soils, but they have underlying material of sandy clay loam or sandy loam, or both, and they have accumulations of soft calcium carbonate masses. In other places are similar soils, but these soils have thin, discontinuous layers of limestone in the underlying material.

Dissimilar soils included in mapping are Sanibel and Terra Ceia soils in small areas.

Under natural conditions, this soil is ponded for 6 to 9 months or more each year. In most years, a seasonal high water table is at or near the surface. In most areas, the soil in this map unit is artificially drained by tile drains and surface ditches. In drained areas, the water table is controlled at a depth of 10 to 36 inches, or according to the need of the crop. The water table is at or above the surface for short periods after heavy rains. If drained, the organic material, when dry, subsides to about half the original thickness. It subsides further as a result of compaction and oxidation. The loss of the organic material is more rapid during the first 2 years after the soil has been artificially drained. If the soil is intensively cultivated, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss of the organic material.

The permeability is rapid in the organic layers, and it is moderately rapid to moderately slow in the underlying material. The available water capacity is very high in the organic layers and is very low to medium in the underlying material. Natural fertility and the organic matter content are high.

In most areas, this Okeelanta soil is used mainly for cultivated crops, such as lettuce, endives, corn, celery, cabbage, and radishes. In a few areas where fill material has been applied, this soil is used for urban development. The natural vegetation is buttonbush, Carolina willow, primrose willow, cattail, maidencane, Jamaica sawgrass, and other water-tolerant grasses. The natural areas provide cover for deer and excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops or citrus crops. However, if intensive management practices and soil-improving measures are used and a water control system is installed to remove excess surface water rapidly, this soil is well suited to many vegetable crops. A specially designed water control system is needed to remove excess water when crops are on the soil and to maintain the water table near the surface to reduce the subsidence of organic material and obtain optimum crop and pasture yields. Proper management practices include seedbed preparation and crop rotation. Soil-improving crops and crop residue should be used to control erosion and to maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this soil is not suited to improved pasture grasses. However, if a water control system is installed to remove excess surface water after heavy rains, suitability is good. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

This soil is not suited to pine trees.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures should be used to minimize the excessive wetness limitation. Organic material, which has low soil strength, should be removed and backfilled with a soil material suitable for urban use. Constructing buildings on pilings can help prevent structural damage that is caused by soil subsidence. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored, and water control measures should be used. Mounding of septic tank absorption fields may be needed.

This Okeelanta soil is in capability subclass IIIw, but it has not been assigned to a woodland group.

26—Ona fine sand. This soil is nearly level and poorly drained. It is in broad areas on the flatwoods. The slopes are smooth and range from 0 to 2 percent.

In 95 percent of areas mapped as Ona fine sand, Ona soil and similar soils make up 84 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 16 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 6 inches thick. The subsoil, to a depth of about 15 inches, is dark reddish brown fine sand. The upper part of the substratum, to a depth of about 42 inches, is grayish brown fine sand. The middle part, to a depth of about 60 inches, is light gray fine sand. The lower part to a depth of 80 inches or more is very pale brown fine sand. In the mapped areas are similar soils, but they have a gray or dark gray subsurface layer. In some places are similar soils, but these soils have a subsoil at a depth of more than 10 inches.

Dissimilar soils included in mapping are Immokalee soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 1 month to 2 months. It recedes to a depth of 10 to 40 inches for periods of 6 months or more. The permeability is rapid in the surface and subsurface layers, and it is moderate in the subsoil. The available water capacity is medium in the surface layer and subsoil and is low in the substratum.

In most areas, this Ona soil has been left in natural vegetation. In a few areas, it is used for cultivated crops, improved pasture, or citrus crops or for homesite and urban development. The natural vegetation is longleaf pine and slash pine. The understory includes inkberry, running oak, saw palmetto, waxmyrtle, fetterbush, pineland threeawn, bluestem, panicum, and other grasses.

Under natural conditions, this soil is poorly suited to cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil-improving measures are used, this soil is fairly suited to many vegetable crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Other management practices include seedbed preparation and regular applications of fertilizer and lime. Seedbed preparation should include the bedding of rows.

The suitability of this soil for citrus trees is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. Regular applications of lime and fertilizer are needed.

This soil has good suitability for improved pasture grasses. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures should be used to remove the excess water after heavy rains. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential of this soil for the production of pine trees is moderately high. Equipment use, seedling mortality, and plant competition are the main concerns in management. Bedding of rows helps to minimize the wetness limitation. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. The sidewalls of shallow excavations should be shored.

This Ona soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

27—Ona-Urban land complex. This complex consists of Ona soil that is nearly level and poorly drained and of areas of Urban land. This complex is on the flatwoods. The slopes are smooth and range from 0 to 2 percent.

This map unit consists of about 53 percent Ona soil and about 40 percent Urban land. The included soils make up about 7 percent of the map unit. The proportions and the patterns of Ona soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Ona soil is black fine sand about 3 inches thick. The subsoil, to a depth of about 16 inches, is dark reddish brown fine sand. The upper part of the substratum, to a depth of about 31 inches, is gray fine sand. The lower part to a depth of about 80 inches or more is light gray fine sand.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Immokalee soils. Also included are some soils that are similar to Ona soil but have a gray or dark gray subsurface layer or have a subsoil at a depth of about 20 to 30 inches.

Some areas of Ona-Urban land complex have been modified by grading and shaping. The sandy material from drainage ditches or fill material that is hauled in are often used to fill low areas. In undrained areas, a seasonal high water table is within 10 inches of the surface for 1 month to 2 months. Drainage systems have been established in most areas. Depth to the high water table is dependent upon the functioning of the drainage system. The permeability of Ona soil is rapid in the surface layer and in the substratum and is moderate in the subsoil. The available water capacity is moderate in the surface layer and in the subsoil and is low in the substratum.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Ona soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, parking lots, or other similar uses.

The soils in this map unit have severe limitations for sanitary facilities and shallow excavations. Water control measures should be used to minimize the excessive wetness limitations for these uses. Septic tank absorption fields may need to be enlarged because of wetness. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of the shallow excavations should be shored.

These soils have moderate limitations for dwellings without basements, small commercial buildings, and recreational uses. Many of these areas have been previously drained or modified by grading and shaping. For dwellings without basements and small commercial buildings, some water control measures should be used. Measures include adding fill material, land leveling, and installing a drainage system to remove excessive surface water after heavy rains. The sandy surface layer should be stabilized for recreational uses.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

28—Florahome fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on the uplands. The slopes are smooth to convex.

In 95 percent of areas mapped as Florahome fine sand, 0 to 5 percent slopes, Florahome soil and similar soils make up 82 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 18 percent of the mapped areas.

Typically, the upper part of the surface layer of this soil is very dark gray fine sand about 10 inches thick. The middle part, to a depth of about 19 inches, is very dark grayish brown fine sand. The lower part, to a depth of about 38 inches, is dark gray fine sand. The upper part of the underlying material, to a depth of about 48 inches, is brown fine sand. The lower part to a depth of about 80 inches is light yellowish brown fine sand. In the mapped areas are similar soils that have a weakly cemented subsoil at a depth of more than 40 inches. In some places are similar soils that have a surface layer that is less than 10 inches thick and some similar soils in higher positions on the landscape that are well drained.

Dissimilar soils included in mapping are Candler and Seffner soils in small areas.

In most years, a seasonal high water table is at a depth of 48 to 72 inches for 4 to 6 months and recedes to a depth of 72 inches or more during extended dry periods. It is within 30 to 48 inches of the surface for up to 2 weeks during periods of heavy rains. The permeability is rapid throughout. The available water capacity is low in the upper part of the surface layer. It is very low in the lower part and in the underlying material. Natural fertility is low. The organic matter content is moderate to moderately low.

In most areas, this Florahome soil is used for citrus crops or for homesite and urban development. In a few areas, it is used for improved pasture or cultivated crops. The natural vegetation includes live oak, turkey oak, longleaf pine, and slash pine. The understory consists of saw palmetto, wild grape, bluestem, paspalum, switchgrass, lopsided indiangrass, panicum, and pineland threeawn.

Under natural conditions, this soil is poorly suited to most cultivated crops. It is well suited to citrus crops in areas that are relatively free of freezing temperatures. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Optimum yields of citrus crops can be obtained in most years without irrigation, but a specially designed irrigation system that maintains optimum soil moisture, is needed to obtain maximum yields. Intensive soil management practices are needed if cultivated crops are to be grown on this soil. Droughtiness and rapid leaching of plant nutrients limit the choice of plants that can be grown and reduce the potential yield of crops. A specially designed and properly managed irrigation system helps to maintain optimum soil moisture and thus ensure maximum yields. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in this soil. Regular applications of fertilizer and lime are needed.

This soil is well suited to improved pasture grasses. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are well suited to this soil, but yields are reduced by periodic droughtiness. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is moderate. Seedling mortality, equipment use, and plant competition are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for sewage lagoons, sanitary landfills, shallow excavations, and recreational uses. Water control measures should be used to minimize the wetness limitation in undrained areas. In addition, the sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Water control measures should be used to minimize the excessive wetness limitation. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Regular applications of fertilizer and lime are needed to maintain lawns and landscape vegetation.

This soil has moderate limitations for septic tank absorption fields. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

This soil has slight limitations for dwellings without basements and small commercial buildings and for local roads and streets.

This Florahome soil is in capability subclass IIIs. The woodland ordination symbol for this soil is 10S.

29—Florahome-Urban land complex, 0 to 5 percent slopes. This complex consists of Florahome soil that is nearly level to gently sloping and moderately well drained and of areas of Urban land. This complex is in the upland areas.

This map unit consists of about 53 percent Florahome soil and about 40 percent Urban land. The included soils make up about 7 percent of the map unit. The proportions and the patterns of Florahome soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the upper part of the surface layer of Florahome soil is black fine sand about 17 inches thick. The lower part, to a depth of about 22 inches, is very dark gray fine sand. The next layer, to a depth of about 35 inches, is dark gray fine sand. The upper part of the underlying material, to a depth of 62 inches, is grayish brown fine sand that has common dark brown mottles. The lower part to a depth of 80 inches is pale brown fine sand.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Candler and Seffner soils. Also included are some soils that are similar to Florahome soil but have a weakly cemented, dark brown fine sandy layer at a depth of more than 40 inches, some similar soils that have a surface layer that is less than 10 inches thick, and some similar soils that are in some of the higher parts of the landscape and are well drained.

In most areas of Florahome-Urban land complex, drainage systems have been established. The depth to the seasonal high water table is dependent upon the functioning of the drainage system. In areas without drainage systems, a seasonal high water table is at a depth of 48 to 72 inches for 4 to 6 months, and it recedes to a depth of 72 inches or more during extended dry periods. The permeability of Florahome soil is rapid throughout. The available water capacity is low in the surface layer and very low in the underlying material. Natural fertility is low. The organic matter content is moderate to moderately low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Florahome soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit have severe limitations for sewage lagoons, trench sanitary landfills, shallow excavations, and recreational uses. Water control measures should be used to minimize the wetness limitation for these uses. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The proximity to a stream or aquifer recharge area should be considered in the placement of a trench sanitary landfill or sewage lagoon to prevent contamination of the water supplies. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Regular applications of fertilizer and lime are needed to maintain lawn grasses and landscape vegetation.

The soils in this map unit have moderate limitations for septic tank absorption fields. Water control measures should be used to minimize the wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of the soils in this map unit can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

These soils have slight limitations for dwellings without basements and small commercial buildings and for local roads and streets.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

30—Pineda fine sand. This soil is nearly level and poorly drained. It is on low hammocks, in broad, poorly defined drainageways, and in sloughs. The slopes are smooth to concave and range from 0 to 2 percent.

In 80 percent of areas mapped as Pineda fine sand, Pineda soil and similar soils make up 87 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 13 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 5 inches thick. The subsurface layer, to a depth of about 25 inches, is gray fine sand. The upper part of the subsoil, to a depth of 29 inches, is strong brown fine sand. The middle part, to a depth of about 37 inches, is dark yellowish brown fine sand. The lower part, to a depth of about 55 inches, is dark gray sandy loam that has about 20 percent tongues of light gray fine sand about 3 to 7 inches long and half an inch to 2 inches wide. The substratum to a depth of 80 inches or more is greenish gray sandy loam mixed with shell fragments. In the mapped areas are similar soils, but they have a subsoil at a depth of more than 40 inches.

Dissimilar soils included in mapping are Malabar and Wabasso soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 1 month to 6 months. It recedes to a depth of 10 to 40 inches for more than 6 months. The water table is above the surface for a short period after heavy rains. The permeability is rapid in the surface and subsurface layers and in the upper part of the subsoil, and it is moderately slow in the lower part of the subsoil and substratum. The available water capacity is very low in the surface and subsurface layers and in the upper part of the subsoil, and it is medium in the lower part of the subsoil and substratum. Natural fertility and the organic matter content are low.

In most areas, this Pineda soil has been left in natural vegetation. In a few areas, it is used for improved pasture or for homesite and urban development. The natural vegetation is cabbage palm, scattered longleaf pine, and slash pine. The understory includes waxmyrtle, blue maidencane, chalky bluestem, bluejoint panicum, scattered saw palmetto, pineland threeawn, and various weeds and grasses.

Under natural conditions, this soil has severe limitations for cultivated crops. However, this soil is fairly suited to use for many vegetable crops if a water control system is installed to remove excess water rapidly and to provide for subsurface irrigation. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

The suitability of this soil for citrus trees is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop between the tree rows is needed to protect the soil from blowing. Regular applications of fertilizer are needed.

This soil has good suitability for improved pasture grasses and hay crops. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. A water control system is needed to remove excess surface water after heavy rains. Management practices should include controlled grazing and regular applications of fertilizer and lime.

The potential of this soil for the production of pine trees is moderately high. A water control system is needed to remove excess surface water. Equipment use and seedling mortality are the main concerns in management. Bedding of rows helps to minimize the wetness limitation. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Mounding of septic tank absorption fields may be needed. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The sandy surface layer should be stabilized for recreational uses. The sidewalls of shallow excavations should be shored.

This Pineda soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

31—Pineda fine sand, frequently flooded. This soil is nearly level and poorly drained. It is on the flood plains. Many areas are isolated by dissected or meandering stream channels. This soil is flooded for long periods following prolonged, intense rains. The slopes are nearly smooth to slightly concave and range from 0 to 2 percent.

In 80 percent of areas mapped as Pineda fine sand, frequently flooded, Pineda soil and similar soils make up 90 to 98 percent of the mapped areas. Dissimilar soils make up 2 to 10 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 4 inches thick. The subsurface layer, to a depth of about 24 inches, is grayish brown fine sand. The upper part of the subsoil, to a depth of about 36 inches, is brownish yellow fine sand. The lower part, to a depth of about 50 inches, is gray sandy clay loam that has few white mottles and about 25 percent tongues of light gray fine sand about 3 to 6 inches long and half an inch to 3 inches wide. The substratum to a depth of 80 inches or more is light gray fine sandy loam. In the mapped areas are similar soils, but they have a subsoil within 20 inches of the surface, and the lower part of the subsoil of some similar soils is at a depth of more than 40 inches.

Dissimilar soils included in mapping are Floridana and Wabasso soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 1 month to 6 months. Flooding occurs frequently during rainy periods. The duration and extent of flooding are variable and are related directly to the intensity and frequency of rains. Flooding normally lasts from 1 month to 4 months. The permeability is rapid in the surface and subsurface layers and in the upper part of the subsoil, and it is moderately slow to slow in the lower part of the subsoil and substratum. The available water capacity is very low in the surface and subsurface layers and in the upper part of the subsoil, and it is medium in the lower part of the subsoil and substratum. Natural fertility and the organic matter content are low.

In most areas, this Pineda soil has been left in natural vegetation. In a few areas, it is used for improved pasture. The natural vegetation is cabbage palm, water oak, slash pine, and laurel oak. The understory includes waxmyrtle, blue maidencane, chalky bluestem, bluejoint panicum, scattered saw palmetto, sedges, and various weeds and grasses.

Under natural conditions, this soil is not suited to cultivated crops, citrus crops, or improved pasture. However, if a water control system is installed to reduce the hazard of flooding, this soil has fair suitability for some vegetable crops and improved pasture. A water control system is also needed to remove excess water rapidly and to provide for subsurface irrigation when crops are on the soil. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer should be applied according to the need of the crop. Improved bahiagrass grows well if properly managed. For improved pasture, management practices should include controlled grazing.

The potential of this soil for the production of pine trees is moderately high. A water control system is needed to remove excess surface water and reduce the hazard of flooding. Bedding the tree rows helps to minimize the wetness limitation. Equipment use and seedling mortality are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil is well suited to habitat for wetland and woodland wildlife. Shallow water areas are easily developed, and the vegetation provides abundant food and shelter for wildlife, which add to the recreational use of these soils.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of flooding and wetness. Major flood control structures and extensive local drainage systems are needed to control flooding. The limitations of this soil for septic tank absorption fields are severe. The installing of a water control system, adding fill material, and mounding the septic tank absorption field can help to minimize the excessive wetness limitation. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. Fill material is needed for local roads and streets, small commercial buildings, and playgrounds.

This Pineda soil is in capability subclass Vw. The woodland ordination symbol for this soil is 10W.

32—Pinellas fine sand. This soil is nearly level and poorly drained. It is in areas that border sloughs and shallow depressions. The slopes are smooth to slightly concave and range from 0 to 2 percent.

In 90 percent of areas mapped as Pinellas fine sand, Pinellas soil and similar soils make up 89 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 11 percent of the mapped areas.

Typically, this soil has a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 18 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 34 inches, is light gray fine sand that has common brownish yellow mottles and accumulations of carbonate coatings on sand grains and in interspaces between sand grains. The lower part, to a depth of about 46 inches, is grayish brown fine sandy loam that has few dark brown mottles. The substratum to a depth of about 80 inches is light olive brown fine sand mixed with shell fragments. In the mapped areas are soils similar to Pinellas soil, but the lower part of the subsoil is at a depth of more than 40 inches.

Dissimilar soils included in mapping are Wabasso soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 1 month to 3 months and between depths of 10 and 40 inches for 2 to 6 months. In dry periods, it recedes to a depth of more than 40 inches. The permeability is rapid in the surface and subsurface layers, the upper part of the subsoil, and substratum, and it is moderate in the lower part of the subsoil. The available water capacity is very low in the surface layer and substratum and is medium in the subsoil.

In most areas, this Pinellas soil has been left in natural vegetation. In a few areas, it is used for improved pasture. The natural vegetation is cabbage palm, longleaf pine, and slash pine. The understory includes scattered saw palmetto, lopsided indiangrass, chalky bluestem, broomsedge bluestem, creeping bluestem, inkberry, hairy panicum, pineland threeawn, and waxmyrtle.

Under natural conditions, this soil is poorly suited to vegetable crops because of wetness. However, if a water control system is installed to remove excess surface water rapidly and to provide for subsurface irrigation, this soil is well suited to most vegetable crops. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer should be applied according to the need of the crop.

The suitability of this soil for citrus trees is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of fertilizer are needed.

The suitability of this soil for improved pasture grasses and hay crops is good. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer, and controlled grazing.

The potential of this soil for the production of pine trees is moderate. A water control system is needed to remove excess surface water. Planting the trees on beds helps to minimize the excessive wetness limitation. Equipment use and seedling mortality are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures should be used and fill material is needed to minimize the excessive wetness limitation. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Mounding of septic tank absorption fields may be needed. The sandy surface layer should be stabilized for recreational uses. The sidewalls of shallow excavations should be shored. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies.

This Pinellas soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

33—Pits. This map unit consists of excavated areas of unconsolidated or heterogeneous soil and geologic materials which have been removed primarily for use in road construction or as fill material for low areas and for building foundations. Areas of this map unit consist of a pit or depressed area, which is surrounded by sidewalls of variable steepness. Included with Pits in mapping are small areas of spoil or stockpiles of variable soil and geologic material around the edges of the pits. Pits, locally called borrow pits, are from 5 to 40 feet deep. Some of the pit bottoms are seasonally ponded. Other areas are filled with water year round and are shown as water on the soil map.

In most areas, Pits remain idle. Smoothing, shaping, and filling with heavy machinery is necessary for any agricultural or urban use. These areas have a high potential for wildlife habitat if they are reshaped and revegetated to conform with existing landscapes. Areas that are filled with water have a high potential for fish if they are stocked and managed properly. Onsite investigation is necessary to determine the potential for any use.

Pits has not been assigned to a capability subclass or to a woodland group.

34—Pomello fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on low ridges and knolls on the flatwoods. The slopes are smooth to convex.

In 80 percent of areas mapped as Pomello fine sand, 0 to 5 percent slopes, Pomello soil and similar soils make up 78 to 94 percent of the mapped areas. Dissimilar soils make up 6 to 22 percent of the mapped areas.

Typically, this soil has a surface layer of gray fine sand about 3 inches thick. The subsurface layer, to a depth of about 40 inches, is white fine sand. The upper part of the subsoil, to a depth of about 48 inches, is black fine sand. The lower part, to a depth of about 55 inches, is dark reddish brown fine sand. The substratum to a depth of about 80 inches is pale brown fine sand. In the mapped areas are similar soils, but they have a subsoil within 30 inches of the surface. In some places are similar soils, but they have a subsoil at a depth of more than 50 inches, and in lower positions on the landscape are similar soils, but they are somewhat poorly drained.

Dissimilar soils included in mapping are Archbold, Pompano, and Smyrna soils in small areas. Also included are some soils that have a subsoil within 30 inches of the surface.

In most years, a seasonal high water table is at a depth of 24 to 40 inches for 1 month to 4 months and recedes to a depth of 40 to 60 inches during dry periods. The permeability is very rapid in the surface and subsurface layers, moderately rapid in the subsoil, and rapid in the substratum. The available water capacity is very low in the surface and subsurface layers and in the substratum, and it is medium in the subsoil. Natural fertility and the organic matter content are very low.

In most areas, this Pomello soil is used for native range, or it has been left in natural vegetation. In a few areas, this soil is used for citrus crops, cultivated crops, or improved pasture or for homesite and urban development. The natural vegetation is longleaf pine, sand pine, and slash pine. The understory includes creeping bluestem, lopsided indiangrass, running oak, saw palmetto, and pineland threeawn.

This soil is poorly suited to cultivated crops, but if intensive management practices are used, a few special crops can be grown. The adapted crops that can be grown are limited. For maximum yields, an irrigation system is needed and fertilizer and lime should be applied according to the need of the crop. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil.

This soil is poorly suited to citrus trees. Only fair yields can be obtained if the level of management is high. A water control system is necessary to maintain the water table at a depth of about 4 feet during wet periods and to provide water for irrigation during periods of low rainfall. Regular applications of fertilizer and lime are needed to obtain maximum yields. A suitable cover crop should be maintained between tree rows to protect the soil from blowing.

The suitability of this soil for improved pasture grasses is fair. Deep-rooted plants, such as Coastal bermudagrass and bahiagrass, are better suited to this soil than other grasses. Droughtiness is the main limitation except during wet periods. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential of this soil for the production of pine trees is moderate. Seedling mortality, plant competition, and equipment use are the main concerns in management. Slash pine and sand pine are adapted trees to plant.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. It has moderate limitations for dwellings without basements and small commercial buildings. Water control measures should be used to minimize the excessive wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. Water control measures should be used to minimize the wetness limitation. In addition, the sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Water control measures should be used for shallow excavations. The sidewalls of shallow excavations should be shored. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies.

This Pomello soil is in capability subclass VIs. The woodland ordination symbol for this soil is 8S.

35—Pomello-Urban land complex, 0 to 5 percent slopes. This complex consists of Pomello soil that is nearly level to gently sloping and moderately well drained and of areas of Urban land. This complex is on low ridges and knolls on the flatwoods.

This map unit consists of about 53 percent Pomello soil and about 40 percent Urban land. The included soils make up about 7 percent of this map unit. The proportions and the patterns of Pomello soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Pomello soil is dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 42 inches, is white fine sand. The upper part of the subsoil, to a depth of about 48 inches, is dark reddish brown fine sand. The lower part, to a depth of about 54 inches, is dark brown fine sand. The substratum to a depth of about 80 inches is light gray fine sand.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Archbold, Pompano, and Smyrna soils. Also included are some soils that are similar to Pomello soil but have a subsoil within 30 inches of the surface, some soils that have a subsoil at a depth of more than 50 inches, and some soils that are somewhat poorly drained in some of the lower parts of the landscape.

In most years, a seasonal high water table is at a depth of 24 to 40 inches for 1 month to 4 months and recedes to a depth of 40 to 60 inches during dry periods. Where drainage systems have been established, depth to the high water table is dependent upon the functioning of the drainage system. The permeability of Pomello soil is very rapid in the surface and subsurface layers, moderately rapid in the subsoil, and rapid in the substratum. The available water capacity is very low in the surface and subsurface layers and in the substratum, and it is medium in the subsoil. Natural fertility and the organic matter content are very low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Pomello soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit have severe limitations for sanitary facilities, building site development, and recreational uses. They have moderate limitations for dwellings without basements and small commercial buildings. Water control measures should be used to minimize the excessive wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of the soils in this map unit can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. Water control measures should be used to minimize the wetness limitation. In addition, the sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of water supplies. The sandy surface layer should be stabilized for recreational uses. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Regular applications of fertilizer are needed to maintain lawn grasses and landscape vegetation. For shallow excavations, water control measures should be used to minimize wetness. The sidewalls of shallow excavations should be shored.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

36—Pompano fine sand. This soil is nearly level and poorly drained. It is on broad, low flats and in poorly defined drainageways on the flatwoods. The slopes are smooth to concave and range from 0 to 2 percent.

In 80 percent of areas mapped as Pompano fine sand, Pompano soil makes up 77 to 95 percent of the mapped areas. Dissimilar soils make up 5 to 23 percent of the mapped areas.

Typically, this soil has a surface layer of dark gray fine sand about 4 inches thick. The upper part of the underlying material, to a depth of about 21 inches, is grayish brown fine sand that has common dark brown splotches. The lower part to a depth of about 80 inches is light gray fine sand.

Dissimilar soils included in mapping are Immokalee and Smyrna soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 2 to 6 months. During dry periods, it is at a depth of 30 inches for more than 9 months each year. The permeability is rapid. The available water capacity is very low. Natural fertility and the organic matter content are low.

In most areas, this Pompano soil has been left in natural vegetation. In a few areas, it is used for cultivated crops, improved pasture, or citrus crops or for homesite and urban development. The natural vegetation is longleaf pine, slash pine, and laurel oak. The understory includes waxmyrtle, inkberry, scattered saw palmetto, blue maidencane, pineland threeawn, sand cordgrass, low panicum, and various weeds and grasses.

Under natural conditions, this soil is poorly suited to cultivated crops because of wetness and the sandy texture. Adapted crops that can be grown on this soil are limited if very intensive management practices are not used. If proper management practices are used, this soil is fairly suited to cropland. A water control system to remove excess water rapidly and to provide for subsurface irrigation is necessary. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

The suitability of this soil for citrus trees is fair in areas that are relatively free of freezing temperatures and if a specially designed water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of lime and fertilizers are needed.

This soil has good suitability for improved pasture grasses and hay crops. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer and lime, and controlled grazing.

The potential of this soil for the production of pine trees is moderate. Equipment use and seedling mortality are the main concerns in management. A water control system is needed to remove excess surface water. Bedding the tree rows helps to minimize the wetness limitation. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. Water control measures should be used to minimize the excessive wetness limitation. In addition, the sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Water control measures should be used for shallow excavations. The sidewalls of shallow excavations should be shored.

This Pompano soil is in capability subclass IVw. The woodland ordination symbol for this soil is 8W.

37—St. Johns fine sand. This soil is nearly level and poorly drained. It is on broad flats on the flatwoods. The slopes are smooth to concave and range from 0 to 2 percent.

In 80 percent of areas mapped as St. Johns fine sand, St. Johns soil and similar soils make up 81 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 19 percent of the mapped areas.

Typically, the upper part of the surface layer of this soil is black fine sand about 7 inches thick. The lower part, to a depth of about 12 inches, is very dark gray fine sand. The subsurface layer, to a depth of about 24 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 30 inches, is black fine sand. The middle part, to a depth of about 36 inches, is dark reddish brown fine sand. The lower part, to a depth of about 44 inches, is brown fine sand. The upper part of the substratum, to a depth of about 58 inches, is light gray fine sand. The lower part to a depth of about 80 inches is pale brown fine sand. In the mapped areas are similar soils, but they have a surface layer that is less than 10 inches thick. In some places are similar soils, but they do not have a subsurface layer.

Dissimilar soils included in mapping are Immokalee and Wabasso soils in small areas.

In most years, a seasonal high water table is within 10 inches of the surface for 6 to 12 months and between depths of 10 and 40 inches for more than 6 months. In rainy periods, it rises to the surface for brief periods. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderately slow to moderate in the subsoil. The available water capacity is medium in the surface layer, very low to low in the subsurface layer and substratum, and medium to very high in the subsoil. Natural fertility is low. The organic matter content is moderate.

In most areas, this St. Johns soil has been left in natural vegetation. In a few areas, it is used for cultivated crops, improved pasture, or citrus crops or for homesite and urban development. The natural vegetation includes longleaf pine, slash pine, and laurel oak. The understory is waxmyrtle, inkberry, saw palmetto, pineland threeawn, bluestem, and various weeds and grasses.

Under natural conditions, this soil is poorly suited to cultivated crops or citrus crops because of wetness. However, if a water control system is installed and soil-improving measures are used, this soil is well suited to most cultivated crops. The suitability of this soil for citrus trees is fair in areas that are relatively free of freezing temperatures and if a specially designed water control system is installed to maintain the water table at a depth of about 4 feet. Planting the trees on beds provides good surface drainage. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of lime and fertilizer are needed. A water control system for cultivated crops is needed to remove excess surface water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

This soil has good suitability for improved pasture grasses and hay crops. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Management practices should include a water control system to remove excess water after heavy rains, regular applications of fertilizer and lime, and controlled grazing.

The potential of this soil for the production of pine trees is moderately high. Equipment use and seedling mortality are the main concerns in management. A water control system is needed to remove excess surface water. Bedding the tree rows helps to minimize the wetness limitation. Slash pine is an adapted tree to plant.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. Water control measures should be used and sewage lagoons and trench sanitary landfills should be sealed or lined with impervious soil material to reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Water control measures should be used for shallow excavations. The sidewalls of shallow excavations should be shored.

This St. Johns soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

38—St. Lucie fine sand, 0 to 5 percent slopes. This soil is deep, nearly level to gently sloping, and excessively drained. It is on the uplands. The slopes generally are uniform and range from 0 to 5 percent.

In 95 percent of areas mapped as St. Lucie fine sand, 0 to 5 percent slopes, St. Lucie soil and similar soils make up 94 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 6 percent of the mapped areas.

Typically, this soil has a surface layer of gray fine sand about 2 inches thick. The upper part of the underlying material, to a depth of about 6 inches, is light gray fine sand. The lower part to a depth of about 80 inches or more is white fine sand. In the mapped areas are similar soils, but they have brownish yellow or yellowish brown fine sand in the lower part of the underlying material.

Dissimilar soils included in mapping are Archbold soils in small areas.

A seasonal high water table is at a depth of 72 inches or more. The permeability is very rapid. The available water capacity is very low. Natural fertility and the organic matter content are very low.

In most areas, this St. Lucie soil has been left in natural vegetation. In a few areas, it is used for improved pasture or for homesite and urban development. The natural vegetation includes sand pine, Chapman oak, scrub live oak, and sand live oak. The understory is scattered saw palmetto, pricklypear cactus, goldleaf goldaster, deermoss, bluestem, and pineland threeawn.

Under natural conditions, this soil is not suited to cultivated crops, citrus crops, or improved pasture because it is very droughty and has low natural fertility. Response to fertilizer is low. Irrigation water moves rapidly through the soil, and little moisture is retained for plant use.

The potential of this soil for the production of pine trees is low. Equipment use and seedling mortality are the main concerns in management. Sand pine is an adapted tree to plant on this soil.

This soil has slight limitations for septic tank absorption fields, for dwellings without basements, and for local roads and streets. No corrective measures are needed. When installing a septic tank absorption field on this soil, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

This soil has slight limitations for small commercial buildings. Land shaping may be needed in the more sloping areas.

This soil has severe limitations for recreational uses, trench sanitary landfills, sewage lagoons, and shallow excavations. The sandy surface layer should be stabilized for recreational uses, and land shaping may be needed in the more sloping areas. Droughtiness is a problem during extended dry periods. Selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Regular applications of fertilizer are needed to establish and maintain lawn grasses and other landscape vegetation. The sealing or lining of a trench sanitary landfill or sewage lagoon with impervious soil material can reduce excessive seepage. The sidewalls for shallow excavations should be shored.

This St. Lucie soil is in capability subclass VIIs. The woodland ordination symbol for this soil is 3S.

39—St. Lucie-Urban land complex, 0 to 5 percent slopes. This complex consists of St. Lucie soil that is nearly level to gently sloping and excessively drained and of areas of Urban land. This complex is in the upland areas.

This map unit consists of about 53 percent St. Lucie soil and about 40 percent Urban land. The included soils make up about 7 percent of the map unit. The proportions and the patterns of St. Lucie soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of St. Lucie soil is gray fine sand about 3 inches thick. The upper part of the underlying material, to a depth of about 20 inches, is light gray fine sand. The lower part to a depth of about 80 inches or more is white fine sand.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Archbold soils. Also included are some soils that are similar to St. Lucie soil but are brownish yellow or yellowish brown in the lower part of the underlying material.

A seasonal high water table is at a depth of 72 inches or more. The permeability of St. Lucie soil is very rapid. The available water capacity is very low. Natural fertility and the organic matter content are very low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. St. Lucie soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit have slight limitations for septic tank absorption fields, dwellings without basements, and local roads and streets. No corrective measures are needed. When a septic tank absorption field is installed on these soils, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

The soils in this map unit have slight limitations for small commercial buildings. Land shaping may be needed in the more sloping areas.

These soils have severe limitations for recreational uses, trench sanitary landfills, sewage lagoons, and shallow excavations. The sandy surface layer should be stabilized for recreational uses, and land shaping may be needed in the more sloping areas. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Regular applications of fertilizer are needed to maintain lawn grasses and landscape vegetation. The sealing or lining of a trench sanitary landfill or sewage lagoon with impervious soil material can reduce excessive seepage. The sidewalls for shallow excavations should be shored.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

40—Samsula muck. This soil is nearly level and very poorly drained. It is in freshwater marshes and swamps. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are smooth and are less than 1 percent.

In 70 percent of areas mapped as Samsula muck, Samsula soil and similar soils make up 79 to 95 percent of the mapped areas. Dissimilar soils make up 5 to 21 percent of the mapped areas.

Typically, the upper part of the organic surface layer of this soil is black muck about 8 inches thick. The lower part, to a depth of about 40 inches, is dark reddish brown muck. The upper part of the underlying material, to a depth of about 44 inches, is very dark gray fine sand. The lower part to a depth of about 80 inches is light gray fine sand. In the mapped areas are similar soils, but they have fine sandy loam in the underlying material. In some places are similar soils, but they have a surface layer of muck that is more than 51 inches thick.

Dissimilar soils included in mapping are Basinger and Sanibel soils in small areas.

In most years, undrained areas of this soil are ponded for 6 to 9 months or more except during extended dry periods. A seasonal high water table fluctuates between depths of about 10 inches and the surface. If drained, the organic material, when dry, subsides to about half the original thickness. It subsides further as a result of compaction and oxidation. The loss of the organic material is more rapid during the first 2 years after the soil has been artificially drained. If the soil is intensively cultivated, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss of the organic material. The permeability is rapid throughout. Internal drainage is slow and is inhibited by the water table. The available water capacity is very high in the organic material and is very low in the underlying sandy material. Natural fertility is medium. The organic matter content is very high.

In most areas, this Samsula soil has been left in natural vegetation. In some areas, it has been drained and is used for improved pasture or cultivated crops. In a few areas where fill material has been applied, this soil is used for homesite and urban development. The natural vegetation is mixed stands of pondcypress, red maple, sweetgum, and black tupelo. The understory includes cattail, St. Johnswort, pickerelweed, sawgrass, maidencane, ferns, sedges, and other water-tolerant grasses. The natural areas provide cover for deer and excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops because of ponding. In most areas, an adequate drainage system is difficult to establish because suitable drainage outlets are not available. However, this soil is fairly suited to some vegetable crops if intensive management practices and soil-improving measures are used and if a water control system is installed to remove excess water rapidly. A specially designed and properly maintained water control system will remove the excess water when crops are on the soil and will keep the soil saturated at all other times. Proper management practices include seedbed preparation and crop rotation. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this soil is not suited to citrus trees. It is poorly suited even if intensive management practices, such as bedding of rows, are used and the water control system is adequate.

Under natural conditions, this soil is poorly suited to improved pasture grasses; however, if a water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

This soil is not suited to pine trees.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures should be used to minimize the excessive wetness limitation. Organic material should be removed and backfilled with a soil material suitable for urban use. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored and water control measures should be used to minimize the wetness limitation. Mounding of septic tank absorption fields may be needed.

This Samsula soil is in capability subclass VIIw but has not been assigned to a woodland group.

41—Samsula-Hontoon-Basinger association, depressional. The soils in this map unit are nearly level and very poorly drained. These soils are in freshwater swamps, depressions, sloughs, and broad, poorly defined drainageways. They are in a regular repeating pattern. Generally, Samsula soil is in the exterior areas of freshwater swamps and depressions that have a thinner accumulation of organic material. Hontoon soil is in the interior areas of freshwater swamps and depressions that have a thicker accumulation of organic material. Basinger soil is along the outer rims of depressions and in sloughs and poorly defined drainageways adjacent to freshwater swamps. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are smooth to concave and range from 0 to 1 percent.

In 90 percent of the areas of this map unit, Samsula-Hontoon-Basinger association, depressional, and similar soils make up 84 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 16 percent of the mapped areas. Generally, the mapped areas consist of about 47 percent Samsula soil and similar soils, 31 percent Hontoon soil, and 14 percent Basinger soil and similar soils. The relative proportions of these soils may differ appreciably from one delineated body to another. The individual soils are generally large enough areas to be mapped separately, but in considering the present and predicted use, they were mapped as one unit.

Typically, the surface layer of Samsula soil is black and dark reddish brown muck about 34 inches thick. The next layer, to a depth of about 40 inches, is black fine sand. The underlying material to a depth of about 80 inches is light gray fine sand. In the mapped areas are similar soils, but they have underlying material of fine sandy loam at a depth of 60 inches or more.

Typically, the upper part of the surface layer of Hontoon soil is black muck about 16 inches thick. The lower part to a depth of 80 inches is very dark brown muck.

Typically, the surface layer of Basinger soil is black fine sand about 6 inches thick. The subsurface layer, to a depth of about 25 inches, is gray fine sand. The subsoil, to a depth of about 35 inches, is dark reddish brown and grayish brown fine sand that has common dark reddish brown mottles. The substratum to a depth of about 80 inches is light gray fine sand. In the mapped areas are similar soils, but they have a surface layer of muck or mucky fine sand, or the soils are similar but have a surface layer that is more than 6 inches thick, or the soils are similar but have a substratum of loamy fine sand at a depth of 60 inches or more.

Dissimilar soils included in mapping are Holopaw and Ona soils in small areas.

In most years, undrained areas of this map unit are ponded for 6 to 9 months or more except during extended dry periods. The water table fluctuates between depths of about 10 inches and the surface for the remainder of the year. If drained, the organic material of the Samsula and Hontoon soils, when dry, subsides to about half the original thickness. It then subsides further as a result of compaction and oxidation. The loss of the organic material is more rapid during the first 2 years. If the soil is intensively cultivated, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss of organic material. The permeability is rapid in Samsula and Hontoon soils and very rapid in Basinger soil. The available water capacity is very high in the organic material of Samsula and Hontoon soils and very low in the sandy part of Samsula soil. The available water capacity of Basinger soil is very low to low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. Natural fertility is medium in Samsula and Hontoon soils and low in Basinger soil. The organic matter content is very high in Samsula and Hontoon soils and low in Basinger soil.

In most areas, the soils in this map unit have been left in natural vegetation. In some areas, the soils have been drained and are used for improved pasture. In other areas, they have been filled and are used for homesite and urban development. The natural vegetation is mixed stands of pondcypress, red maple, sweetgum, cabbage palm, scattered pond pine, and black tupelo. The understory includes cutgrass, maidencane, Jamaica sawgrass, sedges, ferns, and other water-tolerant grasses. In some areas, these soils provide cover for deer and excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, the Samsula, Hontoon, and Basinger soils are not suited to most cultivated crops and citrus crops because of ponding and excessive wetness. In most areas, an adequate drainage system is difficult to establish because suitable drainage outlets are not available. However, this soil is fairly suited to some vegetable crops if intensive management practices and soil-improving measures are used and if a water control system is installed to remove excess water rapidly. A specially designed and properly maintained water control system will remove excess water when crops are on the soil and will keep the soil saturated at all other times. Proper management practices include seedbed preparation and crop rotation. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, the soils in this map unit are poorly suited to improved pasture grasses; however, if a water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The soils in this map unit are not suited to pine trees.

The soils in this map unit have severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures are needed to minimize the excessive wetness limitation. Organic materials should be removed and backfilled with a fill material suitable for urban use. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored, and water control measures should be used to minimize the wetness limitation. The mounding of septic tank absorption fields may be necessary.

The soils in this association are in capability subclass VIIw. They have not been assigned to a woodland group.

42—Sanibel muck. This soil is nearly level and very poorly drained. It is in depressions, freshwater swamps and marshes, and in poorly defined drainageways. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are concave and are less than 1 percent.

In 80 percent of areas mapped as Sanibel muck, Sanibel soil and similar soils make up 81 to 95 percent of the mapped areas. Dissimilar soils make up 5 to 19 percent of the mapped areas.

Typically, this soil has an organic surface layer of black muck about 11 inches thick. Below that layer, to a depth of about 15 inches, is black fine sand. The upper part of the underlying material, to a depth of about 28 inches, is gray fine sand. The lower part to a depth of 80 inches or more is light gray fine sand that has common brown mottles. In the mapped areas are similar soils, but they have a surface layer of mucky fine sand. In places are similar soils, but they are loamy fine sand in the lower part of the underlying material.

Dissimilar soils included in mapping are Hontoon and Samsula soils in small areas.

In most years, undrained areas of this soil are ponded for 6 to 9 months or more except during extended dry periods. The water table fluctuates between depths of about 10 inches and the surface for 2 to 6 months. If drained, the organic material, when dry, subsides to about half the original thickness. It subsides further as a result of compaction and oxidation. The loss of the organic material is more rapid during the first 2 years after the soil has been artificially drained. If the soil is intensively cultivated, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss of organic material. The permeability is rapid throughout. Internal drainage is low and is inhibited by the shallow water table. The available water capacity is very high in the organic material and is medium to low in the underlying sandy material. Natural fertility is medium. The organic matter content is very high.

In most areas, this Sanibel soil has been left in natural vegetation. In some areas, it has been drained and is used for improved pasture or cultivated crops. In a few areas where fill material has been applied, the soil is used for homesite and urban development. The natural vegetation is mixed stands of baldcypress, red maple, sweetgum, and black tupelo. The understory includes cattail, St. Johnswort, pickerelweed, sawgrass, maidencane, ferns, sedges, and other water-tolerant grasses. The natural areas provide cover for deer and excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops because of ponding. In most areas, an adequate drainage system is difficult to establish because suitable drainage outlets are not available. However, if intensive management practices and soil-improving measures are used and if a water control system is installed to remove excess water rapidly, this soil is fairly suited to some vegetable crops. A specially designed and maintained water control system will remove excess water when crops are on the soil and will keep the soil saturated at all other times. Proper management practices include seedbed preparation and crop rotation. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this soil is not suited to citrus trees. It is poorly suited even if intensive management practices, such as bedding of rows, are used and if the water control system is adequate.

Under natural conditions, this soil is poorly suited to improved pasture grasses; however, if a water control system is installed to remove excess surface water after heavy rains, suitability is fair. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

This soil is not suited to pine trees.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures should be used to minimize the excessive wetness limitation. Organic material should be removed and backfilled with a soil material suitable for urban use. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored, and water control measures should be used to minimize the wetness limitation. Mounding of septic tank absorption fields may be needed.

This Sanibel soil is in capability subclass VIIw but has not been assigned to a woodland group.

43—Seffner fine sand. This soil is nearly level and somewhat poorly drained. It is on the rims of depressions and on broad, low ridges on the flatwoods. The slopes are smooth to concave and range from 0 to 2 percent.

In 90 percent of areas mapped as Seffner fine sand, Seffner soil and similar soils make up 85 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 15 percent of the mapped areas.

Typically, the upper part of the surface layer is black fine sand about 6 inches thick. The lower part, to a depth of about 19 inches, is very dark grayish brown fine sand. The upper part of the underlying material, to a depth of about 36 inches, is grayish brown fine sand. The middle part, to a depth of about 52 inches, is light gray fine sand that has common dark brown mottles. The lower part to a depth of 80 inches or more is white fine sand that has common brown mottles. In the mapped areas are similar soils, but they have a surface layer that is less than 10 inches thick. In places are similar soils, but they have a surface layer that is more than 24 inches thick. In some higher positions on the landscape are similar soils, but they are moderately well drained.

Dissimilar soils included in mapping are Basinger and Ona soils in small areas.

In most years, a seasonal high water table is within 18 to 40 inches of the surface for 2 to 4 months and between depths of 10 to 20 inches for periods of up to 2 weeks during wet periods. It recedes to a depth of less than 60 inches during extended dry periods. The permeability is rapid throughout. The available water capacity is medium in the surface layer, and it is low to very low in the underlying material. Natural fertility is medium. The organic matter content is moderate to moderately low.

In most areas, this Seffner soil is used for citrus crops or improved pasture or for homesite and urban development. In a few areas, it is used for cultivated crops. The natural vegetation is longleaf pine, slash pine, live oak, and laurel oak. The understory includes waxmyrtle, fetterbush lyonia, creeping bluestem, broomsedge bluestem, grassleaf goldaster, lopsided indiangrass, saw palmetto, panicum, and pineland threeawn.

Under natural conditions, this soil is poorly suited to most cultivated crops. The number of adapted crops that can be grown is limited unless intensive management practices are used. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

The suitability of this soil for citrus crops is fair in areas that are relatively free of freezing temperatures and if proper management practices are used. A close-growing cover crop between trees is needed to protect the soil from blowing. A water control system is necessary to maintain the water table at a depth of about 4 feet during wet periods. A specially designed and properly managed irrigation system helps to maintain optimum soil moisture and obtain maximum yields. Regular applications of fertilizer and lime are needed.

The suitability of this soil for improved pasture grasses is fair. Pangolagrass and improved bahiagrass grow well if properly managed. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential of this soil for the production of pine trees is moderately high. Equipment use, seedling mortality, and plant competition are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for sanitary facilities, shallow excavations, and recreational uses. It has moderate limitations for dwellings without basements, small commercial buildings, and local roads and streets. Water control measures should be used to minimize the excessive wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The sidewalls for shallow excavations should be shored. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Droughtiness is a problem during extended dry periods. Regular applications of fertilizer are needed to maintain lawns and landscape vegetation. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies.

This Seffner soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

44—Smyrna fine sand. This soil is nearly level and poorly drained. It is on broad flatwoods. The slopes are smooth and range from 0 to 2 percent.

In 95 percent of areas mapped as Smyrna fine sand, Smyrna soil and similar soils make up 90 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 10 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 4 inches thick. The subsurface layer, to a depth of about 17 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 22 inches, is black fine sand. The lower part, to a depth of about 27 inches, is dark brown fine sand. The upper part of the substratum, to a depth of about 53 inches, is pale brown fine sand. The lower part to a depth of 80 inches or more is light gray fine sand. In the mapped areas are similar soils, but they have a surface layer that is more than 8 inches thick. In places are similar soils, but they do not have a subsurface layer, and in other places are similar soils, but they have a subsoil at a depth of more than 20 inches.

Dissimilar soils included in mapping are Wabasso soils in small areas. In some areas, reaction in the loamy subsoil layer of the Wabasso soils is very strongly acid.

In most years, a seasonal high water table is within 10 inches of the surface for 1 month to 4 months. It recedes to a depth of 10 to 40 inches for more than 6 months. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderate to moderately rapid in the subsoil. The available water capacity is low to very low in the surface and subsurface layers and in the substratum, and it is medium in the subsoil. Natural fertility is low. The organic matter content is moderate to moderately low.

In most areas, this Smyrna soil has been left in natural vegetation. In a few areas, it is used for cultivated crops, improved pasture, or citrus crops or for homesite and urban development. The natural vegetation is longleaf pine and slash pine. The understory includes lopsided indiangrass, inkberry, saw palmetto, pineland threeawn, waxmyrtle, bluestem, panicum, and other grasses.

Under natural conditions, this soil is poorly suited to cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil-improving measures are used, this soil is fairly suited to many vegetable crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops and crop residue should be used to control erosion and to maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

The suitability of this soil for citrus trees is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of lime and fertilizer are needed.

This soil has good suitability for improved pasture grasses and hay crops. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. A water control system is needed to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime should be applied according to the need of the crop. Overgrazing should be prevented.

The potential of this soil for the production of pine trees is moderately high. Equipment use, seedling mortality, and plant competition are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for sanitary facilities, building site development, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Septic tank absorption fields may need to be enlarged because of wetness. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. Fill material is needed for local roads and streets, small commercial buildings, and playgrounds. The sidewalls of shallow excavations should be shored, and water control measures should be used to minimize the wetness limitation. The sandy surface layer should be stabilized for recreational uses.

This Smyrna soil is in capability subclass IVw. The woodland ordination symbol for this soil is 10W.

45—Smyrna-Urban land complex. This complex consists of Smyrna soil that is nearly level and poorly drained and of areas of Urban land. This complex is on the flatwoods. The slopes are smooth and range from 0 to 2 percent.

This map unit consists of about 53 percent Smyrna soil and about 40 percent Urban land. The included soils make up about 7 percent of the map unit. The proportions and the patterns of Smyrna soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Smyrna soil is black fine sand about 5 inches thick. The subsurface layer, to a depth of 18 inches, is light gray fine sand. The upper part of the subsoil, to a depth of about 22 inches, is black fine sand. The lower part, to a depth of about 28 inches, is dark brown fine sand. The upper part of the substratum, to a depth of about 50 inches, is grayish brown fine sand. The lower part to a depth of about 80 inches is pale brown fine sand.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Wabasso soils. In some areas, the argillic horizon of Wabasso soils is very strongly acid. Also included are some soils that are similar to Smyrna soils but have a surface layer that is more than 8 inches thick, do not have a subsurface layer, and have a subsoil at a depth of 20 inches or more.

Some areas of Smyrna-Urban land complex have been modified by grading and shaping. The sandy material from drainage ditches or fill material that is hauled in are often used to fill the low areas. In undrained areas, a seasonal high water table is within 10 inches of the surface for 1 month to 4 months. Drainage systems have been established in most areas. Depth to the high water table is dependent upon the functioning of the drainage system. The permeability of Smyrna soil is rapid in the surface and subsurface layers and in the substratum. It is moderate to moderately rapid in the subsoil. The available water capacity of Smyrna soil is low to very low in the surface and subsurface layers and in the substratum. It is medium in the subsoil. Natural fertility is low. The organic matter content is moderate to moderately low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Smyrna soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit have severe limitations for sanitary facilities and shallow excavations. Water control measures should be used to minimize the excessive wetness limitations for these uses. Septic tank absorption fields may need to be enlarged because of wetness. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored.

The soils in this map unit have moderate limitations for dwellings without basements, small commercial buildings, and recreational uses. Many of these areas have been previously drained or modified by grading and shaping. Some water control measures should be used, fill material added, land leveled, and a drainage system installed to remove excess surface water after heavy rains to minimize the wetness limitations. The sandy surface layer should be stabilized for recreational uses.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

46—Tavares fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on low ridges and knolls on the uplands throughout the county. The slopes are smooth to concave.

In 90 percent of areas mapped as Tavares fine sand, 0 to 5 percent slopes, Tavares soil and similar soils make up 78 to 92 percent of the mapped areas. Dissimilar soils make up 8 to 22 percent of the mapped areas.

Typically, this soil has a surface layer of very dark gray fine sand about 6 inches thick. The upper part of the underlying material, to a depth of about 16 inches, is brown fine sand. The middle part, to a depth of about 41 inches, is pale brown fine sand. The lower part to a depth of 80 inches is white fine sand. In the mapped areas are similar soils, but they have a surface layer that is more than 9 inches thick. In some areas are other similar soils, but the underlying material of these soils is brown to dark brown sand or fine sand. In some parts of the landscape are similar soils, but they are somewhat poorly drained; and in other parts of the landscape are similar soils, but they are well drained.

Dissimilar soils included in mapping are Apopka, Candler, Millhopper, and Pomello soils in small areas.

In most years, a seasonal high water table is at a depth of 40 to 80 inches for more than 6 months, and it recedes to a depth of more than 80 inches during extended dry periods. The permeability is very rapid throughout. The available water capacity is very low. Natural fertility and the organic matter content are very low.

In most areas, this Tavares soil is used for citrus crops or for homesite and urban development. In a few areas, it is used for improved pasture or cultivated crops; or it has been left in natural vegetation. The natural vegetation is water oak, laurel oak, live oak, turkey oak, slash pine, and longleaf pine. The understory includes creeping bluestem, lopsided indiangrass, and pineland threeawn.

Under natural conditions, this soil is poorly suited to cultivated crops. It is fairly well suited to citrus crops in areas that are relatively free of freezing temperatures and if good management practices are used. Management practices include irrigation and regular applications of fertilizer and lime. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Soil-improving crops and crop residue should be used to control erosion and maintain the organic matter content in the soil.

Under natural conditions, this soil is poorly suited to improved pasture grasses. Intensive management practices are needed to minimize soil limitations, which include droughtiness and low fertility. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are more drought tolerant. Regular applications of fertilizer and lime are needed. Management practices should include controlled grazing.

The potential of this soil for the production of pine trees is moderately high. Seedling mortality and equipment use are the main concerns in management. Slash pine and South Florida slash pine are the recommended trees to plant.

This soil is well suited to dwellings without basements, small commercial buildings, and local roads and streets. No corrective measures are needed.

This soil has moderate limitations for septic tank absorption fields, and water control measures should be used. When installing a septic tank absorption field on this soil, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

This soil has severe limitations for sewage lagoons, sanitary landfills, shallow excavations, and recreational uses. The sandy surface layer should be stabilized for recreational uses. The sidewalls of shallow excavations should be shored. The sealing or lining of a trench sanitary landfill or sewage lagoon with impervious soil material can reduce excessive seepage. Water control measures should be used for trench sanitary landfills.

This Tavares soil is in capability subclass IIIs. The woodland ordination symbol for this soil is 10S.

47—Tavares-Millhopper fine sands, 0 to 5 percent slopes. The soils in this map unit are nearly level to gently sloping and moderately well drained. These soils are on low ridges and knolls on the uplands and on the flatwoods. They occur in a regular repeating pattern. The slopes are nearly smooth to slightly convex.

In 90 percent of the areas of this map unit, Tavares-Millhopper fine sands, 0 to 5 percent slopes, and similar soils make up 94 to 98 percent of the mapped areas, and dissimilar soils make up 2 to 6 percent of the mapped areas. Generally, the mapped areas consist of about 68 percent Tavares soil and similar soils and about 28 percent Millhopper soil and similar soils. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication. The proportions and patterns of Tavares, Millhopper, and similar soils, however, are relatively consistent in most delineations of the map unit.

Typically, the surface layer of Tavares soil is dark grayish brown fine sand about 6 inches thick. The upper part of the underlying material, to a depth of about 21 inches, is pale brown fine sand. The middle part, to a depth of about 60 inches, is very pale brown fine sand. The lower part to a depth of 80 inches is white fine sand that has common very pale brown mottles. In the mapped areas are similar soils, but they have a surface layer that is more than 9 inches thick. In some places are similar soils, but the lower part of the underlying material of these soils is brown or dark brown fine sand. In some parts of the landscape are similar soils, but they are somewhat poorly drained or well drained.

Typically, the surface layer of Millhopper soil is dark grayish brown fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of about 40 inches, is light yellowish brown fine sand. The lower part, to a depth of about 64 inches, is very pale brown fine sand that has few yellowish brown mottles. The upper part of the subsoil, to a depth of about 76 inches, is brownish yellow sandy loam. The lower part to a depth of more than 80 inches is light gray sandy clay loam that has common yellowish brown and yellowish red mottles. In the mapped areas are similar soils, but they have a subsoil within 40 inches of the surface. In some parts of the landscape are similar soils, but they are well drained.

Dissimilar soils included in mapping are small areas of Candler soils.

A seasonal high water table in Tavares soil is at a depth of 40 to 72 inches for more than 6 months, and it recedes to a depth of more than 80 inches during extended dry periods. A seasonal high water table in Millhopper soil is at a depth of 40 to 60 inches for 1 month to 4 months, and it recedes to a depth of 60 to 72 inches for 2 to 4 months. During periods of high rainfall, the water table is at a depth of 30 to 40 inches for cumulative periods of 1 week to 3 weeks. The permeability of Tavares soil is very rapid. The permeability of Millhopper soil is rapid in the surface and subsurface layers and moderately rapid or moderate in the subsoil. The available water capacity of Tavares soil is very low. The available water capacity of Millhopper soil is low in the surface and subsurface layers and medium in the subsoil. Natural fertility is very low in Tavares soil and low in Millhopper soil. Organic matter content is very low in Tavares soil and low or moderately low in Millhopper soil.

In most areas, the soils in this map unit are used for citrus crops or improved pasture or for homesite and urban development. In a few areas, they are used for cultivated crops. The natural vegetation is water oak, laurel oak, turkey oak, live oak, slash pine, and longleaf pine. The understory includes creeping bluestem, lopsided indiangrass, panicum, and pineland threeawn.

The soils in this map unit are well suited to citrus trees in areas that are relatively free of freezing temperatures and if proper management practices are used. Management practices should include irrigation and regular applications of fertilizer and lime. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Under natural conditions, these soils are poorly suited to most cultivated crops. Droughtiness and rapid leaching of plant nutrients are the main limitations. Management practices should include irrigation and regular applications of fertilizer and lime. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil.

Under natural conditions, the soils in this map unit are poorly suited to improved pasture. Intensive management practices are needed to minimize soil limitations, including droughtiness and low natural fertility. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are more drought tolerant. Regular applications of fertilizer and lime are needed. Management practices should include controlled grazing.

The potential of these soils for the production of pine trees is moderately high. Seedling mortality, equipment use, and plant competition are the main concerns in management. Slash pine and longleaf pine are adapted trees to plant.

The soils in this map unit have slight limitations for dwellings without basements, small commercial buildings, and local roads and streets. Land shaping may be needed in the more sloping areas.

These soils have moderate limitations for septic tank absorption fields. Water control measures should be used for septic tank absorption fields. When installing a septic tank absorption field on these soils, the proximity to a stream or canal should be considered to prevent lateral seepage and ground water pollution. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

These soils have severe limitations for sewage lagoons, trench sanitary landfills, shallow excavations, and recreational uses. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Water control measures should be used for trench sanitary landfills. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses.

The soils in this map unit are in capability subclass IIIs. The woodland ordination symbol for this soil is 10S.

48—Tavares-Urban land complex, 0 to 5 percent slopes. This complex consists of Tavares soil that is nearly level to gently sloping and moderately well drained and of areas of Urban land. This complex is on low ridges and knolls on the uplands and on the flatwoods.

This map unit consists of about 50 percent Tavares soil and about 40 percent Urban land. The included soils make up about 10 percent of the map unit. The proportions and the patterns of Tavares soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Tavares soil is dark gray fine sand about 6 inches thick. The upper part of the underlying material, to a depth of about 10 inches, is grayish brown fine sand. The middle part, to a depth of about 48 inches, is pale brown fine sand. The lower part to a depth of about 80 inches is very pale brown fine sand that has common dark brown mottles.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Apopka, Candler, Millhopper, and Pomello soils. Also included are some soils that are similar to Tavares soil but have a surface layer that is more than 9 inches thick, have brown or dark brown sand or fine sand in the lower part of the underlying material, and are somewhat poorly drained or well drained in some parts of the landscape.

In most areas, the soils in this map unit are artificially drained by established drainage systems. However, the depth to the water table is dependent upon the functioning of the drainage system. In undrained areas, a seasonal high water table is at a depth of 40 to 80 inches for more than 6 months, and it recedes to a depth of more than 80 inches during extended dry periods. The permeability of Tavares soil is very rapid throughout. The available water capacity is very low.

Natural fertility and the organic matter content are very low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Tavares soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit are well suited to dwellings without basements, small commercial buildings, and local roads and streets. Land shaping may be needed in the more sloping areas.

These soils have moderate limitations for septic tank absorption fields. Water control measures should be used to minimize the excessive wetness limitation. The rapid permeability of the soils in this map unit can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies.

The soils in this map unit have severe limitations for sewage lagoons, trench sanitary landfills, shallow excavations, and recreational uses. For these uses, water control measures should be used to minimize the wetness limitation. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. Land shaping may be needed in the more sloping areas. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Regular applications of fertilizer are needed to maintain lawn grasses and landscape vegetation.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

49—Terra Ceia muck. This soil is nearly level and very poorly drained. It is in freshwater swamps and marshes that are mainly north of Lake Apopka. Large ditches and canals equipped with water control structures dissect the map unit in most places. Undrained areas are ponded for 6 to 9 months or more each year. The slopes are smooth and are less than 1 percent.

In 95 percent of areas mapped as Terra Ceia muck, Terra Ceia soil and similar soils make up 85 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 15 percent of the mapped areas.

Typically, this soil has an organic layer of black muck about 9 inches thick. Below that layer, to a depth of about 74 inches or more, is dark brown muck. The underlying material to a depth of 80 inches or more is light gray sandy clay loam. In the mapped areas are similar soils, but they have thin layers of fibers from woody plants at a depth of 31 to 51 inches.

Dissimilar soils included in mapping are Gator and Okeelanta soils in small areas.

Under natural conditions, the water table is at or above the surface for most of the year except during extended dry periods. In most areas, the soil in this map unit is artificially drained by tile drains and surface ditches. In drained areas, the water table is controlled at a depth of 10 to 36 inches, or according to the need of the crop. The water table is at or above the surface for short periods after heavy rains. If drained, the organic material, when dry, subsides to about half the original thickness. It subsides further as a result of compaction and oxidation. The loss of the organic material is more rapid during the first 2 years after the soil has been artificially drained. If the soil is intensively cultivated, the organic material continues to subside at the rate of about 1 inch per year. The lower the water table, the more rapid the loss of organic material. The permeability is rapid throughout. Internal drainage is impeded by the shallow water table. The available water capacity is very high throughout. The natural fertility is high. The organic matter content is very high.

In most areas, this Terra Ceia soil is used mainly for cultivated crops, such as cabbage, celery, endives, lettuce, and radishes. In a few areas, where fill material has been applied, this soil is used for urban development. The natural vegetation is Carolina willow, water primrose, waxmyrtle, pickerelweed, sawgrass, cattail, buttonbush, arrowhead, maidencane, ferns, and other water-tolerant grasses. The natural areas provide cover for deer and are excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops. However, if intensive management practices and soil-improving measures are used and if a water control system is installed to remove excess water rapidly, this soil has good suitability for many vegetable crops. A specially designed water control system should be installed and maintained to remove the excess water when crops are on the soil and to keep the soil saturated at all other times. Proper management practices include seedbed preparation and crop rotation. Soil-improving crops and crop residue should be used to control erosion and maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

Under natural conditions, this soil is not suited to citrus trees. It is poorly suited to this use even if intensive management practices, such as bedding of rows, are used and the water control system is adequate.

Under natural conditions, this soil is not suited to improved pasture grasses; however, if a water control system is installed to remove excess surface water after heavy rains, suitability is good. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. The water control system should maintain the water table near the surface to prevent excess subsidence of the organic material. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

This soil is not suited to pine trees.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses because of ponding and excess humus. Water control measures should be used to minimize the excessive wetness limitation. Organic material, which has low soil strength, should be removed and backfilled with a soil material suitable for urban use. Constructing buildings on pilings can help prevent structural damage that is caused by soil subsidence. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored. Water control measures should be used to minimize the excessive wetness limitation. Mounding of septic tank absorption fields may be needed.

This Terra Ceia soil is in capability subclass IIIw and has not been assigned to a woodland group.

50—Urban land. This miscellaneous area is covered by such urban facilities as shopping centers, parking lots, industrial buildings, houses, streets, sidewalks, airports, and related urban structures. The natural soil cannot be observed. The slopes are dominantly less than 2 percent but range to 5 percent.

In areas mapped as Urban land, 85 percent or more of the surface is covered by asphalt, concrete, buildings, and other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in this map unit are moderately urbanized areas where structures cover 50 to 85 percent of the surface. Candler, Florahome, Millhopper, Ona, Pomello, St. Lucie, Smyrna, Tavares, and Wabasso soils mostly are used for lawns, playgrounds, parks, and open areas. These soils generally have been altered by grading and shaping or have been covered by about 12 inches of fill material. This fill material consists of sandy and loamy material that may contain fragments of limestone and shell. The individual areas of soils in this map unit are too small to map separately at the scale used for the maps in the back of this publication.

Drainage systems have been established in most areas of Urban land. Depth to the seasonal high water table is dependent upon the functioning of the drainage system.

Urban land has not been assigned to a capability subclass or to a woodland group.

51—Wabasso fine sand. This soil is nearly level and poorly drained. It is on broad flatwoods. The slopes are smooth to slightly convex and range from 0 to 2 percent.

In 90 percent of areas mapped as Wabasso fine sand, Wabasso soil and similar soils make up 96 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 4 percent of the mapped areas.

Typically, this soil has a surface layer of black fine sand about 3 inches thick. The subsurface layer, to a depth of about 18 inches, is light brownish gray fine sand. The upper part of the subsoil, to a depth of about 21 inches, is black fine sand. The middle part, to a depth of about 45 inches, is very pale brown sandy clay loam that has common yellowish brown mottles. The lower part, to a depth of 70 inches, is light gray sandy clay loam that has common yellowish brown mottles. The substratum to a depth of 80 inches or more is light brownish gray loamy sand. In the mapped areas are similar soils, but some of these soils have a subsoil at a depth of 30 inches, in some soils the lower part of the subsoil is at a depth of more than 40 inches, and in some the upper part of the subsoil is weakly coated with colloidal organic matter.

Dissimilar soils included in mapping are Immokalee and Smyrna soils in small areas.

In most years, a seasonal high water table is at a depth of less than 10 inches for 1 month to 5 months. It recedes to a depth of more than 40 inches during extended dry periods. The permeability is rapid in the surface and subsurface layers and in the substratum. It is moderate in the sandy part of the subsoil and slow or very slow in the loamy part. The available water capacity is very low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. Natural fertility is low. The organic matter content is moderate to moderately low.

In most areas, this Wabasso soil has been left in natural vegetation. In a few areas, it is used for cultivated crops, improved pasture, or citrus crops or for homesite and urban development. The natural vegetation is longleaf pine and slash pine. The understory includes lopsided indiangrass, inkberry, saw palmetto, pineland threeawn, waxmyrtle, bluestem, panicum, and other grasses.

This soil has very severe limitations for cultivated crops because of wetness and the sandy texture in the root zone. However, if a water control system is installed and soil-improving measures are used, this soil is fairly suited to many vegetable crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops and crop residue should be used to control erosion and to maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer and lime should be applied according to the need of the crop.

The suitability of this soil for citrus trees is good in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds lowers the effective depth of the water table. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of lime and fertilizer are needed.

This soil has good suitability for improved pasture grasses and hay crops. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Water control measures should be used to remove the excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

The potential of this soil for the production of pine trees is moderately high. Equipment use, seedling mortality, and plant competition are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for dwellings without basements, small commercial buildings, local roads and streets, sewage lagoons, trench sanitary landfills, septic tank absorption fields, recreational areas, and shallow excavations. Water control measures should be used to minimize the excessive wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. The sealing or lining of a sewage lagoon or trench sanitary landfill can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. The sidewalls of shallow excavations should be shored.

This Wabasso soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

52—Wabasso-Urban land complex. This complex consists of Wabasso soil that is nearly level and poorly drained and of areas of Urban land. This complex is on the flatwoods. The slopes are smooth and range from 0 to 2 percent.

This map unit consists of about 57 percent Wabasso soil and about 40 percent Urban land. The included soils make up about 3 percent of the map unit. The proportions and the patterns of Wabasso soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Wabasso soil is dark gray fine sand about 4 inches thick. The subsurface layer, to a depth of about 16 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 25 inches, is black and dark brown fine sand. The middle part, to a depth of about 35 inches, is gray sandy clay loam that has common dark yellowish brown mottles. The lower part, to a depth of about 42 inches, is grayish brown sandy clay loam that has common brownish yellow mottles. The substratum to a depth of about 80 inches or more is gray fine sand.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Immokalee, Pineda, and Smyrna soils. Also included are some soils that are similar to Wabasso soil, but in some of these soils, the upper part of the subsoil extends to a depth of more than 30 inches, in some the lower part of the subsoil extends to a depth of more than 40 inches, and in some the upper part of the subsoil is weakly coated with colloidal organic matter.

Some areas of Wabasso-Urban land complex have been modified by grading and shaping. The sandy and loamy material from drainage ditches or fill material that is hauled in is often used to fill the low areas. In undrained areas, a seasonal high water table is at a depth of 10 to 40 inches for more than 6 months and at a depth of less than 10 inches for 1 month to 2 months. It recedes to a depth of more than 40 inches during extended dry periods. Drainage systems have been established in most areas. Depth to the high water table is dependent upon the functioning of the drainage system. The permeability of Wabasso soil is rapid in the surface and subsurface layers and in the substratum. It is moderate in the sandy part of the subsoil and slow or very slow in the loamy part. The available water capacity is very low in the surface and subsurface layers and in the substratum. It is medium in the subsoil. Natural fertility is low. The organic matter content is moderate to moderately low.

The soils in this map unit are not used for cultivated crops, citrus crops, improved pasture, or commercial trees. Wabasso soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit have severe limitations for sanitary facilities, shallow excavations, building site development, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation for these uses. Septic tank absorption fields may need to be enlarged because of wetness and slow permeability. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sidewalls of shallow excavations should be shored. Many of these areas have been previously drained or modified by grading and shaping. For building site development, some water control measures may be needed. Such measures include the addition of fill material, land leveling, and installation of a drainage system to remove excess surface water after heavy rains. The sandy surface layer should be stabilized for recreational uses.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

53—Wauberg fine sand. This soil is nearly level and poorly drained. It is in low areas on the flatwoods. The slopes are nearly smooth to slightly concave and range from 0 to 2 percent.

In 95 percent of areas mapped as Wauberg fine sand, Wauberg soil and similar soils make up 87 to 99 percent of the mapped areas. Dissimilar soils make up 1 to 13 percent of the mapped areas.

Typically, the upper part of the surface layer of this soil is black fine sand about 5 inches thick. The lower part, to a depth of about 8 inches, is very dark gray fine sand. The subsurface layer, to a depth of about 28 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 52 inches, is dark gray sandy clay loam that has common dark brown mottles. The lower part, to a depth of about 60 inches, is gray sandy clay loam that has common white mottles. The substratum to a depth of about 80 inches or more is light gray sandy clay. In the mapped areas are similar soils, but they have a surface layer that is more than 9 inches thick. In some places are similar soils, but they have a surface layer of mucky fine sand, and also other similar soils, but these soils have a subsoil within 20 inches of the surface.

Dissimilar soils included in mapping are Wabasso soils in small areas. Also included are areas of soils that have a subsoil at a depth of more than 40 inches. Other dissimilar soils included in the mapped areas have a thick, dark surface layer. These soils are in depressions.

In most years, a seasonal high water table is within 12 inches of the surface for a period of about 6 months, and it recedes to a depth of more than 40 inches during extended dry periods. The water table is above the surface for short periods after heavy rains. The permeability is rapid in the surface and subsurface layers, very slow in the upper part of the subsoil and the substratum, and moderately slow in the lower part of the subsoil. The available water capacity is low to medium in the surface layer, subsoil, and substratum. It is very low to low in the subsurface layer. Natural fertility is low. The organic matter content is moderately low to moderate.

In most areas, this Wauberg soil has been left in natural vegetation. In a few areas, it is used for improved pasture or cultivated crops. The natural vegetation is mixed stands of pondcypress, red maple, laurel oak, sweetgum, slash pine, and longleaf pine. The understory includes bulrush, waxmyrtle, sand cordgrass, creeping bluestem, chalky bluestem, maidencane, panicum, and various other weeds and grasses.

Under natural conditions, this soil is poorly suited to cultivated crops. However, it is well suited to vegetable crops if a water control system is installed to remove excess water rapidly and to provide for subsurface irrigation. Soil-improving crops and crop residue should be used to control erosion and to maintain the content of organic matter in the soil. Seedbed preparation should include the bedding of rows. Fertilizer should be applied according to the need of the crop.

Suitability of this soil for citrus trees is fair in areas that are relatively free of freezing temperatures and if a water control system is installed to maintain the water table at a depth of about 4 feet. Planting trees on beds provides good surface drainage. A close-growing cover crop between tree rows is needed to protect the soil from blowing. Regular applications of fertilizer are needed.

This soil is well suited to improved pasture grasses. Pangolagrass, improved bahiagrass, and white clover grow well if properly managed. Management practices should include a water control system to remove excess surface water after heavy rains, regular applications of fertilizer, and controlled grazing.

The potential of this soil for the production of pine trees is high. Water control measures are necessary to remove excess surface water. Bedding the tree rows helps to minimize the wetness limitation. Wetness, slow internal drainage, seedling mortality, and plant competition are the main concerns in management. Slash pine is an adapted tree to plant on this soil.

This soil has severe limitations for building site development, sanitary facilities, and recreational uses. Water control measures should be used to minimize the excessive wetness limitation. Fill material is needed in most areas for building site development. Mounding of the septic tank absorption field can help to minimize the excessive wetness limitation. Increasing the size of the absorption field can minimize the limitation caused by the slow permeability or very slow permeability of the subsoil and substratum. The sandy surface layer should be stabilized for recreational uses. The sidewalls of shallow excavations should be shored. Water control measures should be used to minimize the wetness limitation.

This Wauberg soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 11W.

54—Zolfo fine sand. This soil is nearly level and somewhat poorly drained. It is in broad, slightly higher positions adjacent to the flatwoods. The slopes are smooth to convex and range from 0 to 2 percent.

In 90 percent of areas mapped as Zolfo fine sand, Zolfo soil and similar soils make up 77 to 93 percent of the mapped areas. Dissimilar soils make up 7 to 23 percent of the mapped areas.

Typically, this soil has a surface layer of dark grayish brown fine sand about 5 inches thick. The upper part of the subsurface layer, to a depth of about 23 inches, is grayish brown fine sand. The middle part, to a depth of about 38 inches, is light brownish gray fine sand that has common brownish yellow mottles. The lower part, to a depth of about 55 inches, is very pale brown fine sand that has common brownish yellow mottles. The upper part of the subsoil, to a depth of about 71 inches, is brown fine sand. The lower part to a depth of 80 inches or more is dark brown fine sand. In the mapped areas are similar soils, but they have a subsoil at a depth of more than 80 inches. In some parts of the landscape are other similar soils, but they are moderately well drained.

Dissimilar soils included in mapping are Lochloosa, Millhopper, Pomello, and Smyrna soils in small areas.

In most years, a seasonal high water table is at a depth of 24 to 40 inches for 2 to 6 months. It is at a depth of 10 to 24 inches during periods of heavy rains. It recedes to a depth of about 60 inches during extended dry periods. The permeability is rapid in the surface and subsurface layers, and it is moderate in the subsoil. The available water capacity is low in the surface and subsurface layers and is medium in the subsoil. Natural fertility and the organic matter content are low.

In most areas, this Zolfo soil is used for citrus crops or improved pasture or for homesite and urban development. In a few areas, it is used for cultivated crops. The natural vegetation is water oak, live oak, laurel oak, turkey oak, longleaf pine, and slash pine. The understory includes broomsedge bluestem, chalky bluestem, lopsided indiangrass, saw palmetto, pineland threeawn, and other perennial grasses.

Under natural conditions, this soil is poorly suited to cultivated crops because of periodic wetness and droughtiness as a result of the low available water capacity. However, if adequate water control and soil-improving measures are used, this soil is well suited to some vegetable crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation in dry periods. Soil-improving crops and crop residue should be used to control erosion and to maintain the content of organic matter in the soil. Fertilizer and lime should be applied according to the need of the crop.

The suitability of this soil for citrus trees is fair in areas that are relatively free of freezing temperatures and if proper management practices are used. A water control system is needed to maintain the water table at a depth of about 4 feet during the wet periods and to provide for subsurface irrigation during periods of low rainfall. Regular applications of fertilizer and lime help to obtain optimum yields. A suitable cover crop between tree rows should be maintained to protect the soil from blowing.

This soil is fairly suited to improved pasture grasses. Bahiagrass and pangolagrass are better suited to this soil than other grasses. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential of this soil for the production of pine trees is moderately high. Seedling mortality is the main concern in management. Slash pine and longleaf pine are adapted trees to plant.

This soil has severe limitations for sanitary facilities, most building site development, and recreational uses. It has moderate limitations for dwellings without basements, small commercial buildings, and local roads and streets. Water control measures should be used to minimize the excessive wetness limitation. Septic tank absorption fields may need to be enlarged because of wetness. The rapid permeability of this soil can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. Water control measures should be used to minimize the wetness limitation, and the sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The sandy surface layer should be stabilized for recreational uses. Water control measures should be used, and the sidewalls of shallow excavations should be shored. The proximity of a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies.

This Zolfo soil is in capability subclass IIIw. The woodland ordination symbol for this soil is 10W.

55—Zolfo-Urban land complex. This complex consists of Zolfo soil that is nearly level and somewhat poorly drained and of areas of Urban land. This complex is in broad, slightly higher positions adjacent to the flatwoods. The slopes are smooth and range from 0 to 2 percent.

This map unit consists of about 50 percent Zolfo soil and about 40 percent Urban land. The included soils make up about 10 percent of the map unit. The proportions and the patterns of Zolfo soil and Urban land are relatively consistent in most delineations of the map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Zolfo soil is very dark grayish brown fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of about 18 inches, is brown fine sand. The middle part, to a depth of about 42 inches, is light brownish gray fine sand. The lower part, to a depth of about 64 inches, is very pale brown fine sand. The upper part of the subsoil, to a depth of about 72 inches, is brown fine sand. The lower part to a depth of 80 inches or more is dark brown fine sand.

The Urban land part of this complex is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Lochloosa, Millhopper, Pomello, and Smyrna soils. Also included are some soils that are similar to Zolfo soil, but the upper part of the subsoil extends to a depth of more than 80 inches, and in some parts of the landscape they are moderately well drained.

Most areas of the soils in this map unit are artificially drained by established drainage systems. However, the depth to the water table is dependent upon the functioning of the drainage system. In undrained areas, a seasonal high water table is at a depth of 24 to 40 inches for 2 to 6 months and is at a depth of 10 to 24 inches during periods of high rainfall. It recedes to a depth of about 60 inches during extended dry periods. The permeability of Zolfo soil is rapid in the surface and subsurface layers and moderate in the subsoil. The available water capacity is low in the surface and subsurface layers and medium in the subsoil. Natural fertility and the organic matter content are low.

The soils in this map unit are not used for cultivated crops, improved pasture, or commercial trees. Zolfo soil in the Urban land part of this complex is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this complex is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit are well suited to dwellings without basements, small commercial buildings, and local roads and streets. Water control measures should be used to minimize the excessive wetness in undrained areas.

The soils in this map unit have severe limitations for sanitary facilities, shallow excavations, and recreational uses. Water control measures should be used to minimize the excessive wetness limitations for these uses. The rapid permeability of the soils can cause ground water pollution in areas of septic tank absorption fields. If the density of housing is moderate to high, a community sewage system can help prevent contamination of the water supplies. The sealing or lining of a sewage lagoon or trench sanitary landfill with impervious soil material can reduce excessive seepage. The proximity to a stream or aquifer recharge area should be considered in the placement of sanitary facilities to prevent contamination of the water supplies. The sidewalls of shallow excavations should be shored. The sandy surface layer should be stabilized for recreational uses. Droughtiness is a problem during extended dry periods. The selection of drought-tolerant vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Regular applications of fertilizer are needed to maintain lawns and landscape vegetation.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

Use and Management of the Soils

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

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

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

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

Contractors can use this survey to locate sources of sand, 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.

Crops and Pasture

Jack Creighton, soil conservationist, Soil Conservation Service, helped to prepare this section.

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

No soils in Orange County meet the requirements for prime farmland.

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

Orange County is experiencing rapid urbanization. Acreage in crops, pasture, and woodland has gradually decreased as more and more land is used for urban development. However, large areas of productive land remain in agricultural use. It is expected that the urbanization pressures will continue for some time, and the amount of land devoted to agriculture will continue to decline. Natural disasters, such as the severe Christmas freeze of 1983 (table 2), will also contribute to the decline of agricultural land.

Some of the agricultural land in Orange County is classified as unique and special. Soils, such as the Gator, Okeelanta, and Terra Ceia soils that occur north of Lake Apopka, have severe limitations for urban uses. These soils on agricultural land will be protected from the pressures of urbanization by the nature of their limitations. The citrus-growing areas and pasturelands will come under the most severe urbanization pressure.

All forms of water and wind erosion occur in Orange County. Soils on which erosion is a problem are scattered throughout the county. A recent increase in the practice of planting grasses between the rows of citrus has helped to decrease both wind and water erosion in the citrus groves. Vegetables are grown chiefly on the nearly level areas which are not subject to intensive water erosion, but the fields are left without vegetation cover at certain times of the year and this contributes to wind erosion. The most serious erosion problems in Orange County occur on unprotected soils on construction sites. When preparing building sites, the soil is generally stripped of all vegetation and subjected to the unrelenting forces of wind and water for 3 months or more.

Loss of soil by erosion reduces crop production and increases pollution. Productivity is reduced as the surface layer is lost, and organic matter is reduced as part of the subsoil is incorporated into the plow layer. If erosion is controlled, the pollution of streams by sediment can be reduced and the quality of water for municipal use, for recreation, and for fish and wildlife can be improved.

Water erosion is not a major problem in Orange County. The soils are sandy and are mostly nearly level. Erosion is caused by rapid runoff, which takes place only during heavy rains on unprotected soils that have short, steep slopes. Examples are Candler and Lake soils that are excessively drained and Tavares soils that are moderately well drained and have slopes of more than 2 percent.

Conservation practices, such as maintaining a vegetation cover on the surface layer, reducing runoff, and increasing infiltration, will help control erosion. A cropping system that maintains a grassed vegetation cover between the rows of citrus can hold soil erosion losses to amounts that do not reduce the productive capacity of the soils. On livestock farms, legume and grass forage crops should be included in the cropping system to reduce erosion on sloping land, provide nitrogen, and improve tilth for the next crop.

Conservation tillage leaves crop residue on the surface, increases infiltration, and reduces runoff and subsequent erosion. This practice can be adapted to most soils in the county.

Wind erosion is a major hazard on the sandy and organic soils. It can damage soils and tender crops in a few hours in open, unprotected areas if the winds are strong and the soil is dry and left without a vegetation cover or surface mulch. Keeping a vegetation cover and surface mulch on the soil reduces wind erosion.

Wind erosion is damaging for several reasons. It reduces soil fertility by removing the finer soil particles and the organic matter; damages or destroys crops by sandblasting; spreads diseases, insects, and weed seeds; and creates health hazards and cleaning problems. Control of wind erosion reduces duststorm damage and improves the quality of the air for healthier living conditions.

Field windbreaks of adapted trees and shrubs, such as cherry laurel, slash pine, southern redcedar, and Japanese privet and strips of small grain crops are effective in reducing wind erosion and crop damage. Field windbreaks and strip crops are narrow plantings made at a right angle to the prevailing wind and at specific intervals across the field. The intervals depend on the erodibility of the soil and the susceptibility of the crop to damage from sandblasting.

Information about conservation practices to control erosion on each kind of the soils in the county is available in the local offices of the Soil Conservation Service.

Soil drainage is a major concern in management on about 75 percent of the acreage used for crops and pasture in Orange County. Some soils, such as Emeralda and Holopaw soils that are poorly drained and Basinger, Chobee, Floridana, Hontoon, and Samsula soils that are very poorly drained, are naturally wet and restrict production of many crops common to the area.

During rainy periods in most years, excessive wetness causes damage in the root zone of some of the somewhat poorly drained soils unless the soils are artificially drained. Examples are Lochloosa and Zolfo soils. Also, excessive wetness causes some damage to pasture plants during rainy periods in most of the poorly drained soils if these soils are not artificially drained. Examples are mainly Immokalee, Malabar, Ona, St. Johns, Smyrna, and Wabasso soils. These poorly drained soils also have a low available water capacity and are droughty during dry periods. It is generally necessary to subsurface irrigate these soils to ensure quality pasture plants and obtain maximum yields.

The very poorly drained soils, such as Canova, Gator, Okeelanta, and Terra Ceia soils, are very wet during rainy periods. Water stands on the surface in most areas, and the production of speciality crops or good quality pasture plants on these soils is not possible unless the soils are artificially drained.

The kind of surface drainage system and subsurface irrigation system needed varies with the kind of soil and the grasses to be grown on the soil. A combination of surface drains and subsurface irrigation systems is needed for intensive pasture production. Information on drainage and irrigation systems needed for each soil in the county is available in the local offices of the Soil Conservation Service.

Soil fertility is naturally low in most of the sandy soils in the county. Most of the soils are strongly acid if they have not been limed. Chobee and Floridana are soils that have a thick surface layer and have a high content of organic matter. They are less acid and are higher in natural fertility than most soils in Orange County. Available phosphorus and potash levels are naturally low in most of these soils. Kinds and amounts of lime and fertilizer added to the soils should be based on the result of soil tests, on the needs of the crops, and on the expected yields. The Cooperative Extension Service can help in determining the proper application of fertilizer and lime.

Soil tilth is an important factor in the germination of seeds, root development, and infiltration of water into the soil. Soils that have good tilth are porous and have a good granular structure.

Most soils in Orange County have a sandy surface layer that has poor tilth. Generally, the structure of the surface layer of most soils in the county is weak. The content of organic matter is low to moderate in most areas. A slight crust can form on the surface of these soils upon drying after heavy rains. Regular additions of crop residue and other organic material in and on the soil improve tilth, increase fertility, and reduce crust formation.

Citrus

Citrus crops are grown mainly in the western part of Orange County, most of which is in high recharge areas for the Floridan aquifer. In 1982, approximately 48,547 acres of citrus crops were grown *(10)*. The overall citrus acreage in the county is expected to decline as a result of the severe damage many groves sustained in the Christmas freeze of 1983 and because of urbanization pressures.

Citrus is grown on a wide variety of soils in the county. The soils on which citrus is grown range from the excessively drained Candler and Lake soils to the poorly drained Immokalee and Smyrna soils. Supplemental irrigation improves production on the droughty soils. Conservation practices to control water are needed on most poorly drained soils.

Some soils that are used for citrus crops are in low areas that have poor air drainage and frequent frost pockets. These areas are generally poorly suited to citrus crops. Grasses or legumes planted between the citrus rows help to minimize the damage caused by wind erosion in young groves and in groves that have been severely pruned back because of freeze damage.

Most soils on which citrus is grown are low in natural fertility and must be supplemented with fertilizer and lime to ensure optimum yields.

Vegetables

Vegetables are grown extensively in the organic soils, also called mucklands, on the north shore of Lake Apopka. With an adequate water control system, Terra Ceia, Gator, and Okeelanta soils are well suited to high-value vegetable crops. When these soils are drained, the organic material oxidizes and subsides at a rate of about 1 inch per year. Flooding during periods when crops are not being grown is a practice used to reduce the rate of subsidence. Flooding also helps to control certain insects and disease-carrying pests.

These organic soils are highly susceptible to wind erosion. Crop residue is generally left on the surface when no water or crops are on the soil to minimize the soil blowing hazard.

About 11,000 acres near Zellwood is used for growing vegetables. However, this acreage is responsible for a larger harvested acreage because of the practice of multiple cropping. Vegetable farming on mineral soils accounts for an additional 4,000 acres. In 1982-83, the most important crops in terms of acreage were sweet corn (10,500 acres), carrots (8,500 acres), radish (6,684 acres), endive (1,300 acres) and additional large acreages of lettuce, cabbage, and celery *(10, 42)*. The combined value for all vegetable crops grown in Orange County in 1982-83 was more than 48 million dollars *(42)*.

Most soils used to produce vegetables are irrigated. Irrigation systems include subirrigation, drip, and sprinkler. If an adequate water control system is maintained, most of the soils on the flatwoods can be used for vegetable crops. Immokalee, Ona, Pompano, and Wabasso soils are sandy soils that are suited to sweet corn, Chinese cabbage, and broccoli. Smaller acreages of many other truck crops are grown on a wide variety of soils. Cantaloupe and watermelon are grown on Lake and Tavares soils. Tomatoes and blackeyed peas are grown on Immokalee, Ona, Lake, and Tavares soils. Many vegetables, including beans, cabbage, cauliflower, cucumbers, onions, peppers, and squash, are grown on Immokalee, Smyrna, and other soils on the flatwoods.

Pastureland

Pastures in the survey area are used to produce forage and hay for beef and dairy cattle. The sale of beef cattle in cow-calf operations is a major livestock enterprise. Bahiagrass is the main pasture plant grown in the county. It is adapted to a wide range of soil types and is conducive to low, annual fertility programs. Bermudagrass, limpograss, and pangolagrass are other improved pasture grasses grown in the survey area. These grasses require higher annual pasture maintenance and fertilizer inputs than bahiagrass pastures; therefore, they are better reserved for hay crops or for grazing livestock that require a higher level of nutrition than is required for mature cows or bulls.

Pasture yields are directly correlated to fertilizer inputs, mainly nitrogen, and the amount of grazing management applied. Continuous grazing produces the lowest yields from any pasture and contributes to the invasion of weeds. Legumes, such as American jointvetch, white clover, perennial peanut, and hairy indigo help reduce costly nitrogen fertilization needed for optimum pasture productivity. The use of legumes can be extremely advantageous; however, increased grazing management is required to maintain legumes with mixed perennial grass pastures.

Yields Per Acre

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

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

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

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

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

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

Land Capability Classification

Land capability classification *(28)* shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

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

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

Class I soils have few limitations that restrict their use. There are no Class I soils in Orange County.

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

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

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

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

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

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

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production. There are no class VIII soils in Orange County.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *w* or *s,* to the class numeral, for example, IIIw. The letter *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

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

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

Woodland Management and Productivity

John Koehler, Orange County forester, Division of Forestry, Florida Department of Agriculture and Consumer Service, helped to prepare this section.

According to the latest statistics, approximately 179,500 acres in Orange County is commercial forest land *(27, 34, 42)*. This represents about 29 percent of the county. Grazing is the main use of these woodlands, and timber management is a secondary, less intensive use. Countywide, native grasses are productive because of low tree densities per acre. The cattle industry thrives as a result.

The forest resources of the county are well distributed. A heavy concentration of hardwoods and cypress is in the low areas of east Orange County and on the flood plains of the Wekiva and St. Johns Rivers. The pine flatwoods and sandhills of central and west Orange County have a lower tree concentration. The largest concentration of woodlands are in general soil map units 6, 8, 9, and 11, which are described in the section "General Soil Map Units."

Since the clearcut practices of the 1920's, when much of the longleaf pine in the county was cut, slash pine has become the dominant commercial tree. Because of its tolerance to controlled burning and ease of planting, slash pine is the dominant tree on the pine flatwoods.

The swamps in central and eastern Orange County contain a mixture of trees. The various trees include cypress, blackgum, sweetgum, elm, hickory, magnolia, red maple, sweetbay, and loblolly bay *(6, 22, 36)*. Occasionally, live oak, water oak, and laurel oak will grow on the fringes. Sound forest management practices that include hardwood management will produce trees of suitable size, quantity, and quality for timber production.

The excessively drained and well drained soils on the uplands, such as Apopka, Candler, and Lake, support sand pine, longleaf pine, and turkey oak. Bluejack oak, post oak, and Chapman oak also grow on these soils. In many of these areas, the trees were removed and the soils are now used for improved pasture and citrus crops.

Timber management in Orange County can be increased by combining resource management practices to create multiple products rather than single products. Many of the same management practices that are used in the cattle industry are also used in forest management. The use of controlled burning, chopping, and disking are examples of the practices that can be combined to manage both timber and cattle on the same property *(4, 20, 30, 31, 33)*.

More detailed information and assistance in forest management can be obtained through the local offices of the Soil Conservation Service or the Florida Division of Forestry.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, and some are more susceptible to erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. In the section "Detailed Soil Map Units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. The common forest understory plants are also listed. Table 6 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

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

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

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

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. On the steepest slopes, even tracked equipment cannot operate; more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if slopes are steep enough that tracked equipment cannot be operated safely across the slope, if soil wetness restricts equipment use for more than 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

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

Ratings of *windthrow hazard* consider the likelihood of trees being uprooted by the wind. Restricted rooting depth is the main reason for windthrow. Rooting depth can be restricted by a high water table, fragipan, or bedrock, or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds cause trees to break but do not uproot them, and *moderate* if strong winds cause an occasional tree to be blown over and many trees to break. Ratings of *moderate* indicate the need for care in thinning or possibly not thinning. Specialized equipment may be needed to avoid damage to shallow root systems in partial cutting operations. A plan for periodic salvage of windthrown trees and the maintenance of a road and trail system may be needed.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. *Plant competition* becomes more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants reduces adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants reduces natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A *moderate* or *severe* rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

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

The soils that are commonly used to produce timber have the yield predicted in cubic meters. The yield is predicted at the point where mean annual increment culminates.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. The procedure and technique for determining site index are given in the site index tables used for this survey *(20, 31, 33, 36)*.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. In order to convert cubic feet per acre to cords per acre, divide the cubic feet by 85. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8 means the soil can be expected to produce 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 568 board feet per acre per year.

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

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Information on planning windbreaks and screens and on planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service, or from a nursery.

Recreation

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations, if any, 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 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry. 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 and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, are not subject to flooding more than once a year during the period of use, and 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, are not subject to prolonged flooding during the period of use, and have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John F. Vance, biologist, Soil Conservation Service, helped to prepare this section.

Wildlife is a valuable resource of Orange County. Urban development, especially in the Orlando area, and intensive agricultural development in the Zellwood area have been detrimental to wildlife habitat, but less developed areas still support a large variety and number of wildlife.

The main game species include white-tailed deer, squirrel, turkey, feral hogs, bobwhite quail, rail, and waterfowl. Nongame species include raccoon, rabbit, armadillo, opossum, skunk, bobcat, gray and red foxes, otter, and a variety of songbirds, wading birds, shore birds, woodpeckers, reptiles, and amphibians. A wide variety of freshwater fish provides good fishing, especially in the St. Johns River.

Good habitat for wildlife is available in the Wekiwa Springs State Park, Rock Springs Runs State Preserve, and the Tosahatchee State Reserve, which are administered by the Florida Department of Natural Resources. Numerous lakes and marshes provide excellent habitat for waterfowl and support good duck hunting.

Many endangered or threatened species are in Orange County. They range from the rare red-cockaded woodpecker and indigo snake to more commonly known species, such as the alligator and bald eagle. A complete list of such species with detailed information on range and habitat can be obtained at the local office of the Soil Conservation Service.

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

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

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

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

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

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 perennial peanut, bahiagrass, clover, and sesbania.

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

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, wild grape, cherry, sweetgum, cabbage palm, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are wild plum, hawthorn, and waxmyrtle.

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, cypress, cedar, and juniper.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, wild millet, 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 include bobwhite quail, dove, meadowlark, field sparrow, cottontail, and red fox.

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

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, egrets, herons, otter, 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, and because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of 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: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and easily overcome; *moderate* if soil properties or site features are somewhat restrictive 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 that special design, soil reclamation, 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 depth to 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. Depth to a high water table, depth to a cemented pan, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

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

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

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations, if any, are minor and easily overcome; *moderate* if soil properties or site features are moderately favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if one or more soil property or site feature is unfavorable for the use, and if overcoming the unfavorable properties requires special design, extra maintenance, or alteration.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to a cemented pan, and flooding affect adsorption of the effluent. A cemented pan interferes 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 and gravel is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

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

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to a cemented pan, 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 cemented pans can cause construction problems.

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

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

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a cemented pan, depth to a water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts 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, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of excess gravel 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 11 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 large stones, 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, few cobbles and stones, 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, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* are wet, and the depth to the water table is less than 1 foot. They may have a plasticity index of more than 10 and a high shrink-swell potential. 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 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand 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 *(1, 2, 18, 26)*. 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. Coarse fragments of soft bedrock, such as marl, are not considered to be sand and gravel.

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, bedrock, and toxic material.

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

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or 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 too much organic matter (humus), have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

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

Water Management

Table 12 gives information on the soil properties and site features that affect water management *(29)*. 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, if any, are minor and are easily overcome; *moderate* if soil properties or site features are somewhat restrictive 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 unfavorable for the indicated use so that special design, increased maintenance, or alteration of the site may be required.

This table also gives the restrictive features that affect each soil for 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 fractured bedrock or other 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 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 too much organic matter (humus). 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 and permeability of the aquifer.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on 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 depth to a cemented pan, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by depth to a cemented pan. The performance of a system is affected by the depth of the root zone 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, slope, and depth to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed *(24, 35)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics *(1, 2, 35)*.

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

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

Engineering Index Properties

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

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

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

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

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

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

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

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

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

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils *(35)*.

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

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 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 than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

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

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

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

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 nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, 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. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

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

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations *(23, 26, 29)*.

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

The four hydrologic soil groups are:

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

In table 15, some soils are assigned to two hydrologic soil groups. Soils that have a seasonal high water table but can be drained are assigned first to a hydrologic soil group that denotes the drained condition of the soil and then to a hydrologic group that denotes the undrained condition, for example, B/D. Because there are different degrees of drainage and water table control, onsite investigation is needed to determine the hydrologic group of the soil in a particular location.

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

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

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

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

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 15.

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

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

Cemented pans are cemented or indurated subsurface layers within a depth of 5 feet. Such pans cause difficulty in excavation. Pans are classified as thin or thick. A thin pan is less than 3 inches thick if continuously indurated, or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A thick pan is more than 3 inches thick if continuously indurated, or more than 18 inches thick if discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence 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 15 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which usually is a result of oxidation over a period of years.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

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

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

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(32)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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 Aquod (*Aqu*, meaning water, plus *od*, from Spodosol).

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 Haplaquods (*Hapl*, meaning minimal horizonation, plus *aquod*, the suborder of the Spodosols that has an aquic moisture regime).

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

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 sandy, siliceous, hyperthermic Typic Haplaquods.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series. An example is the St. Johns series, which is a member of the sandy, siliceous, hyperthermic family of Typic Haplaquods.

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. 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 detailed description of each soil horizon follows standards in the *Soil Survey Manual (24)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (32)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

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

Apopka Series

The Apopka series consists of well drained soils that formed in sandy and loamy marine sediment. These soils are on the uplands. The slopes range from 5 to 12 percent. Apopka soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Apopka soils are associated on the landscape with Candler, Lake, Lochloosa, Millhopper, and Tavares soils. Candler, Lake, and Tavares soils do not have an argillic horizon. Candler and Lake soils are excessively drained, and Tavares soils are moderately well drained. Lochloosa soils are somewhat poorly drained. Millhopper soils are moderately well drained.

Typical pedon of Apopka fine sand, in an area of Candler-Apopka fine sands, 5 to 12 percent slopes; in a field; about 1.5 miles east of Zellwood, 920 feet north and 2,000 feet west of the southeast corner of sec. 23, T. 20 S., R. 27 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) fine sand; weak fine crumb structure; few fine roots; slightly acid; clear wavy boundary.

E1—5 to 50 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few fine roots; many uncoated sand grains; medium acid; gradual wavy boundary.

E2—50 to 69 inches; very pale brown (10YR 8/3) fine sand; single grained; loose; many fine roots; many uncoated sand grains; medium acid; abrupt wavy boundary.

Bt—69 to 80 inches; reddish yellow (7.5YR 6/6) sandy clay loam; weak fine subangular blocky structure; firm; few fine roots; few distinct red (2.5YR 5/8) clay films on faces of peds; strongly acid.

The thickness of the solum is more than 60 inches. Reaction ranges from very strongly acid to medium acid except where the A horizon has been limed.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2. The texture is sand or fine sand. The thickness of this horizon ranges from 4 to 8 inches.

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 3 to 8. The texture is sand or fine sand that has less than 5 percent silt and clay. The combined thickness of the E1 and E2 horizons ranges from 36 to 64 inches.

The Bt horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 to 8. In some pedons, this horizon has mottles in shades of brown, yellow, or red. The texture is sandy loam or sandy clay loam.

Archbold Series

The Archbold series consists of moderately well drained, very rapidly permeable soils. They formed in thick deposits of marine or eolian sand. These soils are on elevated knolls or ridges on the flatwoods. The slopes range from 0 to 5 percent. Archbold soils are hyperthermic, uncoated Typic Quartzipsamments.

Archbold soils are associated on the landscape with Candler, Pomello, St. Lucie, Tavares, and Zolfo soils. Candler and St. Lucie soils are excessively drained. Pomello soils have a spodic horizon. Tavares soils have higher chromas in the underlying material than Archbold soils. Zolfo soils are somewhat poorly drained and have a weakly expressed spodic horizon at a depth of more than 50 inches.

Typical pedon of Archbold fine sand, 0 to 5 percent slopes; in a wooded area; about 5 miles north and 2 miles west of Christmas, 80 feet east and 420 feet north of the center of sec. 6, T. 22 S., R. 33 E.

A—0 to 2 inches; dark gray (10YR 4/1) fine sand; single grained; loose; many fine and medium roots; mixture of uncoated sand grains and organic material, salt-and-pepper appearance; strongly acid; diffuse wavy boundary.

C—2 to 80 inches; white (10YR 8/1) fine sand; single grained; loose; few fine and medium roots, decreases with depth; strongly acid.

Reaction ranges from slightly acid to extremely acid. The texture is sand or fine sand. The content of silt and clay is 5 percent or less between depths of 10 and 40 inches.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Many pedons have clean white sand grains interspersed with organic matter that has a salt-and-pepper appearance. The thickness of the A horizon ranges from 2 to 5 inches.

The C horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. In some pedons, the C horizon has hue of 10YR, value of 6, and chroma of 1 or 2 at a depth of more than 40 inches. Also in some pedons, this horizon has stains along old root channels.

Basinger Series

The Basinger series consists of very poorly drained soils that formed in sandy marine sediment. These soils are in shallow depressions, swamps, and sloughs and along the rims of the larger depressions. The slopes range from 0 to 2 percent. Basinger soils are siliceous, hyperthermic Spodic Psammaquents.

Basinger soils are associated on the landscape with Floridana, Hontoon, Ona, Pompano, Samsula, and Smyrna soils. Floridana soils have a mollic epipedon and an argillic horizon. Hontoon and Samsula soils are organic. Ona and Smyrna soils are poorly drained and have a spodic horizon. Pompano soils are poorly drained.

Typical pedon of Basinger fine sand, in an area of Samsula-Hontoon-Basinger association, depressional; in a swamp; about 2 miles south and 0.5 mile east of Orlovista, 1,100 feet east and 800 feet south of the northwest corner of sec. 7, T. 23 S., R. 29 E.

A—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine roots; many uncoated sand grains; strongly acid; clear smooth boundary.

E—6 to 25 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.

Bh/E—25 to 35 inches; dark reddish brown (5YR 3/3) fine sand, (Bh); grayish brown (10YR 5/2) fine sand, (E); single grained; nonsticky and nonplastic; strongly acid; gradual wavy boundary.
C—35 to 80 inches; light gray (10YR 6/1) fine sand; single grained; nonsticky and nonplastic; strongly acid.

Reaction is very strongly acid or strongly acid.
The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The texture is fine sand, sand, or mucky fine sand. The thickness of this horizon ranges from 4 to 7 inches.
The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. In some pedons, this horizon has dark grayish brown stains along root channels. The texture is fine sand or sand. The thickness of this horizon ranges from 15 to 28 inches.
The Bh part of the Bh/E horizon has hue of 5YR, value of 3, and chroma of 3 or 4; or hue of 7.5YR, value of 3, and chroma of 2; or hue of 10YR, value of 4 or 5, and chroma of 2. The E part has hue of 10YR, value of 5 to 8, and chroma of 1 to 2. The texture is fine sand or sand. The thickness of this horizon ranges from 9 to 18 inches.
The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The texture is fine sand or sand.

Candler Series

The Candler series consists of excessively drained, very rapidly permeable soils. They formed in thick deposits of eolian or marine sand. These soils are on the uplands. The slopes range from 0 to 12 percent. Candler soils are hyperthermic, uncoated Typic Quartzipsamments.
Candler soils are associated on the landscape with Apopka, Florahome, Lake, Lochloosa, Millhopper, and Tavares soils. Apopka, Lochloosa, and Millhopper soils have an argillic horizon. Apopka soils are well drained, Lochloosa soils are somewhat poorly drained, and Millhopper soils are moderately well drained. Florahome and Tavares soils are moderately well drained. Florahome soils have an umbric epipedon. Lake soils have coated sand grains.
Typical pedon of Candler fine sand, 0 to 5 percent slopes; in a field; about 5 miles north and 1 mile west of Apopka, 310 feet east and 2,580 feet south of the northwest corner of sec. 21, T. 20 S., R. 28 E.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; few fine and medium roots; many uncoated sand grains; strongly acid; clear wavy boundary.
E1—5 to 30 inches; yellowish brown (10YR 5/6) fine sand; single grained; loose; few fine and medium roots; many uncoated sand grains; strongly acid; gradual wavy boundary.
E2—30 to 74 inches; brownish yellow (10YR 6/8) fine sand; single grained; loose; few fine and medium roots; many uncoated sand grains; strongly acid; clear wavy boundary.
E&Bt—74 to 80 inches; yellow (10YR 7/6) fine sand, (E); strong brown (7.5YR 5/8) loamy sand lamellae about 1/16 to 1/4 inch thick and 2 to 6 inches long, (Bt); single grained; loose; few fine roots; many uncoated sand grains; strongly acid.

The thickness of the solum is 80 or more inches. Reaction ranges from very strongly acid to medium acid.
The A or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The texture is fine sand or sand. The thickness of this horizon ranges from 4 to 8 inches.
The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8. The texture is fine sand or sand. The thickness of this horizon ranges from 44 to 69 inches.
The E part of the E&Bt horizon has hue of 10YR, value of 7 or 8, and chroma of 1 to 3. The texture is fine sand or sand. The Bt part of this horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. The texture is fine sand to sandy loam. The individual lamellae is 1/32 to 1/2 inch thick and from 1/2 inch to 35 inches long. The abundance of lamellae increases slightly with depth. Some pedons have a continuous Bt horizon at a depth of more than 90 inches. The colors of this continuous Bt horizon are similar to those of the Bt part of the E&Bt horizon. The texture ranges from loamy sand to sandy clay loam.

Canova Series

The Canova series consists of very poorly drained soils that formed in sandy and loamy marine sediment under conditions favorable for the accumulation of organic material. These soils are in freshwater swamps and marshes. The slopes are 0 to 1 percent. Canova soils are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs.
Canova soils are associated on the landscape with Felda, Gator, Okeelanta, Pompano, Sanibel, and Terra Ceia soils. Felda soils are poorly drained and do not have an organic surface layer. Gator, Okeelanta, and Terra Ceia soils are organic. Pompano and Sanibel soils do not have an argillic horizon. Pompano soils are poorly drained.
Typical pedon of Canova muck; in a cultivated field; about 3 miles south and 1 mile west of Zellwood, 900 feet west and 350 feet north of the southeast corner of sec. 5, T. 21 S., R. 27 E.

Oap—0 to 6 inches; black (10YR 2/1) muck; massive; herbaceous fiber; slightly acid; abrupt smooth boundary.

A—6 to 9 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; few fine roots; slightly acid; gradual wavy boundary.

E—9 to 16 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine roots; slightly acid; abrupt irregular boundary.

Btg/E—16 to 22 inches; dark gray (N 4/0) sandy clay loam; common medium distinct gray (10YR 6/1) mottles; weak coarse subangular blocky structure; sticky and plastic; about 16 percent tongues of dark gray (10YR 4/1) sand, 2 to 4 inches long and 1/2 inch to 3 inches wide; moderately alkaline; clear wavy boundary.

Btg—22 to 37 inches; gray (5Y 5/1) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; sticky and plastic; moderately alkaline; gradual wavy boundary.

Cg—37 to 80 inches; light gray (5Y 6/1) sandy clay loam; massive; sticky and plastic; many medium distinct light gray (10YR 7/2) accumulations of carbonates; strong effervescence; moderately alkaline.

The thickness of the organic material ranges from 6 to 9 inches. The thickness of the solum ranges from 20 to 53 inches or more. Reaction is medium acid or slightly acid in the Oa horizon, slightly acid to moderately alkaline in the A and E horizons, medium acid to moderately alkaline in the Btg horizon, and mildly alkaline or moderately alkaline in the BCg and Cg horizons.

The Oa horizon has hue of 5YR or 10YR, value of 2, and chroma of 2; or it is neutral and has value of 2. The fiber content, unrubbed, is less than 33 percent, and rubbed, it is less than 5 percent. The texture is muck.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1. In some pedons, this horizon has few to common (10YR 7/1) uncoated sand grains. The texture is fine sand or sand. The thickness of this horizon ranges from 3 to 9 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1. The texture is fine sand or sand. The thickness of this horizon ranges from 6 to 11 inches.

The Btg part of the Btg/E horizon and the Btg horizon have hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2; or they are neutral and have value of 4. Mottles and streaks are in shades of yellow and brown. The texture is sandy clay loam or sandy loam. The content of clay is 18 to 28 percent, and the content of silt is less than 15 percent. Tongues of (10YR 4/1 or 5/1) sandy material from the E horizon extend into the Btg/E horizon. About 15 to 25 percent tongues, 2 to 8 inches long and 1/2 inch to 4 inches wide, are in this Btg/E horizon. The thickness of the Btg/E horizon ranges from 5 to 9 inches.

Some pedons have a BCg horizon that has similar colors as the Btg horizon. The texture is sandy clay loam. In some pedons, the BCg horizon has lenses of loamy sand or sandy loam.

Some pedons have a Cg or Cgk horizon that has hue of 5Y, 5GY, or 5G, value of 5 or 6, and chroma of 1. The texture is sandy clay loam or sandy loam that has lenses of sand or loamy sand. Few to many, fine and medium, soft and hard, light gray, white, or yellowish brown fragments of carbonatic material and shell fragments are in this horizon. In some pedons, the Cg or Cgk horizon has thin, discontinuous strata of limestone at a depth of more than 60 inches.

Chobee Series

The Chobee series consists of very poorly drained soils that formed in thick beds of loamy marine sediment. These soils are on the flood plains. The slopes are less than 2 percent. Chobee soils are fine-loamy, siliceous, hyperthermic Typic Argiaquolls.

Chobee soils are associated on the landscape with Gator, Felda, Floridana, and Wabasso soils. Gator soils are organic. Felda and Floridana soils have a surface layer and subsurface layer that have a combined thickness of more than 20 inches. Felda soils are poorly drained and do not have a mollic epipedon. Wabasso soils are poorly drained and have a spodic horizon.

Typical pedon of Chobee fine sandy loam, in an area of Floridana and Chobee soils, frequently flooded; in a grassy area; about 3.5 miles south and 8.5 miles east of Christmas, 2,600 feet east and 550 feet south of the northwest corner of sec. 13, T. 23 S., R. 34 E.

A—0 to 12 inches; black (10YR 2/1) fine sandy loam; moderate medium granular structure; friable; many fine and medium roots; slightly acid; clear smooth boundary.

Bt1—12 to 38 inches; dark gray (10YR 4/1) sandy clay loam; common fine distinct light gray (10YR 7/1) mottles; weak coarse subangular blocky structure; slightly sticky and slightly plastic; common fine and medium roots; mildly alkaline; gradual wavy boundary.

Bt2—38 to 56 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct dark brown (10YR 4/3) and light gray (10YR 7/1) mottles; weak coarse subangular blocky structure; sticky and plastic; moderately alkaline; gradual irregular boundary.

Cg—56 to 80 inches; light gray (10YR 7/1) fine sand; massive; nonsticky and nonplastic; slight effervescence; moderately alkaline.

The thickness of the solum is more than 40 inches.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or it is neutral and has value of 2. The texture is fine sandy loam. Reaction is slightly acid or neutral. The thickness of this horizon ranges from 6 to 14 inches.

The Bt horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. In some pedons, this horizon has dark brown or light gray mottles. The texture is sandy clay loam or fine sandy loam. The content of clay in the control section ranges from 18 to 35 percent. Reaction is mildly alkaline or moderately alkaline. The combined thickness of the Bt horizons ranges from 30 to 50 inches.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The texture is fine sand or loamy fine sand. Reaction is mildly alkaline or moderately alkaline.

Emeralda Series

The Emeralda series consists of poorly drained soils that formed in sandy and clayey alluvium. These soils are on the flood plains. The slopes range from 0 to 2 percent. Emeralda soils are fine, mixed, hyperthermic Mollic Albaqualfs.

Emeralda soils are associated on the landscape with Felda, Gator, Holopaw, and Pompano soils. Felda and Holopaw soils have a surface layer and subsurface layer that have a combined thickness of more than 20 inches. Gator soils are very poorly drained and are organic. Pompano soils do not have an argillic horizon.

Typical pedon of Emeralda fine sand, in an area of Emeralda and Holopaw fine sands, frequently flooded; in a wooded area; about 7.5 miles north and 2 miles east of Apopka, 850 feet east and 1,490 feet south of the northwest corner of sec. 1, T. 20 S., R. 28 E.

A—0 to 7 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine roots; strongly acid; abrupt wavy boundary.

Eg—7 to 12 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine roots; medium acid; abrupt wavy boundary.

Btg1—12 to 25 inches; gray (10YR 5/1) sandy clay; common fine distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; sticky and plastic; few fine roots; neutral; clear wavy boundary.

Btg2—25 to 42 inches; light gray (10YR 6/1) sandy clay; common medium distinct brown (10YR 5/3) mottles; weak medium subangular blocky structure; sticky and plastic; moderately alkaline; clear wavy boundary.

Ck2—42 to 80 inches; light gray (10YR 7/1) sandy clay; many medium distinct yellowish brown (10YR 5/6) mottles; massive; sticky and plastic; about 15 percent soft, white (10YR 8/1) calcium carbonate accumulations; moderate effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 70 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The texture is fine sand. Reaction ranges from strongly acid to slightly acid. The thickness of this horizon ranges from 6 to 9 inches.

The E horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The texture is fine sand or loamy fine sand. Reaction ranges from strongly acid to slightly acid. The thickness of this horizon ranges from 5 to 8 inches.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. In some pedons, this horizon has mottles in shades of gray, yellow, or brown. The texture is sandy clay loam or sandy clay. Reaction ranges from slightly acid to moderately alkaline. The combined thickness of the Btg horizons ranges from 30 to 45 inches.

The Ck horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2; or it is neutral and has value of 4 to 7. This horizon has mottles in shades of gray, yellow, or brown. The texture is sandy clay, sandy clay loam, or sandy loam. Few to many pockets of calcium carbonate accumulations and calcium carbonate nodules are in this horizon. Reaction is moderately alkaline. The Ck horizon is calcareous.

Felda Series

The Felda series consists of poorly drained soils that formed in stratified sandy and loamy alluvium and marine sediment. These soils are on the flood plains and low plains on the flatwoods. The slopes are less than 2 percent. Felda soils are loamy, siliceous, hyperthermic Arenic Ochraqualfs.

Felda soils are associated on the landscape with Chobee, Emeralda, Holopaw, Malabar, Pompano, and Wabasso soils. Chobee soils have a Bt horizon at a depth of less than 20 inches and also have a mollic epipedon. Emeralda soils have a surface layer and subsurface layer that have a combined thickness of less than 20 inches. Holopaw and Malabar soils have a surface layer and subsurface layer that have a combined thickness of more than 40 inches. Malabar soils have a Bw horizon. Pompano soils do not have an argillic horizon. Wabasso soils have a spodic horizon.

Typical pedon of Felda fine sand; in a wooded area; about 2.5 miles south and 3.5 miles east of Christmas, 100 feet east and 2,480 feet north of the southwest corner of sec. 8, T. 23 S., R. 34 E.

A—0 to 4 inches; black (10YR 2/1) fine sand; weak fine crumb structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.

E1—4 to 10 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many fine roots; slightly acid; clear wavy boundary.

E2—10 to 22 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grained; nonsticky and nonplastic; few fine and medium roots; slightly acid; clear smooth boundary.
Btg1—22 to 31 inches; gray (10YR 5/1) sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; slightly sticky and slightly plastic; few fine roots; neutral; clear smooth boundary.
Btg2—31 to 53 inches; gray (5Y 5/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; medium coarse subangular blocky structure; slightly sticky and slightly plastic; neutral; clear irregular boundary.
Cg—53 to 80 inches; greenish gray (5G 6/1) loamy sand; massive; nonsticky and nonplastic; many shell fragments; mildly alkaline.

The thickness of the solum ranges from 30 to 80 inches. Reaction is strongly acid or neutral in the A and E horizons and is slightly acid to mildly alkaline in the B and C horizons.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1. The texture is fine sand or sand. The thickness of this horizon ranges from 3 to 5 inches.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The texture is fine sand or sand. The combined thickness of the A and E horizons ranges from 20 to 40 inches.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2; or it is neutral and has value of 5. In some pedons, this horizon has mottles in shades of yellow or brown. The texture is sandy clay loam or sandy loam.

The Cg horizon has hue of 10YR to 5G, value of 4 to 7, and chroma of 1 or 2. In some pedons, this horizon has mottles in shades of yellow or brown. The texture is loamy sand or fine sand. Shell fragments range from none to many. In some pedons, the Cg horizon does not have shell fragments.

Florahome Series

The Florahome series consists of moderately well drained soils that formed in sandy marine sediment. These soils are on the uplands. The slopes range from 0 to 5 percent. Florahome soils are sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts.

Florahome soils are associated on the landscape with Candler, Seffner, Smyrna, and Tavares soils. Candler soils are excessively drained and do not have an umbric epipedon. Seffner soils are somewhat poorly drained. Smyrna soils have a spodic horizon. Tavares soils do not have an umbric horizon.

Typical pedon of Florahome fine sand, 0 to 5 percent slopes; in a citrus grove; about 0.25 mile east of Conway, 400 feet east and 1,650 feet north of the southwest corner of sec. 9, T. 23 S., R. 30 E.

A1—0 to 10 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; friable; many fine and medium roots; strongly acid; gradual wavy boundary.
A2—10 to 19 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; many fine and medium roots; few small pockets of light gray (10YR 7/1) uncoated sand grains; strongly acid; diffuse wavy boundary.
AC—19 to 38 inches; dark gray (10YR 4/1) fine sand; single grained; loose; few fine roots; strongly acid; gradual wavy boundary.
C1—38 to 48 inches; brown (10YR 5/3) fine sand; single grained; loose; strongly acid; gradual wavy boundary.
C2—48 to 80 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; strongly acid.

Reaction ranges from very strongly acid to medium acid. The texture is sand or fine sand to a depth of 80 inches or more.

The A or Ap horizon has hue of 10YR, value of 1 to 3, and chroma of 1 or 2; or hue of 10YR, value of 3, and chroma of 3. The AC horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 or less. The combined thickness of the A or Ap horizon and AC horizon is 20 to 38 inches.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 2 to 4. In some pedons, this horizon has few to common, fine or medium, dark brown mottles in the lower part of the C horizon. Mottles indicative of wetness are common where the matrix has chroma of 3 or 4 in the lower part of the horizon.

Floridana Series

The Floridana series consists of very poorly drained soils that formed in sandy and loamy alluvium and marine sediment. These soils are in depressions and sloughs and on the flood plains. The slopes are less than 2 percent. Floridana soils are loamy, siliceous, hyperthermic Arenic Argiaquolls.

Floridana soils are associated on the landscape with Basinger, Chobee, Felda, Gator, Sanibel, and Wauberg soils. Basinger and Sanibel soils do not have an argillic horizon. Chobee soils have a Bt horizon at a depth of less than 20 inches. Felda soils do not have a mollic epipedon. Gator soils are organic. Wauberg soils do not have a mollic epipedon.

Typical pedon of Floridana fine sand, in an area of Floridana and Chobee soils, frequently flooded; in a grassy area; about 3 miles south and 8 miles east of Christmas, 570 feet east and 1,000 feet north of the southwest corner of sec. 12, T. 23 S., R. 34 E.

A—0 to 14 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; common fine and medium roots; slightly acid; gradual smooth boundary.

E—14 to 28 inches; gray (10YR 5/1) fine sand; single grained; nonsticky and nonplastic; medium acid; abrupt wavy boundary.

Btg1—28 to 41 inches; dark gray (10YR 4/1) sandy clay loam; common medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; sticky and plastic; neutral; gradual wavy boundary.

Btg2—41 to 53 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct light gray (10YR 7/1) mottles; weak medium subangular blocky structure; sticky and plastic; neutral; gradual wavy boundary.

Cg—53 to 80 inches; light gray (10YR 7/1) loamy fine sand; common medium distinct grayish brown (10YR 5/2) mottles; massive; nonsticky and nonplastic; mildly alkaline.

The thickness of the solum ranges from 48 to 80 inches. Reaction ranges from medium acid to mildly alkaline.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The texture is fine sand, sand, or mucky fine sand. The thickness of this horizon ranges from 10 to 20 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The texture is fine sand or sand. The thickness of this horizon ranges from 8 to 14 inches.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2; or it is neutral and has value of 4 to 7. In some pedons, this horizon has mottles of gray, yellow, and brown. The texture is sandy clay loam or sandy loam. The thickness of this horizon ranges from 20 to 27 inches. Some pedons have a BCg horizon that has colors and textures similar to those in the Btg horizon.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1. The texture is loamy fine sand or sand. In some pedons, this horizon has pockets of shell fragments and soft calcium carbonate.

Gator Series

The Gator series consists of very poorly drained soils that formed in well decomposed layers of organic matter underlain by sandy and loamy marine sediment. These soils are on broad flats, in depressions, and on the flood plains. The slopes are less than 1 percent. Gator soils are loamy, siliceous, euic, hyperthermic Terric Medisaprists.

Gator soils are associated on the landscape with Canova, Chobee, Emeralda, Floridana, Holopaw, Sanibel, and Terra Ceia soils. Canova, Chobee, Emeralda, Floridana, Holopaw, and Sanibel soils are mineral soils. Emeralda and Holopaw soils are poorly drained. Terra Ceia soils have an organic layer more than 51 inches thick.

Typical pedon of Gator muck; in a cultivated field; about 2 miles south and 1.25 miles west of Zellwood, 300 feet west and 2,100 feet north of the southeast corner of sec. 33, T. 20 S., R. 27 E.

Oa—0 to 28 inches; black (10YR 2/1) muck; about 10 percent fiber, less than 5 percent rubbed; massive; friable; medium acid by the Hellige-Truog method (pH 5.3 in 0.01 molar calcium chloride); gradual wavy boundary.

C1—28 to 37 inches; dark olive gray (5YR 3/2) fine sandy loam; common fine distinct white (10YR 8/1) mottles; massive; slightly sticky and slightly plastic; slightly acid; gradual wavy boundary.

C2—37 to 80 inches; light gray (5Y 7/1) sandy clay loam; massive; slightly sticky and plastic; slightly acid.

The thickness of the organic material ranges from 16 to 40 inches. Reaction ranges from very strongly acid to medium acid by the Hellige-Truog method (4.5 to 6.0 or more in 0.01 molar calcium chloride) in the Oa and Oap horizon and from slightly acid to moderately alkaline in the C horizon.

The Oa or Oap horizon has hue of 10YR, 5YR, or N, value of 2, and chroma of 2 or less; or hue of 5YR, value of 2, and chroma of 3.

The C horizon has hue of 10YR to 5Y or is neutral and has value of 3 to 7 and chroma of 1 or 2. The texture is fine sandy loam or sandy clay loam. In some pedons, the lower part of the C horizon has texture of loamy fine sand or fine sand, or it has thin discontinuous strata of limestone or soft calcium carbonate accumulations at a depth of more than 60 inches.

Holopaw Series

The Holopaw series consists of deep, poorly drained soils. They formed in stratified, sandy and loamy sediment and alluvium. These soils are on the flood plains and in depressions. The slopes are less than 2 percent. Holopaw soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

Holopaw soils are associated on the landscape with Emeralda, Felda, Gator, and Pompano soils. Emeralda soils have a surface layer and subsurface layer that have a combined thickness of less than 20 inches. Felda soils have an argillic horizon at a depth of 20 to 40 inches. Gator soils are very poorly drained and organic. Pompano soils are sandy throughout.

Typical pedon of Holopaw fine sand, in an area of Emeralda and Holopaw fine sands, frequently flooded; in a wooded area; about 3.5 miles north and 2.25 miles east of Apopka, 1,600 feet east and 150 feet south of the northwest corner of sec. 25, T. 20 S., R. 28 E.

A—0 to 6 inches; black (10YR 2/1) fine sand; moderate medium granular structure; friable; many fine roots; medium acid; gradual smooth boundary.

E1—6 to 25 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many fine roots; neutral; gradual smooth boundary.

E2—25 to 51 inches; gray (10YR 6/1) fine sand; single grained; nonsticky and nonplastic; slightly acid; abrupt wavy boundary.

Btg1—51 to 65 inches; dark gray (10YR 4/1) sandy clay loam; common medium distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; slightly sticky and slightly plastic; neutral; gradual wavy boundary.

Btg2—65 to 71 inches; gray (10YR 5/1) sandy loam; common medium distinct dark grayish brown (10YR 4/2) mottles; massive; slightly sticky and slightly plastic; neutral; gradual wavy boundary.

Cg—71 to 80 inches; light gray (10YR 7/1) loamy sand; few fine distinct dark yellowish brown (10YR 4/4) mottles; massive; nonsticky and nonplastic; slightly acid.

The thickness of the solum ranges from 50 to 80 inches. Reaction ranges from strongly acid to neutral in the A and E horizons and from medium acid to moderately alkaline in the Btg and Cg horizons.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The texture is sand or fine sand. The thickness of this horizon ranges from 4 to 12 inches.

The E horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The texture is sand or fine sand. The combined thickness of the A and E horizons is more than 40 inches.

The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. In some pedons, this horizon has mottles in shades of brown and yellow. The texture is fine sandy loam, sandy loam, or sandy clay loam. In some pedons, this horizon has pockets and lenses of sand or fine sand. The thickness of this horizon ranges from 12 to 20 inches.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1. The texture is loamy fine sand, loamy sand, or fine sand.

Hontoon Series

The Hontoon series consists of very poorly drained soils that formed in well decomposed layers of organic matter. These soils are in marshes and swamps and along drainageways. The slopes are less than 1 percent. Hontoon soils are dysic, hyperthermic Typic Medisaprists.

Hontoon soils are associated on the landscape with Basinger, Ona, St. Johns, Samsula, Sanibel, and Smyrna soils. The associated soils are mineral except Samsula soils. Samsula soils have an organic layer less than 51 inches thick. Ona, St. Johns, and Smyrna soils have a spodic horizon and are poorly drained.

Typical pedon of Hontoon muck; in a swamp; about 3 miles south and 12.25 miles east of Taft, 1,325 feet west and 700 feet south of the northeast corner of sec. 24, T. 24 S., R. 31 E.

Oa1—0 to 20 inches; black (10YR 2/1) muck; about 80 percent fiber, 12 percent rubbed; weak fine platy structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.

Oa2—20 to 49 inches; dark reddish brown (5YR 3/2) muck; about 30 percent fiber, 10 percent rubbed; massive; nonsticky and nonplastic; common fine roots; very strongly acid; clear wavy boundary.

Oa3—49 to 80 inches; very dark brown (10YR 2/2) muck; about 40 percent fiber, 8 percent rubbed; massive; nonsticky and nonplastic; very strongly acid.

Reaction is very strongly acid or strongly acid by the Hellige-Truog method (less than 4.5 in 0.01 molar calcium chloride). The mineral content in the Oa horizons within 16 to 51 inches of the surface ranges from about 5 to 30 percent.

The Oa horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2.

Immokalee Series

The Immokalee series consists of poorly drained soils that formed in sandy marine sediment. These soils are in broad areas on the flatwoods. The slopes are less than 2 percent. Immokalee soils are sandy, siliceous, hyperthermic Arenic Haplaquods.

Immokalee soils are associated on the landscape with Basinger, Ona, Pineda, Pomello, Pompano, Smyrna, and Wabasso soils. Basinger, Pineda, and Pompano soils do not have a spodic horizon. Pineda soils have an argillic horizon. Ona and Smyrna soils have a spodic horizon within 20 inches of the surface. Pomello soils are moderately well drained and have a spodic horizon at a depth of more than 40 inches. Wabasso soils have an argillic horizon.

Typical pedon of Immokalee fine sand; in a wooded area; about 7 miles north and 3 miles east of Apopka, 400 feet west and 1,800 feet north of the southeast corner of sec. 1, T. 20 S., R. 28 E.

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

E1—5 to 18 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few medium roots; very strongly acid; gradual wavy boundary.

E2—18 to 35 inches; light gray (10YR 7/1) fine sand; single grained; nonsticky and nonplastic; few medium roots; very strongly acid; abrupt smooth boundary.

Bh1—35 to 41 inches; black (10YR 2/1) fine sand; massive; nonsticky and nonplastic; very strongly acid; gradual wavy boundary.

Bh2—41 to 48 inches; dark brown (7.5YR 3/2) fine sand; single grained; loose; very strongly acid; gradual wavy boundary.

BC—48 to 67 inches; brown (10YR 4/3) fine sand; single grained; nonsticky and nonplastic; very strongly acid; gradual wavy boundary.

C—67 to 80 inches; light brownish gray (10YR 6/2) fine sand; few fine distinct brown (10YR 4/3) mottles; single grained; nonsticky and nonplastic; very strongly acid.

The thickness of the solum is more than 42 inches. The texture is sand or fine sand. Reaction is very strongly acid or strongly acid.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. Unrubbed colors often have a salt-and-pepper appearance. The thickness of this horizon ranges from 2 to 7 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. In some pedons, a transitional horizon 1/2 inch to 2 inches thick is between the base of the E horizon and the Bh horizon. The thickness of the E horizon ranges from 25 to 40 inches.

The Bh horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The thickness of this horizon ranges from 12 to 25 inches. The BC horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 2 to 4.

Lake Series

The Lake series consists of excessively drained soils that formed in sandy marine sediment. These soils are on the uplands. The slopes range from 0 to 5 percent. Lake soils are hyperthermic, coated Typic Quartzipsamments.

Lake soils are associated on the landscape with Apopka, Candler, and Tavares soils. Apopka soils have an argillic horizon. Candler soils have uncoated sand grains. Tavares soils are moderately well drained.

Typical pedon of Lake fine sand, 0 to 5 percent slopes; in a cultivated field; about 1.25 miles north and 0.75 mile east of Plymouth, 1,825 feet west and 100 feet south of the northeast corner of sec. 31, T. 20 S., R. 28 E.

Ap—0 to 4 inches; very dark gray (10YR 3/1) fine sand; weak fine crumb structure; friable; many fine and medium roots; medium acid; gradual wavy boundary.

C1—4 to 35 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; many fine roots; few uncoated sand grains; strongly acid; gradual wavy boundary.

C2—35 to 50 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few fine roots; few uncoated sand grains; strongly acid; gradual wavy boundary.

C3—50 to 80 inches; brownish yellow (10YR 6/8) fine sand; single grained; loose; strongly acid.

Reaction is strongly acid or very strongly acid except where the A horizon has been limed.

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

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. In some pedons are streaks of small pockets of clean sand grains.

Lochloosa Series

The Lochloosa series consists of somewhat poorly drained soils that formed in sandy and loamy marine sediment. These soils are on low ridges on the flatwoods. The slopes are less than 2 percent. Lochloosa soils are loamy, siliceous, hyperthermic Aquic Arenic Paleudults.

Lochloosa soils are associated on the landscape with Apopka, Millhopper, Smyrna, and Wabasso soils. Apopka soils are well drained and have an argillic horizon at a depth of more than 40 inches. Millhopper soils are moderately well drained and have a surface layer and subsurface layer that have a combined thickness of more than 40 inches. Smyrna and Wabasso soils are poorly drained and have a spodic horizon.

Typical pedon of Lochloosa fine sand; in a field; about 0.25 mile south and 0.5 mile east of Tildenville, 1,900 feet east and 2,550 feet north of the southwest corner of sec. 22, T. 22 S., R. 27 E.

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

E1—7 to 23 inches; light brownish gray (10YR 6/2) fine sand; weak fine and medium granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

E2—23 to 29 inches; light gray (10YR 7/2) fine sand; common medium distinct strong brown (7.5YR 5/8) mottles; weak fine granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

Bt—29 to 40 inches; light gray (10YR 6/1) sandy clay loam; common medium distinct strong brown (7.5YR

5/8) mottles; weak fine and medium subangular blocky structure; friable; slightly sticky and slightly plastic; few fine roots; strongly acid; clear wavy boundary.

Btg—40 to 64 inches; light gray (10YR 6/1) sandy clay loam; common fine prominent yellowish red (5YR 5/4) and dark reddish brown (2.5YR 3/4) mottles; moderate medium subangular blocky structure; slightly sticky and slightly plastic; few fine roots; very strongly acid; gradual wavy boundary.

Cg—64 to 80 inches; gray (10YR 5/1) sandy clay loam; common fine prominent yellowish red (5YR 4/6) mottles; massive; sticky and plastic; strongly acid.

The thickness of the solum is 60 or more inches. Reaction is strongly acid or very strongly acid.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The texture is sand or fine sand. The thickness of this horizon ranges from 5 to 7 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. The combined thickness of the E1 and E2 horizons is 19 to 29 inches. The texture is sand or fine sand.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 8. Mottles are in shades of red or yellow. The texture is sandy clay loam or sandy loam. The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles are in shades of red or brown. The combined thickness of the Bt and Btg horizons is 30 to 39 inches.

The Cg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. The texture is sandy loam or sandy clay loam.

Malabar Series

The Malabar series consists of poorly drained soils that formed in sandy and loamy marine sediment. Malabar soils are on broad flats and in shallow depressions on the flatwoods. The slopes are less than 2 percent. Malabar soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

Malabar soils are associated on the landscape with Basinger, Felda, Pineda, Pompano, and Wabasso soils. Basinger and Pompano soils do not have an argillic horizon. Felda and Pineda soils have an argillic horizon within 40 inches of the surface. Wabasso soils have a spodic horizon.

Typical pedon of Malabar fine sand; in a wooded area; about 2.75 miles south and 2 miles east of Christmas, 2,400 feet west and 1,000 feet north of the southeast corner of sec. 11, T. 23 S., R. 33 E.

A-0 to 3 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many fine roots; slightly acid; gradual smooth boundary.

E—3 to 18 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine roots; medium acid; clear wavy boundary.

Bw—18 to 30 inches; light yellowish brown (10YR 6/4) fine sand; single grained; nonsticky and nonplastic; few fine roots; medium acid; clear wavy boundary.

E'—30 to 42 inches; light gray (10YR 7/2) fine sand; single grained; nonsticky and nonplastic; slightly acid; clear wavy boundary.

Btg—42 to 58 inches; gray (5Y 5/1) fine sandy loam; common medium distinct pale brown (10YR 6/3) and brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; slightly sticky and slightly plastic; neutral; gradual wavy boundary.

Cg—58 to 80 inches; gray (5Y 6/1) loamy sand; massive; nonsticky and nonplastic; neutral.

The thickness of the solum ranges from 46 to 80 inches. Reaction ranges from medium acid to neutral in the A, E, Bw, and E' horizons and from neutral to moderately alkaline in the Btg and Cg horizons.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1. The texture is fine sand or sand. The thickness of this horizon ranges from 2 to 7 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 2. The texture is fine sand or sand. The combined thickness of the A and E horizons ranges from 8 to 23 inches.

The Bw horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8; or hue of 7.5YR, value of 5, and chroma of 6 or 8. The texture is fine sand or sand. The thickness of this horizon ranges from 12 to 20 inches.

The E' horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. The texture is fine sand or sand. The thickness of this horizon ranges from 0 to 12 inches.

The Btg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; or hue of 5Y, value of 5 to 7, and chroma of 1 or 2; or is neutral and has value of 5 to 7. Some pedons have a BCg horizon that has similar colors as the Btg horizon. In some pedons, these horizons have mottles in shades of gray, brown, and yellow. The texture is sandy loam, fine sandy loam, or sandy clay loam. In some pedons, the texture of the BCg horizon is loamy fine sand. The combined thickness of the Btg and BCg horizons ranges from 10 to 22 inches.

The Cg horizon has hue of 10YR to 5GY, value of 5 to 7, and chroma of 1 or 2; or it is neutral and has value of 5 to 7. The texture is fine sand, loamy fine sand, or loamy sand.

Millhopper Series

The Millhopper series consists of moderately well drained soils that formed in sandy and loamy marine sediment. These soils are on the uplands and low ridges on the flatwoods. The slopes range from 0 to 5 percent.

Millhopper soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Millhopper soils are associated on the landscape with Apopka, Candler, Lochloosa, and Tavares soils. Apopka soils are well drained. Candler and Tavares soils do not have an argillic horizon. Lochloosa soils are somewhat poorly drained and have an argillic horizon within 40 inches of the surface.

Typical pedon of Millhopper fine sand, in an area of Tavares-Millhopper fine sands, 0 to 5 percent slopes; in a citrus grove; about 2.25 miles south and 1 mile east of Plymouth, 1,600 feet east and 50 feet south of the northwest corner of sec. 17, T. 21 S., R. 28 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sand; weak medium granular structure; very friable; many fine roots; medium acid; clear wavy boundary.

E1—6 to 40 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; few fine roots; slightly acid; clear wavy boundary.

E2—40 to 64 inches; very pale brown (10YR 7/3) fine sand; few fine distinct yellowish brown (10YR 5/4) mottles; single grained; loose; few fine roots; medium acid; clear wavy boundary.

Bt—64 to 76 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; very friable; strongly acid; clear wavy boundary.

Btg—76 to 80 inches; light gray (10YR 7/1) sandy clay loam; common medium prominent yellowish brown (10YR 5/8) and yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; sticky and plastic; strongly acid.

Reaction ranges from very strongly acid to slightly acid in the A and E horizons and from very strongly acid to medium acid in the Bt and Btg horizons.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The texture is fine sand or sand. The thickness of this horizon ranges from 5 to 9 inches. In pedons that have an Ap horizon that has value of 3, the thickness of the horizon is 6 inches or less.

The upper part of the E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8. The lower part has hue of 10YR, value of 6 to 8, and chroma of 2 to 4. Gray, red, or strong brown mottles, indicative of wetness, occur at a depth of more than 40 inches. The texture is fine sand or sand. The combined thickness of the E1 and E2 horizons is 36 to 65 inches.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 7. In some pedons, this horizon has gray, yellow, and brown mottles. The texture is loamy fine sand, sandy loam, or fine sandy loam. The thickness of this horizon ranges from 6 to 12 inches. The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 4. In some pedons, this horizon has mottles in shades of gray, yellow, and brown. The texture is sandy loam or sandy clay loam.

Okeelanta Series

The Okeelanta series consists of very poorly drained soils that formed in well decomposed organic matter underlain by sandy marine sediment. These soils are on broad flats. The slopes are less than 1 percent. Okeelanta soils are sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists.

Okeelanta soils are associated on the landscape with Sanibel and Terra Ceia soils. Sanibel soils are mineral soils. Terra Ceia soils have an organic layer more than 51 inches thick.

Typical pedon of Okeelanta muck; in a cultivated field; about 1 mile south and 0.5 mile east of Zellwood, 1,850 feet west and 1,300 feet north of the southeast corner of sec. 27, T. 20 S., R. 27 E.

Oap—0 to 9 inches; black (10YR 2/1) muck; 5 percent fiber, unrubbed; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

Oa—9 to 25 inches; dark brown (7.5YR 3/2) muck; 30 percent fiber, unrubbed; massive; nonsticky and nonplastic; slightly acid; clear smooth boundary.

C—25 to 62 inches; light gray (10YR 6/1) fine sand; common coarse distinct dark gray (10YR 4/1) mottles; single grained; nonsticky and nonplastic; mildly alkaline; clear wavy boundary.

Cg—62 to 80 inches; grayish brown (10YR 5/2) loamy sand; single grained; nonsticky and nonplastic; many fine shell fragments; moderate effervescence; mildly alkaline.

The thickness of the organic material ranges from 16 to 50 inches. Reaction ranges from very strongly acid to slightly acid by the Hellige-Truog method (4.5 to 6.5 in 0.01 molar calcium chloride) in the Oa horizon and from strongly acid to mildly alkaline in the C horizon.

The Oa or Oap horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2. The content of fiber, unrubbed, ranges from 5 to 33 percent, and it ranges from 3 to 16 percent, rubbed. The texture is muck.

The C horizon has hue of 10YR, value of 2 to 7, and chroma of 1 or 2; or it is neutral and has value of 2 to 7. The texture is fine sand or loamy sand that may contain few to many shell fragments.

Ona Series

The Ona series consists of poorly drained soils that formed in sandy marine sediment. These soils are on broad plains on the flatwoods. The slopes are less than 2 percent. Ona soils are sandy, siliceous, hyperthermic Typic Haplaquods.

Ona soils are associated on the landscape with Basinger, Hontoon, Immokalee, Samsula, Sanibel, St.

Johns, Smyrna, and Wabasso soils. Basinger soils do not have a spodic horizon. Hontoon and Samsula soils are organic soils. Immokalee, St. Johns, and Smyrna soils have an albic horizon and a spodic horizon at a depth of more than 10 inches. Sanibel soils are mineral soils, and they have a thin organic surface layer. Wabasso soils have an argillic horizon.

Typical pedon of Ona fine sand; in a citrus grove; about 3.25 miles south and 1 mile west of Winter Garden, 50 feet east and 1,800 feet south of the northwest corner of sec. 3, T. 23 S., R. 27 E.

Ap—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many fine and medium roots; very strongly acid; clear smooth boundary.

Bh—6 to 15 inches; dark reddish brown (5YR 3/2) fine sand; weak coarse subangular blocky structure; firm; common fine roots; many sand grains coated with organic matter; strongly acid; clear wavy boundary.

C1—15 to 42 inches; grayish brown (10YR 5/2) fine sand; single grained; nonsticky and nonplastic; strongly acid; clear wavy boundary.

C2—42 to 60 inches; light gray (10YR 7/2) fine sand; single grained; nonsticky and nonplastic; strongly acid; gradual smooth boundary.

C3—60 to 80 inches; very pale brown (10YR 7/3) fine sand; single grained; nonsticky and nonplastic; strongly acid.

Reaction ranges from extremely acid to medium acid. The texture is sand or fine sand.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 9 inches.

The Bh horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2; or it is neutral and has value of 2. Sand grains are well coated with organic matter. The thickness of this horizon ranges from 6 to 20 inches.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4.

Pineda Series

The Pineda series consists of poorly drained soils that formed in sandy and loamy alluvial and marine sediment. These soils are on low hammocks, in broad, poorly defined drainageways, in sloughs, and on the flood plains. The slopes are less than 2 percent. Pineda soils are loamy, siliceous, hyperthermic Arenic Glossaqualfs.

Pineda soils are associated on the landscape with Floridana, Malabar, and Wabasso soils. Floridana soils are very poorly drained and have a mollic epipedon. Malabar soils have an argillic horizon at a depth of more than 40 inches. Wabasso soils have a spodic horizon.

Typical pedon of Pineda fine sand; in a wooded area; about 3.25 miles south and 5 miles east of Christmas, 700 feet west and 100 feet north of the southeast corner of sec. 8, T. 23 S., R. 34 E.

A—0 to 5 inches; black (10YR 2/1) fine sand; single grained; loose; many fine and medium roots; medium acid; clear smooth boundary.

E—5 to 25 inches; gray (10YR 5/1) fine sand; single grained; loose; many fine and medium roots; medium acid; clear wavy boundary.

Bw1—25 to 29 inches; strong brown (7.5YR 5/6) fine sand; single grained; loose; strongly acid; clear wavy boundary.

Bw2—29 to 37 inches; dark yellowish brown (10YR 4/4) fine sand; single grained; nonsticky and nonplastic; medium acid; clear wavy boundary.

Btg/E—37 to 55 inches; dark gray (5Y 4/1) sandy loam; weak fine subangular blocky structure; slightly sticky and slightly plastic, (Btg); 20 percent tongues of light gray (10YR 7/2) fine sand, 3 to 7 inches long and 1/2 inch to 2 inches wide; single grained; nonsticky and nonplastic, (E); neutral; abrupt irregular boundary.

Cg—55 to 80 inches; greenish gray (5GY 5/1) sandy loam; massive; friable; many shell fragments; moderately alkaline.

The thickness of the solum is 40 to 80 inches. Reaction ranges from strongly acid to neutral in the A, E, and Bw horizons and from neutral to moderately alkaline in the Btg/E and Cg horizons.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2; or it is neutral and has value of 2 to 4. The texture is fine sand or sand. The thickness of this horizon ranges from 2 to 5 inches.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 to 3. The texture is sand or fine sand. Some pedons do not have an E horizon.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 3 to 8. In some pedons, a thin, weakly expressed E' horizon is at the base of the Bw horizon, and it has colors similar to those of the E horizon. The texture of the Bw and E' horizons is sand or fine sand. The combined thickness of the A, E, Bw, and E' horizons is 20 to 40 inches. The Btg/E horizon has hue of 10YR to 5GY, value of 4 to 7, and chroma of 1 or 2. The texture of the Btg part of this horizon is sandy loam, fine sandy loam, or sandy clay loam. Tongues of vertical intrusions of fine sand or sand extend from the E horizon into the upper part of the Btg horizon. In some pedons, the Btg horizon has colors similar to those of the Btg part of the Btg/E horizon.

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

Pinellas Series

The Pinellas series consists of poorly drained soils that formed in sandy and loamy marine sediment. These soils are in nearly level areas that border sloughs and shallow depressions. The slopes are less than 2 percent. Pinellas soils are loamy, siliceous, hyperthermic Arenic Ochraqualfs.

Pinellas soils are associated on the landscape with Felda, Floridana, Malabar, and Wabasso soils. The associated soils do not have a Bk horizon. Malabar soils have an argillic horizon at a depth of more than 40 inches. Floridana soils are very poorly drained and have a mollic epipedon. Wabasso soils have a spodic horizon.

Typical pedon of Pinellas fine sand; in a wooded area; about 3 miles south and 3.25 miles east of Christmas, 50 feet east and 1,200 feet north of the southwest corner of sec. 7, T. 23 S., R. 33 E.

A—0 to 5 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

E—5 to 18 inches; light gray (10YR 7/1) fine sand; single grained; loose; many fine and medium roots; medium acid; clear wavy boundary.

Bk1—18 to 28 inches; light gray (10YR 7/2) fine sand; common fine distinct brownish yellow (10YR 6/6) mottles; massive; nonsticky and nonplastic; few coarse roots; common thin coatings of carbonates on sand grains and along root channels; moderately alkaline; clear wavy boundary.

Bk2—28 to 34 inches; light gray (10YR 7/1) fine sand; few fine distinct dark brown (10YR 4/3) mottles; massive; nonsticky and nonplastic; common fine roots; common thin coatings of carbonates along root channels; moderately alkaline; clear wavy boundary.

Btg—34 to 46 inches; grayish brown (2.5Y 5/2) fine sandy loam; common fine and medium distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; slightly sticky and slightly plastic; common fine roots; mildly alkaline; gradual wavy boundary.

2C—46 to 80 inches; light olive brown (2.5Y 5/4) fine sand; single grained; nonsticky and nonplastic; many fine and medium shell fragments; moderately alkaline.

The thickness of the solum is less than 60 inches. The combined thickness of the A, E, and Bk horizons ranges from 20 inches to less than 40 inches. Reaction ranges from strongly acid to mildly alkaline in the A and E horizons and from neutral to strongly alkaline in the B horizons.

The A horizon has hue of 10YR, value of 2 to 6, and chroma of 1. The texture is sand or fine sand. The thickness of this horizon ranges from 3 to 5 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. The texture is sand or fine sand.

The Bk horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 3. Secondary carbonate accumulations occur as coatings on sand grains and along root channels. The Bk horizon is more than 6 inches thick. It has more than 15 percent calcium carbonate equivalent, or more than 5 percent higher carbonates than are in the underlying horizons. The texture is sand or fine sand.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 or 2; or it is neutral and has value of 4 to 7. The texture is fine sandy loam or sandy loam. In most pedons, this horizon has secondary carbonate accumulations of less than 5 percent calcium carbonate equivalent.

The 2C horizon is a mixture of sandy material and shell fragments in varying proportions. The color of this horizon is largely dependent on the color of the shell fragments; however, the sand has color similar to that of the Btg horizon.

Pomello Series

The Pomello series consists of moderately well drained soils that formed in sandy marine sediment. These soils are on low ridges on the flatwoods. The slopes range from 0 to 5 percent. Pomello soils are sandy, siliceous, hyperthermic Arenic Haplohumods.

Pomello soils are associated on the landscape with Archbold, Immokalee, Pompano, St. Lucie, and Smyrna soils. Archbold, Pompano, and St. Lucie soils do not have a spodic horizon. Pompano soils are poorly drained, and St. Lucie soils are excessively drained. Immokalee and Smyrna soils are poorly drained.

Typical pedon of Pomello fine sand, 0 to 5 percent slopes; in a pasture; about 1.5 miles south and 0.75 mile east of Christmas, 1,800 feet east and 1,200 feet north of the southwest corner of sec. 3, T. 23 S., R. 33 E.

A—0 to 3 inches; gray (10YR 5/1) fine sand; single grained; loose; many fine and medium roots; strongly acid; clear smooth boundary.

E—3 to 40 inches; white (10YR 8/1) fine sand; single grained; loose; few fine roots; very strongly acid; abrupt smooth boundary.

Bh1—40 to 48 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; few segregated masses of dark reddish brown (5YR 2/2) weakly cemented material; very strongly acid; clear smooth boundary.

Bh2—48 to 55 inches; dark reddish brown (5YR 3/3) fine sand; massive, parting to weak fine granular structure; very friable; very strongly acid; clear wavy boundary.

C—55 to 80 inches; pale brown (10YR 6/3) fine sand; single grained; loose; very strongly acid.

Depth to the spodic horizon ranges from 35 to 50 inches or more. The texture is sand or fine sand. Reaction is very strongly acid to medium acid.

The A or Ap horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Unrubbed colors often have a salt-and-pepper appearance. The thickness of this horizon ranges from 3 to 5 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1. The combined thickness of the A and E horizons is more than 30 inches.

The Bh horizon has hue of 5YR, value of 2 or 3, and chroma of 1 to 3; or it has hue of 10YR, value of 2, and chroma of 1. In some pedons, this horizon has weakly cemented fragments of Bh bodies that make up less than one-half of the Bh horizon.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3.

Pompano Series

The Pompano series consists of poorly drained soils that formed in sandy marine sediment. These soils are in poorly defined drainageways and on broad, low flats. The slopes are less than 2 percent. Pompano soils are siliceous, hyperthermic Typic Psammaquents.

Pompano soils are associated on the landscape with Basinger, Emeralda, Holopaw, Immokalee, Pomello, Smyrna, and Wabasso soils. Basinger soils are in shallow depressions and sloughs and are very poorly drained. Emeralda soils have a mollic epipedon and a Bt horizon within 20 inches of the surface. Holopaw and Wabasso soils have an argillic horizon. Wabasso, Immokalee, Pomello, and Smyrna soils have a spodic horizon. Pomello soils are moderately well drained.

Typical pedon of Pompano fine sand; in a wooded area; about 1 mile south and 3 miles west of Lake Buena Vista, 500 feet east and 2,200 feet south of the northwest corner of sec. 31, T. 24 S., R. 28 E.

A—0 to 4 inches; dark gray (10YR 4/1) fine sand; weak fine crumb structure; very friable; many fine roots; medium acid; gradual smooth boundary.

C1—4 to 21 inches; grayish brown (10YR 5/2) fine sand; common fine distinct dark brown (10YR 4/3) mottles; single grained; loose; few fine roots; slightly acid; gradual wavy boundary.

C2—21 to 80 inches; light gray (10YR 7/1) fine sand; single grained; nonsticky and nonplastic; slightly acid.

Reaction ranges from very strongly acid to mildly alkaline. The texture is sand or fine sand.

The A or Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The thickness of this horizon ranges from 2 to 5 inches.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3; or it is neutral and has value of 5 to 8. In some pedons, the C horizon has higher chroma colors caused by uncoated sand grains or by thin coatings of colloidal organic material on sand grains.

Samsula Series

The Samsula series consists of very poorly drained soils that formed in well decomposed organic matter underlain by sandy marine sediment. These soils are in marshes and swamps and along drainageways. The slopes are less than 1 percent. Samsula soils are sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists.

Samsula soils are associated on the landscape with Basinger, Hontoon, Ona, Pompano, Sanibel, and Smyrna soils. Basinger, Ona, Pompano, Sanibel, and Smyrna soils are mineral soils. Hontoon soils have an organic layer more than 51 inches thick.

Typical pedon of Samsula muck, in an area of Samsula-Hontoon-Basinger association, depressional; in a swamp; about 1.5 miles south and 0.5 mile east of Orlovista, 1,100 feet east and 2,300 feet north of the southwest corner of sec. 6, T. 23 S., R. 29 E.

Oa1—0 to 8 inches; black (10YR 2/1) muck; about 20 percent fiber, 5 percent rubbed; moderate medium granular structure; friable; many fine roots; extremely acid; clear smooth boundary.

Oa2—8 to 34 inches; dark reddish brown (5YR 2/2) muck; about 15 percent fiber, 5 percent rubbed; massive; nonsticky and nonplastic; many fine and medium roots; extremely acid; abrupt wavy boundary.

A—34 to 40 inches; black (10YR 2/1) fine sand; single grained; loose; extremely acid; clear wavy boundary.

C—40 to 80 inches; light gray (10YR 6/1) fine sand; single grained; nonsticky and nonplastic; extremely acid.

The thickness of the organic material ranges from 16 to 50 inches. The texture of the A and C horizons is sand or fine sand. Reaction of the organic material is very strongly acid or strongly acid by the Hellige-Truog method (less than 4.5 in 0.01 molar calcium chloride). Reaction of the mineral material is extremely acid to medium acid.

The Oa horizon has hue of 10YR, 7.5YR, or 5YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2. The fiber content, unrubbed, ranges from 15 to 45 percent and ranges from 5 to 16 percent, rubbed.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 18 inches.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2.

Sanibel Series

The Sanibel series consists of very poorly drained soil that formed in sandy marine sediment under conditions favorable for the accumulation of organic matter. These soils are on broad flats, in depressions, and along drainageways. The slopes are less than 1 percent. Sanibel soils are sandy, siliceous, hyperthermic Histic Humaquepts.

Sanibel soils are associated on the landscape with Basinger, Floridana, Hontoon, Ona, Samsula, and Smyrna soils. Basinger, Floridana, Ona, and Smyrna soils do not have a histic epipedon. Floridana soils have an argillic horizon at a depth of 20 to 40 inches. Ona and Smyrna soils are poorly drained and have a spodic horizon. Hontoon and Samsula soils are organic.

Typical pedon of Sanibel muck; in a swamp; about 3 miles south and 1.25 miles east of Orlovista, 200 feet west and 300 feet north of the southeast corner of sec. 6, T. 23 S., R. 29 E.

Oa—0 to 11 inches; black (10YR 2/1) muck; 5 percent fiber, rubbed; weak medium granular structure; friable; many fine and medium roots; medium acid; gradual wavy boundary.

A—11 to 15 inches; black (10YR 2/1) fine sand; weak medium granular structure; very friable; few fine roots; medium acid; gradual wavy boundary.

C1—15 to 28 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine roots; medium acid; gradual wavy boundary.

C2—28 to 80 inches; light gray (10YR 7/1) fine sand; common fine distinct brown (10YR 5/3) mottles; single grained; nonsticky and nonplastic; medium acid.

Reaction ranges from extremely acid to neutral throughout.

The Oa or Oap horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. The thickness of this horizon ranges from 8 to 15 inches.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The texture is sand, fine sand, or mucky fine sand. The thickness of this horizon ranges from 1 inch to 7 inches.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. The texture is sand or fine sand.

Seffner Series

The Seffner series consists of somewhat poorly drained soils that formed in sandy marine sediment. These soils are on the rims of depressions and on broad, low ridges on the flatwoods. The slopes range from 0 to 2 percent. Seffner soils are sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts.

Seffner soils are associated on the landscape with Basinger, Florahome, Ona, Smyrna, and Zolfo soils. Basinger soils are very poorly drained. Florahome soils are moderately well drained. Ona and Smyrna soils are poorly drained and have a spodic horizon. Zolfo soils have a surface layer less than 10 inches thick, and they have a spodic horizon.

Typical pedon of Seffner fine sand; in a pasture; about 0.75 mile east of Conway, 1,500 feet west and 1,100 feet north of the southeast corner of sec. 9, T. 23 S., R. 30 E.

A1—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; few very fine roots; strongly acid; clear smooth boundary.

A2—6 to 19 inches; very dark grayish brown (10YR 3/2) fine sand; weak fine granular structure; very friable; few very fine roots; medium acid; clear wavy boundary.

C1—19 to 36 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; strongly acid; gradual wavy boundary.

C2—36 to 52 inches; light gray (10YR 7/2) fine sand; common fine distinct brown (10YR 4/3) mottles; single grained; loose; strongly acid; clear irregular boundary.

C3—52 to 80 inches; white (10YR 8/1) fine sand; common fine distinct brown (10YR 5/3) mottles; single grained; nonsticky and nonplastic; strongly acid.

The thickness of the umbric epipedon ranges from 10 to 20 inches. The texture is sand or fine sand to a depth of 80 inches or more. Reaction ranges from very strongly acid to neutral.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. Some pedons have an AC horizon that has hue of 10YR, value of 3 to 6, and chroma of 1 to 4.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3.

Smyrna Series

The Smyrna series consists of poorly drained soils that formed in sandy marine sediment. These soils are in broad, nearly level areas on the flatwoods. The slopes range from 0 to 2 percent. Smyrna soils are sandy, siliceous, hyperthermic Aeric Haplaquods.

Smyrna soils are associated on the landscape with Basinger, Immokalee, Ona, Pomello, Pompano, Samsula, and Wabasso soils. Basinger and Samsula soils are very poorly drained. Basinger soils do not have a spodic horizon. Samsula soils are organic. Immokalee soils have a spodic horizon at a depth of more than 30 inches. Ona soils have a spodic horizon within 20 inches of the surface. Pomello soils are moderately well drained and have a spodic horizon at a depth of more than 40 inches. Pompano soils do not have a spodic horizon. Wabasso soils have an argillic horizon.

Typical pedon of Smyrna fine sand; in a pasture; about 1.5 miles south of Christmas, 650 feet west and 2,100 feet north of the southeast corner of sec. 4, T. 23 S., R. 33 E.

Ap—0 to 4 inches; black (10YR 2/1) fine sand; weak coarse granular structure; very friable; many fine roots; strongly acid; gradual wavy boundary.

E—4 to 17 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine roots; strongly acid; abrupt wavy boundary.

Bh1—17 to 22 inches; black (5YR 2/1) fine sand; moderate medium granular structure; friable; few fine roots; sand grains coated with organic matter; very strongly acid; gradual wavy boundary.

Bh2—22 to 27 inches; dark brown (7.5YR 4/4) fine sand; single grained; nonsticky and nonplastic; strongly acid; clear wavy boundary.

C1—27 to 53 inches; pale brown (10YR 6/3) fine sand; single grained; nonsticky and nonplastic; strongly acid; clear wavy boundary.

C2—53 to 80 inches; light gray (10YR 7/1) fine sand; single grained; nonsticky and nonplastic; strongly acid.

The combined thickness of the A and E horizons is less than 20 inches. The texture is sand or fine sand. Reaction ranges from extremely acid to medium acid in the A and E horizons except where limed, extremely acid to strongly acid in the Bh horizon, and very strongly acid or strongly acid in the C horizon.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The thickness of this horizon ranges from 3 to 6 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. The thickness of this horizon ranges from 6 to 14 inches.

The Bh horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 1 to 4. The combined thickness of the Bh1 and Bh2 horizons ranges from about 8 to 18 inches.

In some pedons, a second sequum of E' and B'h horizons are at a depth of more than 40 inches.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4.

St. Johns Series

The St. Johns series consists of poorly drained soils that formed in sandy marine sediment. These soils are on low-lying plains on the flatwoods. The slopes are less than 2 percent. St. Johns soils are sandy, siliceous, hyperthermic Typic Haplaquods.

St. Johns soils are associated on the landscape with Basinger, Immokalee, Ona, Sanibel, Smyrna, and Wabasso soils. Basinger and Sanibel soils are very poorly drained and do not have a spodic horizon. Immokalee, Smyrna, and Wabasso soils do not have an umbric epipedon. Wabasso soils have an argillic horizon. Ona soils do not have an albic horizon.

Typical pedon of St. Johns fine sand; in a wooded area; about 3 miles north and 2.25 miles east of Apopka, 1,680 feet east and 2,550 feet south of the northwest corner of sec. 25, T. 20 S., R. 28 E.

A1—0 to 7 inches; black (10YR 2/1) fine sand; weak fine crumb structure; friable; many fine and medium roots; very strongly acid; clear smooth boundary.

A2—7 to 12 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; common fine roots; very strongly acid; gradual smooth boundary.

E—12 to 24 inches; gray (10YR 5/1) fine sand; single grained; nonsticky and nonplastic; few fine and medium roots; very strongly acid; abrupt wavy boundary.

Bh1—24 to 30 inches; black (10YR 2/1) fine sand; weak fine subangular blocky structure; nonsticky and nonplastic; common fine and medium roots; very strongly acid; clear wavy boundary.

Bh2—30 to 36 inches; dark reddish brown (5YR 2/2) fine sand; weak fine subangular blocky structure; nonsticky and nonplastic; few fine roots; very strongly acid; gradual wavy boundary.

BC—36 to 44 inches; brown (10YR 4/3) fine sand; single grained; nonsticky and nonplastic; few fine roots; very strongly acid; gradual wavy boundary.

C1—44 to 58 inches; light gray (10YR 6/1) fine sand; single grained; nonsticky and nonplastic; very strongly acid; gradual wavy boundary.

C2—58 to 80 inches; pale brown (10YR 6/3) fine sand; single grained; nonsticky and nonplastic; very strongly acid.

Reaction ranges from extremely acid to strongly acid. The texture is sand or fine sand.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The combined thickness of the A horizons ranges from 8 to 15 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The thickness of this horizon ranges from 10 to 15 inches.

The Bh horizon has hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The thickness of this horizon ranges from 10 to 20 inches. The BC horizon has hue of 10YR, value of 3 to 6, and chroma of 3 or 4.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 3.

St. Lucie Series

The St. Lucie series consists of excessively drained soils that formed in sandy marine sediment. These soils are on the uplands. The slopes range from 0 to 5 percent. St. Lucie soils are hyperthermic, uncoated Typic Quartzipsamments.

St. Lucie soils are associated on the landscape with Archbold, Candler, and Pomello soils. Archbold and Pomello soils are moderately well drained. Pomello soils have a spodic horizon. Candler soils have higher chromas in the underlying material than St. Lucie soils.

Typical pedon of St. Lucie fine sand, 0 to 5 percent slopes; in a wooded area; about 0.75 mile north and 3 miles east of Tangerine, 300 feet west and 2,450 feet south of the northeast corner of sec. 2, T. 20 S., R. 27 E.

A—0 to 2 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; clear smooth boundary.

C1—2 to 6 inches; light gray (10YR 7/1) fine sand; single grained; loose; strongly acid; clear smooth boundary.

C2—6 to 80 inches; white (10YR 8/1) fine sand; single grained; loose; strongly acid.

Reaction ranges from neutral to extremely acid. The texture is sand or fine sand. The sand extends to a depth of more than 80 inches. It does not have a subsurface diagnostic horizon within 80 inches of the surface.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1. This horizon is a mixture of uncoated quartz sand grains and dark color organic matter granules.

The C horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2.

Tavares Series

The Tavares series consists of moderately well drained soils that formed in sandy marine sediment. These soils are in low-lying areas on hillslopes and ridges on the uplands and on the flatwoods. The slopes range from 0 to 5 percent. Tavares soils are hyperthermic, uncoated Typic Quartzipsamments.

Tavares soils are associated on the landscape with Apopka, Archbold, Candler, Florahome, Lake, Millhopper, and Zolfo soils. Apopka and Millhopper soils have an argillic horizon. Archbold soils have lower moist chromas and lower clay content than Tavares soils. Candler and Lake soils are excessively drained. Florahome soils have an umbric epipedon. Zolfo soils are somewhat poorly drained and have a weakly expressed spodic horizon at a depth of more than 50 inches.

Typical pedon of Tavares fine sand, 0 to 5 percent slopes; in a citrus grove; about 2.25 miles south and 0.5 mile east of Oakland, 1,250 feet east and 900 feet north of the southwest corner of sec. 33, T. 22 S., R. 27 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; friable; many fine and medium roots; common uncoated light gray (10YR 7/1) sand grains; strongly acid; abrupt wavy boundary.

C1—6 to 16 inches; brown (10YR 5/3) fine sand; single grained; loose; common fine roots; strongly acid; gradual wavy boundary.

C2—16 to 41 inches; pale brown (10YR 6/3) fine sand; single grained; loose; few fine roots; strongly acid; gradual wavy boundary.

C3—41 to 80 inches; white (10YR 8/1) fine sand; single grained; loose; strongly acid.

Reaction ranges from extremely acid to medium acid. The texture is sand or fine sand. The content of silt and clay is 5 percent or less between depths of 10 and 40 inches.

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness of this horizon ranges from 3 to 9 inches.

The upper part of the C horizon has hue of 10YR, value of 5 to 8, and chroma of 3 or 4. The lower part has hue of 10YR, value of 6 to 8, and chroma of 1 to 4.

Terra Ceia Series

The Terra Ceia series consists of very poorly drained soils that formed in well decomposed layers of organic matter. These soils are in freshwater swamps and in depressions. The slopes are less than 1 percent. Terra Ceia soils are euic, hyperthermic Typic Medisaprists.

Terra Ceia soils are associated on the landscape with Canova, Gator, and Okeelanta soils. Canova soils are mineral soils. Gator and Okeelanta soils have an organic layer less than 51 inches thick.

Typical pedon of Terra Ceia muck; in a cultivated field; about 1.25 miles south of Zellwood, 1,800 feet east and 300 feet south of the northwest corner of sec. 34, T. 20 S., R. 27 E.

Oap—0 to 9 inches; black (10YR 2/1) muck; about 35 percent fiber, unrubbed, 5 percent fiber, rubbed; weak fine and medium granular structure; very friable; common fine roots; medium acid; clear wavy boundary.

Oa—9 to 74 inches; dark brown (7.5YR 3/2) muck; about 30 percent fiber, unrubbed, and 10 percent fiber, rubbed; massive; nonsticky and nonplastic; slightly acid; abrupt smooth boundary.

Cg—74 to 80 inches; light gray (5Y 6/1) sandy clay loam; massive; sticky and plastic; strong effervescence; moderately alkaline.

The thickness of the organic material is more than 51 inches. Reaction ranges from medium acid to moderately alkaline by the Hellige-Truog (4.5 or more in 0.01 molar calcium chloride) method.

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

The Cg horizon has hue of 10YR to 5Y, value of 2 to 7, and chroma of 1 or 2; or it is neutral and has value of 2. The texture is sandy clay loam, sandy loam, or fine sand. In some pedons, the Cg horizon has discontinuous strata of limestone.

Wabasso Series

The Wabasso series consists of poorly drained soils that formed in sandy and loamy marine sediment. These soils are in nearly level areas on the flatwoods. The slopes are less than 2 percent. Wabasso soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

Wabasso soils are associated on the landscape with Basinger, Chobee, Immokalee, Pineda, Pompano, Smyrna, and Wauberg soils. Basinger, Immokalee, Pompano, and Smyrna soils do not have an argillic horizon. Chobee, Pineda, Pompano, and Wauberg soils do not have a spodic horizon. Chobee, Pineda, and Wauberg soils have an argillic horizon.

Typical pedon of Wabasso fine sand; in a pasture; about 1 mile south of Bithlo, 700 feet west and 400 feet south of the northeast corner of sec. 33, T. 22 S., R. 32 E.

A—0 to 3 inches; black (10YR 2/1) fine sand; weak fine crumb structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

E—3 to 18 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bh—18 to 21 inches; black (10YR 2/1) fine sand; moderate medium granular structure; friable; common fine roots; sand grains coated with organic matter; strongly acid; gradual smooth boundary.

Btg1—21 to 45 inches; very pale brown (10YR 7/3) sandy clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; sticky and plastic; neutral; gradual wavy boundary.

Btg2—45 to 70 inches; light gray (5Y 7/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; sticky and plastic; few fine roots; mildly alkaline; gradual wavy boundary.

Cg—70 to 80 inches; light brownish gray (10YR 6/2) loamy sand; single grained; nonsticky and nonplastic; mildly alkaline.

The thickness of the solum is 60 inches or more.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The texture is sand or fine sand. The thickness of this horizon ranges from 3 to 5 inches. Reaction ranges from extremely acid to slightly acid.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Reaction ranges from extremely acid to slightly acid. The texture is sand or fine sand. The combined thickness of the A and E horizons is less than 30 inches.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3; or hue of 7.5YR, value of 3, and chroma of 2. Reaction ranges from very strongly acid to neutral. The texture is sand or fine sand. In some pedons, the Bh horizon is underlain by a thin sand or fine sand E' horizon. The thickness of the Bh horizon ranges from 3 to 14 inches. The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 3. The texture is sandy loam or sandy clay loam. Reaction ranges from strongly acid to moderately alkaline. The combined thickness of the Btg horizons ranges from 40 to 50 inches.

The Cg horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2; or it is neutral and has value of 6 or 7. Reaction is mildly alkaline or moderately alkaline. The texture is loamy sand or fine sand. In some pedons, the Cg horizon has shell fragments.

Wauberg Series

The Wauberg series consists of poorly drained soils that formed in sandy and loamy marine sediment. These soils are in low-lying areas on the flatwoods. The slopes are less than 2 percent. Wauberg soils are loamy, siliceous, hyperthermic Arenic Albaqualfs.

Wauberg soils are associated on the landscape with Floridana and Wabasso soils. Floridana soils are very poorly drained and have a mollic epipedon. Wabasso soils have a spodic horizon.

Typical pedon of Wauberg fine sand; in a pasture; about 4 miles east of Orlando International Airport, 1,450 feet west and 1,200 feet south of the northeast corner of sec. 36, T. 23 S., R. 30 E.

A1—0 to 5 inches; black (10YR 2/1) fine sand; moderate medium granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

A2—5 to 8 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; common fine roots; slightly acid; clear smooth boundary.

E—8 to 28 inches; gray (10YR 5/1) fine sand; single grained; nonsticky and nonplastic; few fine roots; medium acid; abrupt wavy boundary.

Btg1—28 to 44 inches; dark gray (N 4/0) sandy clay loam; common medium distinct dark brown (10YR 4/3) mottles; moderate medium subangular blocky structure; slightly sticky and plastic; few fine roots; strongly acid; clear wavy boundary.

Btg2—44 to 52 inches; dark gray (N 4/0) sandy clay loam; common medium distinct dark brown (10YR 4/3) mottles, few fine distinct white (10YR 8/1) mottles; weak medium subangular blocky structure;

slightly sticky and plastic; very few fine roots; strongly acid; clear wavy boundary.

Btg3—52 to 60 inches; gray (10YR 6/1) sandy clay loam; common fine distinct white (10YR 8/1) mottles; massive; sticky and plastic; strongly acid; clear wavy boundary.

Cg—60 to 80 inches; light gray (5Y 6/1) sandy clay; massive; sticky and plastic; medium acid.

The thickness of the solum is 50 to 75 inches. Reaction ranges from very strongly acid to slightly acid in the A and E horizons except where the surface layer has been limed and from strongly acid to neutral in the Btg and Cg horizons.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or it is neutral and has value of 2 or 3. The texture is sand or fine sand. The thickness of this horizon ranges from 5 to 9 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The texture is sand or fine sand. The combined thickness of the A and E horizons is 20 to 39 inches.

The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1; or it is neutral and has value of 4 to 6. In some pedons, the Btg horizon has mottles in shades of white, yellow, brown, or red. Typically, the texture is sandy clay loam but ranges to sandy loam or fine sandy loam.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1; or it is neutral and has value of 5 to 7. The texture is sandy clay or clay.

Zolfo Series

The Zolfo series consists of somewhat poorly drained soils that formed in sandy marine sediment. The soils are on broad, low ridges on the flatwoods. The slopes are less than 2 percent. Zolfo soils are sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods.

Zolfo soils are associated on the landscape with Archbold, Immokalee, Lochloosa, Millhopper, Ona, Pomello, Smyrna, and Tavares soils. Archbold, Lochloosa, Millhopper, and Tavares soils do not have a spodic horizon. Lochloosa and Millhopper soils have an argillic horizon. Immokalee, Ona, Pomello, and Smyrna soils have a spodic horizon within 50 inches of the surface. Immokalee, Ona, and Smyrna soils are poorly drained, and Pomello soils are moderately well drained.

Typical pedon of Zolfo fine sand; in a citrus grove; at the southern end of Lake Drawdy, 1,900 feet east and 1,500 feet north of the southwest corner of sec. 9, T. 22 S., R. 23 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; many fine and medium roots; neutral; clear smooth boundary.

E1—5 to 23 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many fine and medium roots; neutral; clear smooth boundary.

E2—23 to 38 inches; light brownish gray (10YR 6/2) fine sand; common fine distinct brownish yellow (10YR 6/8) mottles; single grained; loose; common fine and medium roots; neutral; gradual wavy boundary.

E3—38 to 55 inches; very pale brown (10YR 7/3) fine sand; common fine distinct brownish yellow (10YR 6/8) mottles; single grained; nonsticky and nonplastic; few fine and medium roots; neutral; gradual wavy boundary.

Bh1—55 to 71 inches; brown (7.5YR 4/2) fine sand; weak fine granular structure; nonsticky and nonplastic; sand grains coated with organic matter; slightly acid; gradual smooth boundary.

Bh2—71 to 80 inches; dark brown (7.5YR 3/2) fine sand; weak fine granular structure; nonsticky and nonplastic; sand grains coated with organic matter; slightly acid.

The thickness of the solum is 80 inches or more. Reaction ranges from neutral to very strongly acid in the A and E horizons and from slightly acid to extremely acid in the Bh horizon.

The A or Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 8 inches.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4. The combined thickness of the A and E horizons ranges from 50 to 72 inches.

The Bh horizon has hue of 10YR to 5YR, value of 2 to 4, and chroma of 1 to 3; or it is neutral and has value of 2. The Bh horizon is spodic material, but does not have a weighted average of 0.6 percent or more organic carbon in the matrix in the upper 12 inches of the horizon or 2.3 percent or more organic carbon in the upper 2 centimeters.

Formation of the Soils

In this section, the factors of soil formation are described and related to the soils in the survey area *(14)*.

Factors of Soil Formation

The kind of soil that forms in a given area depends on five major factors. These factors are: the climate under which the soil material has existed since accumulation; the physical and mineral composition of the parent material; the living organisms, or plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that these factors of soil formation have acted on the soil material.

The five factors of soil formation are interdependent; each modifies the effects of the others. As a soil forms, it is influenced by the five factors, but one factor may have caused the major differences in the soils in some places. A variation in one or more of the factors results in the formation of a different soil.

Climate

Orange County has a subtropical climate. The soils in the county are in the hyperthermic temperature regime. In this regime, the average temperature of the soil at a depth of 20 inches (50 centimeters) is about 72 degrees Fahrenheit (22 degrees Celsius). The soils are never frozen; therefore, biological activity and chemical reactions involved in the soil formation processes continue throughout the year. These processes are also accelerated by the adequate supply of moisture that is available. The average annual rainfall is about 51 inches. Because of the warm, moist climate of Orange County, organic matter decomposes rapidly, and chemical reaction in the soil is more rapid than in cooler, drier areas. Heavy rains leach the soil of most plant nutrients and produce strongly acid soil conditions, especially in well drained to excessively drained sandy soils. Fine particles of clay and sometimes organic matter are carried downward, or translocated, and eventually form a subsoil.

The climate is fairly uniform throughout the county; therefore, climate has not been a major contributing factor to the differences among the soils. These differences are mainly the result of the other factors of soil formation.

Parent Material

The parent material of the soils in Orange County consists mostly of deposits of marine origin. These deposits were mostly quartz sand and varying amounts of clay and shell fragments. Clay is more abundant in soils that formed in the sediment on marine terraces and in lagoons. Parent material was transported by sea waters that covered the area a number of times during the Pleistocene age *(5, 9, 19, 43)*.

The parent materials in Orange County differ somewhat in mineral and chemical composition and in physical constitution. The main physical differences, such as those between sand, silt, and clay, can be observed in the field. Other differences, such as mineral and chemical composition, are important to soil formation and affect present physical and chemical characteristics of the soils. Many differences among soils in the county reflect original differences in the parent materials as they were laid down.

Some organic soils are throughout the county. They formed in partly decayed remains of wetland vegetation.

Living Organisms

Plants and animals and micro-organisms, such as bacteria and fungi, are important in the formation of soils. Plants generally supply organic matter that decomposes, gives a dark color to the surface, and supplies the soil with plant nutrients. Trees and other plants take nutrients from the soil and store them in their roots, stems, leaves, and other parts. When these plants or plant parts decay, the nutrients are returned to the soil and can be used again. Bacteria and fungi decompose the vegetation and return the nutrients to the soil. In addition, many metabolic processes of the bacteria and fungi release organic acids and other materials that affect the process of soil formation. Earthworms, ants, and other animals mix the soil and influence porosity and other soil properties.

The native vegetation has had a major influence on soil genesis. Unless drastically disturbed by man, the soil and the natural vegetation show a close relationship, which is readily apparent in Orange County. The very poorly drained soils are in the various swamp and marsh communities. Xerophytic communities of pines and oaks are on sand ridges, and pine-palmetto communities dominate the poorly drained soils on the flatwoods. The natural relationship between the soil and the native plants is sometimes disturbed by human activities. Clearing, logging, and burning, for example, have disrupted the natural succession of plants in some areas.

Relief

Relief, or lay of the land, affects soil formation because it influences microclimate and water relationships *(9, 12)*. Soil temperature is influenced by altitude and by the orientation of slopes toward or away from the sun. Relief controls drainage, runoff, erosion, soil fertility, and vegetation. Soil formation is retarded on steeper slopes because soil material and organic matter tend to gravitate downslope.

Relief has a significant effect on the soils. Because the parent material of most of the soils in Orange County was sandy marine deposits, the soils are sandy. Because sandy soils have low available water capacity and easily become droughty, most of the water available to plants comes from the water table. As a result, the depth to the water table becomes extremely important in determining the type of vegetation that grows in a particular area.

In addition, the depth to the water table affects internal drainage. On sand ridges, where the water table is deep and the soils are highly leached, soluble plant nutrients, colloidal clays, and organic matter are carried rapidly downward through the sandy soil.

In flatwood areas, the water table is commonly at or near the surface, and it rarely drops below 5 feet of the surface. Organic matter is translocated down a short distance and forms a humus-rich spodic horizon, or a Bh horizon. This horizon is locally referred to as a hardpan.

In low areas or depressions, where the water table is normally above the surface, muck accumulates under the marsh or swamp vegetation. As these plants die, they accumulate in water where oxygen is excluded and slowly and partly decay. The amount of muck that accumulates depends mostly on the depth and duration of standing water. In some wet areas, accumulations of organic matter have formed a thick black topsoil on the mineral soil instead of a muck surface layer.

Time

Time is an important factor in soil formation. The physical and chemical changes brought about by climate, living organisms, and relief are slow. The length of time needed to convert raw geological material into soil varies according to the nature of the geologic material and the interaction of the other factors. Some basic minerals from which soils are formed weather fairly rapidly, while other minerals are chemically inert and show little change over long periods of time. The translocation of fine particles in the soil to form horizons is variable under different conditions, but the processes always take a relatively long period of time.

In Orange County, the dominant geological material is inactive *(5, 43)*. The sands are almost pure quartz and are highly resistant to weathering. The finer textured silt and clay are the product of deposition or earlier weathering.

Relatively little geologic time has elapsed since the material, in which the soils in Orange County formed, was laid down or emerged from the sea. The age of a soil refers to the degree of maturity of that soil, not to chronological or geological time. Because soils are influenced by the other four factors of soil formation, they mature at different rates. Immature soils, or soils that show little or any horizonation, may be on older landscapes than mature soils that show distinct horizonation. Examples of this situation are common throughout Orange County.

In many areas in recent times, human activity has become a major factor in soil genesis. Tillage and management practices have altered soil structure, porosity, and other physical properties. The addition of lime, fertilizer, and other chemicals has altered chemical properties. Intensive use has sometimes caused removal of soil horizons through erosion. This process is often accompanied by increased deposition on flood plains and in depressions. In many places, a new soil called Arents has been created that does not have the normal diagnostic horizons attributed to natural soil-forming processes. Other areas, called Urban land, have been thoroughly covered or altered during construction of buildings, streets, or other structures. In some places, soils have been altered only to support activities on the surface. Little attention has been paid to the physical, chemical, and mineralogical properties of the underlying layers. Such neglect has often resulted in later problems that have been costly and difficult to remedy.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

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.

Alkali (sodic) soil. Soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

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.

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

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

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	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.

Bedding. A partial method of controlling excess water for the growth of citrus and other crops by using regularly spaced, shallow ditches and beds.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

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

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

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

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 textured soil. Sand or loamy sand.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). The volume of soft soil decreases excessively under load.

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

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

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

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

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

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

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

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

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.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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 to loess in blankets on 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, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil restrict the growth of most plants.

Fast intake (in tables). The movement of water into the soil is rapid.

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

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has 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.*

Fill. Material used to raise the surface level of the land to a desired level.

Fine textured soil. Sandy clay, silty clay, and clay.

Flatwoods. Broad, nearly level, low ridges of poorly drained, dominantly sandy soils that have a characteristic vegetation of open pine forest and an understory of saw palmetto and pineland threeawn.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant that is not a grass or a sedge.

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.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Green-manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hammock. A densely wooded area, slightly elevated above adjacent areas, that has characteristic natural vegetation of cabbage palms, oaks, and pines with an understory of saw palmetto, shrubs, and grasses.

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 or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

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. This contrasts 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—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lamellae. Thin, slightly wavy layers of soil enriched with clay and sometimes with iron or organic matter, or both. These layers are brighter in color than the soil between the layers. Individual layers are generally 1/8 to 1 inch or more thick and are generally repeated vertically at intervals of 1 inch to 6 inches.

Landshaping. Rearrangement of soil materials by cutting and filling to form a more suitable site for the intended use.

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.

Marl. An unconsolidated mineral deposited in marine or freshwater. It consists mainly of silt- and clay-size particles of calcium carbonate.

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.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

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).

Mounding. Filling the area for the absorption field of a sanitary system with suitable soil material to the level above the water table needed to meet local and state requirements.

Muck. Dark, 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, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Open space. A relatively undeveloped green or wooded area provided mainly within an urban area to minimize feelings of congested living.

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.

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

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

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). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

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

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.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

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

Random transect. An unbiased, statistically sound sampling scheme used to determine map unit composition and purity by random sampling.

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

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). There is a 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.

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 adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

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

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

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.

Sinkhole. A depression in the landscape where limestone has been dissolved.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

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 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

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsidence. The sinking of an organic soil to a lower level after the lowering of the water table.

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 organic matter content than the overlying surface layer.

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

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 is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

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, such as zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). There is a 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.

Water control. Regulating the water table as needed by means of canals, ditches, tile, pumping, or any other appropriate method.

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

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

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of course 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. This contrasts with poorly graded soil.

Wetness (in tables). Soil that is wet during the intended period of use.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Based on data recorded in the period 1944 through 1983 at Orlando, Florida]

Month	Temperature					Precipitation			
	Normal daily mean	Normal daily maximum	Normal	Mean number of days with temperatures of--		Normal total 1951-1980	Mean number of days--		
				90°F or higher	32°F or lower		Rainfall 0.01 inch or more	Thunderstorms	Heavy fog, visibility 1/4 mile or less
	°F	°F	°F	°F	°F	In	In		
January	60.5	71.7	49.3	0	2	2.10	6	1	6
February	61.5	72.9	50.0	0	1	2.83	7	1	3
March	66.8	78.3	55.3	1	*	3.20	8	3	3
April	72.0	83.6	60.3	5	0	2.19	5	3	1
May	77.3	88.3	66.2	11	0	3.96	9	8	2
June	80.9	90.6	71.2	20	0	7.39	14	14	1
July	82.4	91.7	73.0	25	0	7.78	17	19	1
August	82.5	91.6	73.4	25	0	6.32	16	17	1
September	81.1	89.7	72.5	18	0	5.62	14	10	1
October	74.9	84.4	65.4	3	0	2.82	9	3	2
November	67.5	78.2	56.8	0	*	1.78	5	1	3
December	62.0	73.1	50.9	*	1	1.83	6	1	5
Total	72.4	82.8	62.0	108	4	47.83	116	82	28

* Less than one-half of a day.

TABLE 2.--FREEZE DATA

[Based on data recorded at Orlando, Florida]

Freeze threshold temperature	Mean date of last spring occurrence	Mean date of first fall occurrence	Mean number of days between dates	Years of record--spring	Number of occurrences in spring	Years of record--fall	Number of occurrences in fall
32°F	January 11, 1982 (29°F)	December 25, 1983 (21°F)	*	20	*	20	*
28°F	January 12, 1982 (23°F)	December 26, 1983 (20°F)	*	20	*	20	*

* When the frequency of occurrence in either spring or fall is 1 year in 10 or less, mean dates are not given.

TABLE 3.--AVERAGE COMPOSITION OF SELECTED MAP UNITS

[Average composition determined by Ground Penetrating Radar (GPR) and other transect methods*]

Map symbol and soil name	Transects	Soils	Composition	Confidence interval**	Confidence level	Dissimilar soils	Composition
			Pct	Pct	Pct		Pct
2. Archbold fine sand, 0 to 5 percent slopes	11	Archbold-------- Similar soils---	71 21	83-99	90	Pomello--------- Other-----------	7 1
3. Basinger fine sand, depressional	11	Basinger-------- Similar soils---	45 44	73-99	90	Samsula--------- Smyrna---------- Floridana-------	7 2 2
4. Candler fine sand, 0 to 5 percent slopes	39	Candler--------- Similar soils---	54 39	81-97	95	Millhopper------ Apopka---------- Other-----------	5 1 1
5. Candler fine sand, 5 to 12 percent slopes	25	Candler--------- Similar soils---	54 40	88-99	95	Tavares--------- Apopka---------- Millhopper------ Other-----------	2 2 1 1
6. Candler-Apopka fine sands, 5 to 12 percent slopes	18	Candler--------- Similar soils--- Apopka---------- Similar soils---	45 21 25 6	92-99	95	Tavares--------- Lochloosa-------	2 1
9. Canova muck	13	Canova---------- Similar soils---	59 27	75-96	80	Gator----------- Okeelanta-------	9 5
10. Chobee fine sandy loam, frequently flooded	3	Chobee---------- Similar soils---	91 5	86-99	90	Gator-----------	4
11. Floridana and Chobee soils, frequently flooded	8	Floridana------- Similar soils--- Chobee----------	70 4 24	86-99	95	Gator-----------	2
12. Emeralda and Holopaw fine sands, frequently flooded	8	Emeralda-------- Similar soils--- Holopaw--------- Similar soils---	46 8 29 6	76-99	90	Pompano--------- Gator-----------	9 2
13. Felda fine sand	12	Felda----------- Similar soils---	91 4	90-99	95	Holopaw---------	5
14. Felda fine sand, occasionally flooded	7	Felda----------- Similar soils---	50 42	79-99	80	Wabasso---------	8
15. Felda fine sand, frequently flooded	4	Felda----------- Similar soils---	51 48	82-99	90	Pompano---------	1
16. Floridana fine sand, frequently flooded	11	Floridana------- Similar soils---	82 17	97-99	95	Gator-----------	1
17. Floridana mucky fine sand, depressional	7	Floridana------- Similar soils---	53 40	84-99	90	Felda-----------	7
18. Gator muck	15	Gator----------- Similar soils---	90 2	82-98	90	Terra Ceia------ Canova----------	6 2
19. Hontoon muck	17	Hontoon--------- Similar soils---	75 23	94-99	95	Sanibel--------- Basinger--------	1 1

See footnotes at end of table.

TABLE 3.--AVERAGE COMPOSITION OF SELECTED MAP UNITS--Continued

Map symbol and soil name	Transects	Soils	Compo-sition	Confidence interval**	Confidence level	Dissimilar soils	Compo-sition
			Pct	Pct	Pct		Pct
20. Immokalee fine sand	14	Immokalee-------	53	85-99	70	Wabasso---------	5
		Similar soils---	40			Pineda----------	2
21. Lake fine sand, 0 to 5 percent slopes	5	Lake------------	94	93-99	95	Tavares---------	2
		Similar soils---	4				
22. Lochloosa fine sand	4	Lochloosa-------	68	91-99	95	Wabasso---------	2
		Similar soils---	30				
23. Malabar fine sand	17	Malabar---------	45	90-99	95	Wabasso---------	3
		Similar soils---	52				
25. Okeelanta muck	5	Okeelanta-------	92	86-99	95	Sanibel---------	1
		Similar soils---	4			Terra Ceia------	3
26. Ona fine sand	8	Ona-------------	61	84-99	95	Immokalee-------	9
		Similar soils---	30				
28. Florahome fine sand, 0 to 5 percent slopes	16	Florahome-------	66	82-99	95	Seffner---------	7
		Similar soils---	24			Candler---------	3
30. Pineda fine sand	3	Pineda----------	86	87-99	80	Malabar---------	5
		Similar soils---	7			Wabasso---------	2
31. Pineda fine sand, frequently flooded	5	Pineda----------	75	90-98	80	Wabasso---------	4
		Similar soils---	19			Floridana-------	2
32. Pinellas fine sand	3	Pinellas--------	61	89-99	90	Wabasso---------	4
		Similar soils---	35				
34. Pomello fine sand, 0 to 5 percent slopes	22	Pomello---------	42	78-94	80	Archbold--------	9
		Similar soils---	43			Pompano---------	4
						Smyrna----------	1
36. Pompano fine sand	6	Pompano---------	86	77-95	80	Smyrna----------	8
						Immokalee-------	6
37. St. Johns fine sand	16	St. Johns-------	64	81-99	80	Wabasso---------	9
		Similar soils---	26			Immokalee-------	1
38. St. Lucie fine sand, 0 to 5 percent slopes	10	St. Lucie-------	72	94-99	95	Archbold--------	2
		Similar soils---	26				
40. Samsula muck	16	Samsula---------	65	79-95	70	Basinger--------	10
		Similar soils---	23			Sanibel---------	2
41. Samsula-Hontoon-Basinger association, depressional	10	Samsula---------	43	84-99	90	Holopaw---------	7
		Similar soils---	4			Ona-------------	1
		Hontoon---------	31				
		Basinger--------	11				
		Similar soils---	3				
42. Sanibel muck	5	Sanibel---------	73	81-95	80	Samsula---------	8
		Similar soils---	15			Hontoon---------	4
43. Seffner fine sand	4	Seffner---------	90	85-99	90	Basinger--------	4
		Similar soils---	3			Ona-------------	3
44. Smyrna fine sand	37	Smyrna----------	53	90-99	95	Wabasso---------	3
		Similar soils---	43			Other-----------	1

See footnotes at end of table.

TABLE 3.--AVERAGE COMPOSITION OF SELECTED MAP UNITS--Continued

Map symbol and soil name	Transects	Soils	Composition	Confidence interval**	Confidence level	Dissimilar soils	Composition
			Pct	Pct	Pct		Pct
46. Tavares fine sand, 0 to 5 percent slopes	31	Tavares----------	67	78-92	90	Candler----------	9
		Similar soils---	19			Millhopper------	4
						Apopka-----------	1
47. Tavares-Millhopper fine sands, 0 to 5 percent slopes	31	Tavares----------	48	94-98	90	Candler----------	4
		Similar soils---	20				
		Millhopper------	14				
		Similar soils---	14				
49. Terra Ceia muck	15	Terra Ceia------	93	85-99	95	Gator------------	5
						Okeelanta-------	2
51. Wabasso fine sand	13	Wabasso----------	58	96-99	90	Immokalee-------	1
		Similar soils---	40			Smyrna-----------	1
53. Wauberg fine sand	7	Wauberg----------	60	87-99	95	Holopaw----------	3
		Similar soils---	34			Wabasso----------	3
54. Zolfo fine sand	23	Zolfo------------	59	77-93	90	Lochloosa-------	1
		Similar soils---	27			Smyrna-----------	4
						Millhopper------	1
						Pomello----------	1
						Other------------	7

* An example of transect data characterization at a specific confidence level reads: In 80 percent of the areas mapped as Pomello fine sand, 0 to 5 percent slopes, Pomello and similar soils will comprise 78 to 94 percent of the delineation. In the remaining 20 percent of the areas of this map unit, the percentage of Pomello and similar soils may be either higher than 94 percent or lower than 78 percent. Inversely, dissimilar soils make up 6 to 22 percent of most mapped areas.

** The confidence interval is the proportion of named plus similar soils at a given confidence level.

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

Map symbol	Soil name	Acres	Percent
1	Arents, nearly level	300	0.1
2	Archbold fine sand, 0 to 5 percent slopes	6,079	1.0
3	Basinger fine sand, depressional	30,292	5.2
4	Candler fine sand, 0 to 5 percent slopes	26,508	4.5
5	Candler fine sand, 5 to 12 percent slopes	12,426	2.1
6	Candler-Apopka fine sands, 5 to 12 percent slopes	7,022	1.2
7	Candler-Urban land complex, 0 to 5 percent slopes	5,501	0.9
8	Candler-Urban land complex, 5 to 12 percent slopes	1,065	0.2
9	Canova muck	904	0.2
10	Chobee fine sandy loam, frequently flooded	1,317	0.2
11	Floridana and Chobee soils, frequently flooded	17,670	3.0
12	Emeralda and Holopaw fine sands, frequently flooded	5,891	1.0
13	Felda fine sand	2,500	0.4
14	Felda fine sand, occasionally flooded	3,891	0.7
15	Felda fine sand, frequently flooded	7,084	1.2
16	Floridana fine sand, frequently flooded	2,632	0.5
17	Floridana mucky fine sand, depressional	1,347	0.2
18	Gator muck	5,400	0.9
19	Hontoon muck	1,786	0.3
20	Immokalee fine sand	21,687	3.7
21	Lake fine sand, 0 to 5 percent slopes	931	0.2
22	Lochloosa fine sand	1,445	0.2
23	Malabar fine sand	20,766	3.6
24	Millhopper-Urban land complex, 0 to 5 percent slopes	2,179	0.4
25	Okeelanta muck	796	0.1
26	Ona fine sand	4,801	0.8
27	Ona-Urban land complex	1,600	0.3
28	Florahome fine sand, 0 to 5 percent slopes	473	0.1
29	Florahome-Urban land complex, 0 to 5 percent slopes	1,417	0.2
30	Pineda fine sand	451	0.1
31	Pineda fine sand, frequently flooded	1,379	0.2
32	Pinellas fine sand	410	0.1
33	Pits	588	0.1
34	Pomello fine sand, 0 to 5 percent slopes	18,565	3.2
35	Pomello-Urban land complex, 0 to 5 percent slopes	7,956	1.4
36	Pompano fine sand	235	*
37	St. Johns fine sand	28,143	4.8
38	St. Lucie fine sand, 0 to 5 percent slopes	1,638	0.3
39	St. Lucie-Urban land complex, 0 to 5 percent slopes	2,110	0.4
40	Samsula muck	5,440	0.9
41	Samsula-Hontoon-Basinger association, depressional	31,327	5.4
42	Sanibel muck	26,898	4.6
43	Seffner fine sand	1,732	0.3
44	Smyrna fine sand	126,509	21.7
45	Smyrna-Urban land complex	21,966	3.8
46	Tavares fine sand, 0 to 5 percent slopes	12,152	2.1
47	Tavares-Millhopper fine sands, 0 to 5 percent slopes	16,633	2.9
48	Tavares-Urban land complex, 0 to 5 percent slopes	16,317	2.8
49	Terra Ceia muck	4,183	0.7
50	Urban land	5,607	1.0
51	Wabasso fine sand	1,699	0.3
52	Wabasso-Urban land complex	2,872	0.5
53	Wauberg fine sand	247	*
54	Zolfo fine sand	16,169	2.8
55	Zolfo-Urban land complex	2,199	0.4
	Water, less than 40 acres in size	33,578	5.8
	Total	582,713	100.0

* Less than 0.1 percent.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Corn	Cabbage	Carrots	Grapefruit	Bahiagrass	Grass-clover	Oranges
		Bu	Crates	Bu	Boxes	AUM*	AUM*	Boxes
1. Arents.								
2---------------- Archbold	VIs	---	---	---	525	5.5	---	400
3---------------- Basinger	VIIw	---	---	---	---	---	---	---
4---------------- Candler	IVs	---	---	---	625	7.0	---	425
5---------------- Candler	VIs	---	---	---	600	6.5	---	400
6:								
Candler---------	VIs	---	---	---	625	7.0	---	425
Apopka----------	IVs	---	---	---	700	7.5	---	500
7---------------- Candler-Urban land	---	---	---	---	---	---	---	---
8---------------- Candler-Urban land	---	---	---	---	---	---	---	---
9---------------- Canova	IIIw	---	480	---	---	14.0	---	---
10--------------- Chobee	Vw	---	---	---	---	---	12.0	---
11:								
Floridana-------	Vw	---	---	---	---	10.0	13.0	---
Chobee----------	Vw	---	---	---	---	8.0	12.0	---
12:								
Emeralda--------	VIw	---	---	---	---	8.0	10.0	---
Holopaw	VIw	---	---	---	---	7.0	10.0	---
13, 14----------- Felda	IIIw	---	250	---	625	8.0	10.5	425
15--------------- Felda	Vw	---	---	---	---	7.0	10.0	---
16--------------- Floridana	Vw	---	---	---	---	10.0	13.0	---
17--------------- Floridana	VIIw	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Cabbage	Carrots	Grapefruit	Bahiagrass	Grass-clover	Oranges
		Bu	Crates	Bu	Boxes	AUM*	AUM*	Boxes
18-------------- Gator	IIIw	95	350	200	---	15.0	17.0	---
19-------------- Hontoon	VIIw	---	---	---	---	---	---	---
20-------------- Immokalee	IVw	---	200	---	400	7.5	12.0	250
21-------------- Lake	IVs	---	---	---	600	4.5	---	400
22-------------- Lochloosa	IIw	---	---	---	675	10.0	12.0	475
23-------------- Malabar	IVw	---	---	---	575	8.0	12.0	325
24-------------- Millhopper-Urban land	---	---	---	---	---	---	---	---
25-------------- Okeelanta	IIIw	95	350	200	---	15.0	18.0	---
26-------------- Ona	IIIw	---	300	---	500	8.5	12.0	300
27-------------- Ona-Urban land	---	---	---	---	---	---	---	---
28-------------- Florahome	IIIs	---	---	---	700	8.0	12.0	500
29-------------- Florahome-Urban land	---	---	---	---	---	---	---	---
30-------------- Pineda	IIIw	---	---	---	575	8.0	12.0	425
31-------------- Pineda	Vw	---	---	---	---	7.0	10.0	---
32-------------- Pinellas	IIIw	---	250	---	575	8.0	12.0	425
33. Pits.								
34-------------- Pomello	VIs	---	---	---	400	3.5	7.0	250
35-------------- Pomello-Urban land	---	---	---	---	---	---	---	---
36-------------- Pompano	IVw	---	260	---	375	8.0	10.0	275

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Cabbage	Carrots	Grapefruit	Bahiagrass	Grass-clover	Oranges
		Bu	Crates	Bu	Boxes	AUM*	AUM*	Boxes
37-------------- St. Johns	IIIw	---	300	---	550	8.5	12.0	300
38-------------- St. Lucie	VIIs	---	---	---	---	---	---	---
39-------------- St. Lucie-Urban land	---	---	---	---	---	---	---	---
40-------------- Samsula	VIIw	---	---	---	---	---	---	---
41:								
Samsula--------	VIIw	---	---	---	---	---	---	---
Hontoon--------	VIIw	---	---	---	---	---	---	---
Basinger-------	VIIw	---	---	---	---	---	---	---
42-------------- Sanibel	VIIw	---	---	---	---	---	---	---
43-------------- Seffner	IIIw	---	---	---	700	9.0	11.0	500
44-------------- Smyrna	IVw	---	200	---	500	8.0	12.0	300
45-------------- Smyrna-Urban land	---	---	---	---	---	---	---	---
46-------------- Tavares	IIIs	---	---	---	600	8.0	12.0	425
47-------------- Tavares-Millhopper	IIIs	---	---	---	615	8.0	12.0	433
48-------------- Tavares-Urban land	---	---	---	---	---	---	---	---
49-------------- Terra Ceia	IIIw	95	340	200	---	14.0	17.0	---
50. Urban land.								
51-------------- Wabasso	IIIw	---	250	---	350	8.0	12.0	200
52-------------- Wabasso-Urban land	---	---	---	---	---	---	---	---
53-------------- Wauberg	IIIw	---	225	---	---	9.5	12.0	---

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Cabbage	Carrots	Grapefruit	Bahiagrass	Grass-clover	Oranges
		Bu	Crates	Bu	Boxes	AUM*	AUM*	Boxes
54-------------- Zolfo	IIIw	---	400	---	500	7.0	10.0	375
55-------------- Zolfo-Urban land	---	---	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment use limitations	Management concerns: Seedling mortality	Management concerns: Windthrow hazards	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
2. Archbold	3S	Slight	Severe	Moderate	Slight	Slight	Sand pine	60	3	Sand pine, slash pine.
							Inopina oak	---	---	
3. Basinger	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75	2	Slash pine, pond pine**.
							Pond pine	60	3	
							Blackgum	---	---	
							Cabbage palm	---	---	
							Loblollybay gordonia	---	---	
							Red maple	---	---	
							Sweetbay	---	---	
4, 5. Candler	8S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	70	8	Sand pine, slash pine, longleaf pine.
							Longleaf pine	60	4	
							Sand pine	75	4	
							Turkey oak	---	---	
							Bluejack oak	---	---	
							Chapman oak	---	---	
							Scrub live oak	---	---	
6: Candler	8S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	70	8	Sand pine, slash pine, longleaf pine.
							Longleaf pine	60	4	
							Sand pine	75	4	
							Turkey oak	---	---	
							Bluejack oak	---	---	
							Chapman oak	---	---	
							Scrub live oak	---	---	
Apopka	10S	Slight	Moderate	Moderate	Slight	Slight	Slash pine	80	10	Slash pine, loblolly pine.
							Loblolly pine	80	8	
							Longleaf pine	70	6	
							Turkey oak	---	---	
							Bluejack oak	---	---	
							Chapman oak	---	---	
							Live oak	---	---	
9. Canova	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress	75***	2	Slash pine**.
							Blackgum	---	---	
							Red maple	---	---	
10. Chobee	6W	Slight	Severe	Moderate	Slight	Severe	Baldcypress	100	6	Baldcypress, slash pine**.
							Red maple	---	---	
							Sweetgum	---	---	

See footnotes at end of table.

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

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment use limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
11:										
Floridana	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	Slash pine**, baldcypress.
							Red maple	---	---	
							Sweetgum	---	---	
							Cabbage palm	---	---	
							Laurel oak	---	---	
							Water oak	---	---	
Chobee	6W	Slight	Severe	Moderate	Slight	Severe	Baldcypress	100	6	Baldcypress, slash pine**.
							Red maple	---	---	
							Sweetgum	---	---	
							Blackgum	---	---	
12:										
Emeralda	11W	Slight	Severe	Moderate	Moderate	Severe	Slash pine	90	11	Slash pine**, baldcypress.
							Baldcypress	100	6	
							Cabbage palm	---	---	
							Water oak	---	---	
							Laurel oak	---	---	
							Sweetgum	---	---	
							Red maple	---	---	
Holopaw	10W	Slight	Severe	Severe	Slight	Severe	Slash pine	80	10	Slash pine**, baldcypress.
							Cabbage palm	---	---	
							Laurel oak	---	---	
13: Felda	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine.
							Cabbage palm	---	---	
							Laurel oak	---	---	
14, 15: Felda	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine	80	10	Slash pine**.
							Red maple	---	---	
							Sweetgum	---	---	
							Cabbage palm	---	---	
							Laurel oak	---	---	
16: Floridana	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress	100	6	Slash pine**, baldcypress.
							Red maple	---	---	
							Sweetgum	---	---	
							Cabbage palm	---	---	
							Laurel oak	---	---	
							Water oak	---	---	

See footnotes at end of table.

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

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment use limitations	Seedling mortality	Windthrow hazards	Plant competition	Common trees	Site index	Productivity class*	
17----------------- Floridana	2W	Slight	Severe	Severe	Slight	Severe	Pondcypress--------- Blackgum------------ Cabbage palm-------- Carolina ash-------- Red maple----------- Sweetbay------------ Pond pine-----------	75*** --- --- --- --- --- ---	2 --- --- --- --- --- ---	Slash pine**.
20----------------- Immokalee	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine----------	70	8	Slash pine.
21----------------- Lake	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine------- Scrub live oak------ Bluejack oak-------- Turkey oak---------- Live oak------------	80 65 --- --- --- ---	10 5 --- --- --- ---	Slash pine.
22----------------- Lochloosa	11A	Slight	Slight	Slight	Slight	Slight	Slash pine---------- Live oak------------ Water oak-----------	90 --- ---	11 --- ---	Slash pine.
23----------------- Malabar	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- Cabbage palm-------- Laurel oak----------	80 70 --- ---	10 6 --- ---	Slash pine**.
26----------------- Ona	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine-------	80 70	10 6	Slash pine.
28----------------- Florahome	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine------- Live oak------------ Turkey oak----------	80 65 --- ---	10 5 --- ---	Slash pine.
30----------------- Pineda	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- Cabbage palm--------	80 70 ---	10 6 ---	Slash pine**.
31----------------- Pineda	10W	Slight	Severe	Severe	Slight	Severe	Slash pine---------- Laurel oak---------- Water oak----------- Cabbage palm--------	80 --- --- ---	10 --- --- ---	Slash pine**.

See footnotes at end of table.

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

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment use limitations	Seedling mortality	Windthrow hazards	Plant competition	Common trees	Site index	Productivity class*	
32: Pinellas	10W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine	---	10	Slash pine**.
							Longleaf pine	60	4	
34: Pomello	8S	Slight	Moderate	Severe	Moderate	Moderate	Slash pine	70	8	Sand pine, slash pine.
							Longleaf pine	60	4	
							Sand pine	60	3	
36: Pompano	8W	Slight	Severe	Severe	Slight	Moderate	Slash pine	70	8	Slash pine**.
							Laurel oak	---	---	
37: St. Johns	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine.
							Longleaf pine	70	6	
							Laurel oak	---	---	
38: St. Lucie	3S	Slight	Severe	Moderate	Slight	Slight	Sand pine	60	3	Sand pine.
							Sand live oak	---	---	
							Scrub live oak	---	---	
							Chapman oak	---	---	
43: Seffner	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine.
							Longleaf pine	70	6	
							Live oak	---	---	
							Laurel oak	---	---	
44: Smyrna	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine.
							Longleaf pine	70	6	
46: Tavares	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine.
							Longleaf pine	70	6	
							Turkey oak	---	---	
							Live oak	---	---	
							Water oak	---	---	
							Laurel oak	---	---	
47:										
Tavares	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine.
							Longleaf pine	70	6	
							Turkey oak	---	---	
							Water oak	---	---	
							Laurel oak	---	---	
							Live oak	---	---	
Millhopper	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, longleaf pine.
							Longleaf pine	65	5	

See footnotes at end of table.

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

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment use limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
51: Wabasso	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine.
							Longleaf pine	65	5	
53: Wauberg	11W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine	90	11	Slash pine**.
							Longleaf pine	80	7	
							Pondcypress	75	2	
							Sweetgum	---	---	
							Red maple	---	---	
							Laurel oak	---	---	
54: Zolfo	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, longleaf pine.
							Longleaf pine	65	5	
							Turkey oak	---	---	
							Laurel oak	---	---	
							Water oak	---	---	
							Live oak	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. To convert cubic feet per acre to cords per acre, divide the cubic feet by 85.

** Adequate surface drainage and/or bedding is recommended before planting pine trees.

*** Site index for pondcypress is estimated.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1. Arents.					
2 Archbold	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
3 Basinger	Severe: ponding.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
4 Candler	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
5 Candler	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
6:					
Candler	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
Apopka	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
7:					
Candler	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
8:					
Candler	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
9 Canova	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
10 Chobee	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, flooding, percs slowly.	Severe: wetness.	Severe: wetness, flooding.
11:					
Floridana	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
11: Chobee	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, flooding, percs slowly.	Severe: wetness.	Severe: wetness, flooding.
12: Emeralda	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
Holopaw	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
13 Felda	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
14 Felda	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
15 Felda	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
16 Floridana	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
17 Floridana	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
18 Gator	Severe: ponding, percs slowly, excess humus.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, percs slowly.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
19 Hontoon	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
20 Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
21 Lake	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
22 Lochloosa	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Slight.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
23------------------- Malabar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
24:					
Millhopper-----------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
Urban land.					
25------------------- Okeelanta	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
26------------------- Ona	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
27:					
Ona------------------	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
Urban land.					
28------------------- Florahome	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
29:					
Florahome------------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
Urban land.					
30------------------- Pineda	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness, droughty.
31------------------- Pineda	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
32------------------- Pinellas	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
33. Pits.					
34------------------- Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
35:					
Pomello--------------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
36: Pompano	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
37: St. Johns	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
38: St. Lucie	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
39: St. Lucie	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
40: Samsula	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
41: Samsula	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Hontoon	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Basinger	Severe: ponding.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
42: Sanibel	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
43: Seffner	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
44: Smyrna	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
45: Smyrna	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
Urban land.					
46: Tavares	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
47: Tavares	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
47:					
Millhopper	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
48:					
Tavares	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
49 Terra Ceia	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
50. Urban land.					
51 Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
52:					
Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
Urban land.					
53 Wauberg	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
54 Zolfo	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
55:					
Zolfo	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Urban land.					

TABLE 8.--WILDLIFE HABITAT

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

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
1. Arents.										
2------------------ Archbold	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
3------------------ Basinger	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	---
4, 5--------------- Candler	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
6:										
Candler-----------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Apopka------------	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.
7, 8:										
Candler-----------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land.										
9------------------ Canova	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
10----------------- Chobee	Poor	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good.
11:										
Floridana---------	Very poor.	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
Chobee------------	Poor	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good.
12:										
Emeralda----------	Poor	Poor	Fair	Fair	Poor	Good	Good	Poor	Fair	Good.
Holopaw-----------	Very poor.	Very poor.	Poor	Fair	Poor	Good	Fair	Very poor.	Fair	Fair.
13, 14, 15--------- Felda	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Poor	Fair.
16----------------- Floridana	Very poor.	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
17----------------- Floridana	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
18----------------- Gator	Fair	Good	---	---	---	Good	Good	Good	---	Good.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
19: Hontoon	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Fair	Good.
20: Immokalee	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
21: Lake	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
22: Lochloosa	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor.
23: Malabar	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
24: Millhopper	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
25: Okeelanta	Fair	Good	---	---	---	Good	Good	Good	---	Good.
26: Ona	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
27: Ona	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
Urban land.										
28: Florahome	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
29: Florahome	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
30: Pineda	Poor	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
31: Pineda	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
32: Pinellas	Very poor.	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
33. Pits.										
34: Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
35: Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
35: Urban land.										
36------ Pompano	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
37------ St. Johns	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
38------ St. Lucie	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
39: St. Lucie------	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land.										
40------ Samsula	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.
41: Samsula------	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.
Hontoon------	Very poor.	Very poor.	Poor	Poor	Very poor.	Good	Good	Very poor.	Poor	Poor.
Basinger------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
42------ Sanibel	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
43------ Seffner	Poor	Poor	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
44------ Smyrna	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
45: Smyrna------	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
Urban land.										
46------ Tavares	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
47: Tavares------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Millhopper------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
48: Tavares------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
49----------------- Terra Ceia	Fair	Good	---	---	---	Good	Good	Good	---	Good.
50. Urban land.										
51----------------- Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.
52:										
Wabasso-----------	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.
Urban land.										
53----------------- Wauberg	Poor	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
54----------------- Zolfo	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
55:										
Zolfo-------------	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Urban land.										

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1. Arents.						
2 Archbold	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
3 Basinger	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
4 Candler	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
5 Candler	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
6:						
Candler	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
Apopka	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
7:						
Candler	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Urban land.						
8:						
Candler	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
Urban land.						
9 Canova	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
10 Chobee	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
11:						
Floridana	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Chobee	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
12:						
Emeralda	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, flooding.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
12:						
Holopaw	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.
13 Felda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
14 Felda	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty.
15 Felda	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
16 Floridana	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
17 Floridana	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
18 Gator	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
19 Hontoon	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
20 Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
21 Lake	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
22 Lochloosa	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Slight.
23 Malabar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
24:						
Millhopper	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
Urban land.						

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
25: Okeelanta	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
26: Ona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
27:						
Ona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.						
28: Florahome	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
29:						
Florahome	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
Urban land.						
30: Pineda	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
31: Pineda	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
32: Pinellas	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
33. Pits.						
34: Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
35:						
Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
Urban land.						
36: Pompano	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
37: St. Johns	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
38 St. Lucie	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
39: St. Lucie	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Urban land.						
40 Samsula	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
41: Samsula	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
Hontoon	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
Basinger	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
42 Sanibel	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
43 Seffner	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
44 Smyrna	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
45: Smyrna	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.						
46 Tavares	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
47: Tavares	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
Millhopper	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
48: Tavares	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
48:						
Urban land.						
49------------ Terra Ceia	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
50. Urban land.						
51------------ Wabasso	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
52:						
Wabasso----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.						
53------------ Wauberg	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
54------------ Zolfo	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
55:						
Zolfo------------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Urban land.						

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "severe," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1. Arents.					
2*: Archbold	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
3: Basinger	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
4*: Candler	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
5*: Candler	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
6*:					
Candler	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Apopka	Moderate: slope.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
7*:					
Candler	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
8*:					
Candler	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
9: Canova	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, seepage.	Severe: seepage, ponding.	Poor: ponding.
10: Chobee	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
11:					
Floridana	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Chobee	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
12:					
Emeralda	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Holopaw	Severe: flooding, wetness.	Severe: seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
13 Felda	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
14, 15 Felda	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
16 Floridana	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
17 Floridana	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding.	Severe: ponding, seepage.	Poor: ponding.
18 Gator	Severe: ponding, percs slowly, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
19 Hontoon	Severe: subsides, ponding, poor filter.	Severe: excess humus, seepage, ponding.	Severe: excess humus, seepage, ponding.	Severe: seepage, ponding.	Poor: excess humus, ponding.
20 Immokalee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
21* Lake	Slight	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
22*: Lochloosa	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
23: Malabar	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
24*:					
Millhopper	Moderate: wetness.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
25: Okeelanta	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
26: Ona	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
27:					
Ona	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Urban land.					
28*: Florahome	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
29*:					
Florahome	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
30: Pineda	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
31*: Pineda	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
32: Pinellas	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
33. Pits.					
34* Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
35*:					
Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Urban land.					
36 Pompano	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
37 St. Johns	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
38* St. Lucie	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
39*:					
St. Lucie	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
40 Samsula	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
41:					
Samsula	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Hontoon	Severe: subsides, ponding, poor filter.	Severe: excess humus, seepage, ponding.	Severe: excess humus, seepage, ponding.	Severe: seepage, ponding.	Poor: excess humus, ponding.
Basinger	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
42 Sanibel	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
43* Seffner	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
44 Smyrna	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
45:					
Smyrna	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Urban land.					
46 Tavares	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
47*:					
Tavares	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Millhopper	Moderate: wetness.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
48*:					
Tavares	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
49 Terra Ceia	Severe: subsides, ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
50. Urban land.					
51 Wabasso	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
52*:					
Wabasso	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Urban land.					
53 Wauberg	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
54 Zolfo	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
55*:					
Zolfo	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Urban land.					

* There may be a hazard of contamination of ground water in areas that have a large number of septic tank absorption fields because of inadequate filtration of the effluent.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1. Arents.				
2 Archbold	Good	Probable	Improbable: too sandy.	Poor: too sandy.
3 Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
4, 5 Candler	Good	Probable	Improbable: too sandy.	Poor: too sandy.
6:				
Candler	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Apopka	Good	Probable	Improbable: too sandy.	Poor: too sandy.
7, 8:				
Candler	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
9 Canova	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
10 Chobee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
11:				
Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
Chobee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
12:				
Emeralda	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, wetness.
Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
13, 14, 15 Felda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
16, 17: Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
18: Gator	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
19: Hontoon	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: wetness, excess humus.
20: Immokalee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
21: Lake	Good	Probable	Improbable: too sandy.	Poor: too sandy.
22: Lochloosa	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
23: Malabar	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
24:				
Millhopper	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
25: Okeelanta	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
26: Ona	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
27:				
Ona	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Urban land.				
28: Florahome	Good	Probable	Improbable: too sandy.	Poor: too sandy.
29:				
Florahome	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
30, 31: Pineda	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
32 Pinellas	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
33. Pits.				
34 Pomello	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
35:				
Pomello	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
36 Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
37 St. Johns	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
38 St. Lucie	Good	Probable	Improbable: too sandy.	Poor: too sandy.
39:				
St. Lucie	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
40 Samsula	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
41:				
Samsula	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Hontoon	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: wetness, excess humus.
Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
42 Sanibel	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
43 Seffner	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
44 Smyrna	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
45:				
Smyrna	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Urban land.				
46 Tavares	Good	Probable	Improbable: too sandy.	Poor: too sandy.
47:				
Tavares	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Millhopper	Good	Probable	Improbable: too sandy.	Poor: too sandy.
48:				
Tavares	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
49 Terra Ceia	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
50. Urban land.				
51 Wabasso	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
52:				
Wabasso	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Urban land.				
53 Wauberg	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
54 Zolfo	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
55:				
Zolfo	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
1. Arents.						
2 Archbold	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
3 Basinger	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
4 Candler	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
5 Candler	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, droughty.
6:						
Candler	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, droughty.
Apopka	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, droughty.
7:						
Candler	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Urban land.						
8:						
Candler	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, droughty.
Urban land.						
9 Canova	Severe: seepage.	Severe: ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing, droughty.	Wetness, droughty.
10 Chobee	Slight	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, soil blowing.	Wetness, rooting depth, percs slowly.
11:						
Floridana	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, fast intake, soil blowing.	Wetness, percs slowly.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
11: Chobee	Slight	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, soil blowing.	Wetness, rooting depth, percs slowly.
12: Emeralda	Slight	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, droughty, percs slowly.	Wetness, droughty, rooting depth.
Holopaw	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
13 Felda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
14, 15 Felda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
16 Floridana	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, fast intake, soil blowing.	Wetness, percs slowly.
17 Floridana	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, fast intake, soil blowing.	Wetness, percs slowly.
18 Gator	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
19 Hontoon	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Subsides, ponding.	Ponding, soil blowing.	Wetness.
20 Immokalee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
21 Lake	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
22 Lochloosa	Severe: seepage.	Moderate: wetness.	Severe: cutbanks cave.	Favorable	Wetness, fast intake, soil blowing.	Favorable.
23 Malabar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
24:						
Millhopper	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Urban land.						
25: Okeelanta	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, subsides, cutbanks cave.	Ponding, soil blowing.	Wetness.
26: Ona	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
27:						
Ona	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
Urban land.						
28: Florahome	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
29:						
Florahome	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Urban land.						
30: Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, percs slowly.
31: Pineda	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
32: Pinellas	Severe: seepage.	Severe: seepage, piping, wetness.	Moderate: slow refill.	Favorable	Wetness, droughty, fast intake.	Wetness.
33. Pits.						
34: Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
35:						
Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
Urban land.						
36 Pompano	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
37 St. Johns	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Wetness, cutbanks cave.	Wetness, droughty, fast intake.	Wetness.
38 St. Lucie	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
39:						
St. Lucie	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Urban land.						
40 Samsula	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Wetness.
41:						
Samsula	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Wetness.
Hontoon	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Subsides, ponding.	Ponding, soil blowing.	Wetness.
Basinger	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Wetness, droughty.
42 Sanibel	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, subsides, cutbanks cave.	Ponding, droughty, soil blowing.	Wetness, droughty.
43 Seffner	Severe: seepage.	Severe: seepage, wetness, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
44 Smyrna	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
45:						
Smyrna----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, droughty.
Urban land.						
46--------------- Tavares	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
47:						
Tavares----------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Millhopper-------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
48:						
Tavares----------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
Urban land.						
49--------------- Terra Ceia	Severe: seepage.	Excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Wetness.
50. Urban land.						
51--------------- Wabasso	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, rooting depth.
52:						
Wabasso----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty, rooting depth.
Urban land.						
53--------------- Wauberg	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, fast intake, soil blowing.	Wetness, percs slowly.
54--------------- Zolfo	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
55:						
Zolfo------------	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Droughty.
Urban land.						

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
1. Arents.										
2---------------- Archbold	0-80	Fine sand--------	SP	A-3	100	100	89-99	1-3	---	NP
3---------------- Basinger	0-7	Fine sand--------	SP	A-3	100	100	85-100	1-4	---	NP
	7-32	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	2-12	---	NP
	32-47	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	2-12	---	NP
	47-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	2-12	---	NP
4---------------- Candler	0-5	Fine sand--------	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	5-74	Sand, fine sand	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	74-80	Sand, fine sand	SP-SM	A-3, A-2-4	100	95-100	75-100	5-12	---	NP
5---------------- Candler	0-4	Fine sand--------	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	4-61	Sand, fine sand	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	61-80	Sand, fine sand	SP-SM	A-3, A-2-4	100	95-100	75-100	5-12	---	NP
6:										
Candler----------	0-6	Fine sand--------	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	6-69	Sand, fine sand	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	69-80	Sand, fine sand	SP-SM	A-3, A-2-4	100	95-100	75-100	5-12	---	NP
Apopka-----------	0-69	Fine sand--------	SP, SP-SM	A-3	100	100	85-100	3-10	---	NP
	69-80	Sandy loam, sandy clay loam, sandy clay.	SM-SC, SC	A-2-4, A-2-6, A-4, A-6	98-100	95-100	60-95	20-40	20-40	4-20
7:										
Candler----------	0-4	Fine sand--------	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	4-67	Sand, fine sand	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	67-80	Sand, fine sand	SP-SM	A-3, A-2-4	100	95-100	75-100	5-12	---	NP
Urban land.										
8:										
Candler----------	0-5	Fine sand--------	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	5-52	Sand, fine sand	SP, SP-SM	A-3	100	95-100	75-100	2-8	---	NP
	52-80	Sand, fine sand	SP-SM	A-3, A-2-4	100	95-100	75-100	5-12	---	NP
Urban land.										

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
9---------------- Canova	0-6	Muck-------------	PT	---	---	---	---	---	---	---
	6-16	Sand, fine sand	SP, SP-SM	A-3	100	100	70-100	3-10	---	NP
	16-37	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	100	75-95	15-35	15-40	5-25
	37-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	80-100	65-95	15-35	5-30	NP-20
10--------------- Chobee	0-7	Fine sandy loam	SP-SM, SM	A-2-4	100	100	85-99	12-25	<40	NP-10
	7-50	Sandy clay loam	SC	A-2-6, A-2-7, A-6, A-7	100	100	85-99	25-45	35-45	20-25
	50-80	Loamy sand, fine sand, sandy clay loam.	SP-SM, SM, SC, SM-SC	A-2-4, A-2-6, A-6, A-7	100	100	80-99	12-45	<45	NP-25
11: Floridana--------	0-14	Fine sand--------	SP-SM, SM	A-3, A-2-4	100	100	80-90	5-25	---	NP
	14-28	Fine sand, sand	SP, SP-SM	A-3	100	100	85-95	2-10	---	NP
	28-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	80-95	15-35	20-30	7-16
Chobee-----------	0-12	Fine sandy loam	SP-SM, SM	A-2-4	100	100	85-99	12-25	<40	NP-10
	12-56	Sandy clay loam	SC	A-2-6, A-2-7, A-6, A-7	100	100	85-99	25-45	35-45	20-25
	56-80	Loamy sand, fine sand, sandy clay loam.	SP-SM, SM, SC, SM-SC	A-2-4, A-2-6, A-6, A-7	100	100	80-99	12-45	<45	NP-25
12: Emeralda--------	0-7	Fine sand, loamy sand.	SP, SP-SM	A-3	100	100	90-99	8-15	---	NP
	7-12	Fine sand, loamy fine sand, loamy sand.	SP-SM, SM	A-2-4	100	100	90-99	10-25	---	NP
	12-42	Sandy clay, clay	CH, SC, CL	A-7	100	100	90-99	45-80	46-66	23-39
	42-80	Sandy clay, clay	CH, SC, CL	A-7	100	100	90-99	45-80	46-66	23-39
Holopaw----------	0-51	Fine sand--------	SP, SP-SM	A-3	100	95-100	75-90	2-10	---	NP
	51-71	Fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	95-100	65-90	15-34	<30	NP-12
	71-80	Fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	100	95-100	65-90	5-15	---	NP
13--------------- Felda	0-22	Fine sand--------	SP, SP-SM	A-3	100	100	90-99	2-5	---	NP
	22-53	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	100	90-99	15-35	<40	NP-15
	53-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	100	100	80-99	2-12	---	NP
14--------------- Felda	0-22	Fine sand--------	SP, SP-SM	A-3	100	100	90-99	2-5	---	NP
	22-42	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	100	90-99	15-35	<40	NP-15
	42-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	100	100	80-99	2-12	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
15------------- Felda	0-24	Fine sand--------	SP, SP-SM	A-3	100	100	90-99	2-5	---	NP
	24-47	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	100	100	90-99	15-35	<40	NP-15
	47-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-2-4	100	100	80-99	2-12	---	NP
16------------- Floridana	0-17	Fine sand--------	SP-SM, SM	A-3, A-2-4	100	100	80-90	5-25	---	NP
	17-28	Fine sand, sand	SP, SP-SM	A-3	100	100	85-95	2-10	---	NP
	28-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	80-95	15-35	20-30	7-16
17------------- Floridana	0-20	Mucky fine sand	SP-SM, SM	A-3, A-2-4	100	100	80-90	5-25	---	NP
	20-28	Sand, fine sand	SP, SP-SM	A-3	100	100	80-90	2-10	---	NP
	28-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	100	100	85-95	20-35	20-40	7-18
18------------- Gator	0-28	Muck-------------	PT	A-8	---	---	---	---	---	---
	28-80	Fine sand, loamy sand, loamy fine sand.	SP-SM	A-3, A-2-4	100	100	85-100	5-12	---	NP
19------------- Hontoon	0-80	Muck-------------	PT	A-8	---	---	---	---	---	---
20------------- Immokalee	0-5	Fine sand--------	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
	5-35	Fine sand, sand	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
	35-67	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	70-100	5-21	---	NP
	67-80	Fine sand, sand	SP, SP-SM	A-3	100	100	70-100	2-10	---	NP
21------------- Lake	0-80	Fine sand--------	SP-SM	A-3, A-2-4	100	100	85-98	5-12	---	NP
22------------- Lochloosa	0-29	Fine sand--------	SP-SM, SM	A-2-4, A-3	95-100	95-100	90-98	8-20	---	NP
	29-58	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	95-100	95-100	90-98	25-40	25-40	5-18
	58-80	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	95-100	95-100	90-98	25-40	25-40	5-18
23------------- Malabar	0-18	Fine sand--------	SP, SP-SM	A-3	100	100	80-100	2-10	---	NP
	18-30	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-100	3-12	---	NP
	30-42	Sand, fine sand	SP, SP-SM	A-3	100	100	80-100	2-10	---	NP
	42-58	Sandy clay loam, fine sandy loam, sandy loam.	SC, SM-SC, SM	A-2, A-4, A-6	100	100	80-100	20-40	<35	NP-20
	58-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	100	100	80-100	5-20	---	NP
24: Millhopper------	0-65	Fine sand--------	SP-SM, SM	A-3, A-2-4	100	97-100	75-95	5-20	---	NP
	65-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-4	100	97-100	75-95	18-40	<28	NP-10

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
24: Urban land.										
25-------------- Okeelanta	0-25	Muck------------	PT	A-8	---	---	---	---	---	---
	25-80	Fine sand, sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	100	85-100	80-95	2-15	---	NP
26-------------- Ona	0-6	Fine sand--------	SP-SM, SP	A-3	100	100	85-95	3-10	---	NP
	6-15	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	85-95	5-20	---	NP
	15-80	Fine sand, sand	SP-SM, SP	A-3	100	100	85-95	3-10	---	NP
27: Ona------------	0-5	Fine sand--------	SP-SM, SP	A-3	100	100	85-95	3-10	---	NP
	5-18	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	85-95	5-20	---	NP
	18-80	Fine sand, sand	SP-SM, SP	A-3	100	100	85-95	3-10	---	NP
Urban land.										
28-------------- Florahome	0-19	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	85-100	1-12	---	NP
	19-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	1-12	---	NP
29: Florahome-------	0-22	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	85-100	1-12	---	NP
	22-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	1-12	---	NP
Urban land.										
30-------------- Pineda	0-5	Fine sand--------	SP, SP-SM	A-3	100	100	80-95	2-8	---	NP
	5-37	Sand, fine sand.	SP, SP-SM	A-3	100	100	80-95	2-10	---	NP
	37-55	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2-4, A-2-6	100	100	65-95	15-35	<35	NP-20
	55-80	Sand, loamy sand, fine sand.	SP-SM, SM, SP	A-3, A-2-4	95-100	90-100	80-95	4-15	---	NP
31-------------- Pineda	0-5	Fine sand--------	SP, SP-SM	A-3	100	100	80-95	2-8	---	NP
	5-37	Sand, fine sand	SP, SP-SM	A-3	100	100	80-95	2-10	---	NP
	37-55	Sandy loam, fine sandy loam sandy clay loam.	SC, SM-SC, SM	A-2-4, A-2-6	100	100	65-95	15-35	20-30	NP-15
	55-80	Sand, loamy sand, fine sand.	SP-SM, SM, SP	A-3, A-2-4	90-100	95-100	80-95	4-15	---	NP
32-------------- Pinellas	0-18	Fine sand--------	SP	A-3	100	100	90-100	2-4	---	NP
	18-34	Sand, fine sand	SP-SM	A-3, A-2-4	100	100	90-100	5-12	---	NP
	34-46	Fine sandy loam, sandy clay loam.	SP-SM, SM-SC, SC	A-2-4, A-2-6	100	100	90-100	12-35	20-30	5-13
	46-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	80-100	75-100	60-95	2-12	---	NP
33. Pits.										

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
34------------- Pomello	0-40	Fine sand--------	SP, SP-SM	A-3	100	100	60-100	1-8	---	NP
	40-55	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	100	100	60-100	6-15	---	NP
	55-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	100	100	60-100	4-10	---	NP
35:										
Pomello---------	0-42	Fine sand--------	SP, SP-SM	A-3	100	100	60-100	1-8	---	NP
	42-54	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	100	100	60-100	6-15	---	NP
	54-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	100	100	60-100	4-10	---	NP
Urban land.										
36------------- Pompano	0-80	Fine sand--------	SP, SP-SM	A-3, A-2-4	100	100	75-100	1-12	---	NP
37------------- St. Johns	0-12	Fine sand--------	SP, SP-SM	A-3	100	100	75-95	3-10	---	NP
	12-24	Sand, fine sand	SP, SP-SM	A-3	100	100	85-95	3-10	---	NP
	24-44	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	100	100	85-95	5-20	---	NP
	44-80	Sand, fine sand	SP, SP-SM	A-3	100	100	80-90	2-10	---	NP
38------------- St. Lucie	0-80	Fine sand--------	SP	A-3	100	90-100	80-99	1-4	---	NP
39:										
St. Lucie-------	0-80	Fine sand--------	SP	A-3	100	90-100	80-99	1-4	---	NP
Urban land.										
40------------- Samsula	0-40	Muck------------	PT	---	---	---	---	---	---	---
	40-80	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	100	100	80-100	2-20	---	NP
41:										
Samsula---------	0-34	Muck------------	PT	---	---	---	---	---	---	---
	34-80	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	100	100	80-100	2-20	---	NP
Hontoon---------	0-80	Muck------------	PT	A-8	---	---	---	---	---	---
Basinger--------	0-6	Fine sand--------	SP	A-3	100	100	85-100	1-4	---	NP
	6-25	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	2-12	---	NP
	25-35	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	2-12	---	NP
	35-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	85-100	2-12	---	NP
42------------- Sanibel	0-11	Muck------------	PT	---	---	---	---	---	---	---
	11-15	Sand, fine sand, mucky fine sand.	SP, SP-SM	A-3	100	100	80-95	1-10	---	NP
	15-80	Sand, fine sand	SP, SP-SM	A-3	100	100	80-95	1-10	---	NP
43------------- Seffner	0-13	Fine sand--------	SP-SM, SP	A-3, A-2-4	100	100	85-100	1-12	---	NP
	13-19	Fine sand, sand	SP-SM, SP	A-3, A-2-4	100	100	85-100	1-12	---	NP
	19-80	Fine sand, sand	SP-SM, SP	A-3, A-2-4	97-100	75-100	70-100	1-12	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
44 Smyrna	0-17	Fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-100	2-12	---	NP
	17-27	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	100	100	80-100	5-20	---	NP
	27-80	Sand, fine sand	SP, SP-SM	A-3	100	100	80-100	2-10	---	NP
45: Smyrna	0-18	Fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-100	2-12	---	NP
	18-28	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	100	100	80-100	5-20	---	NP
	28-80	Sand, fine sand	SP, SP-SM	A-3	100	100	80-100	2-10	---	NP
Urban land.										
46 Tavares	0-6	Fine sand	SP, SP-SM	A-3	100	95-100	85-100	2-10	---	NP
	6-80	Sand, fine sand	SP, SP-SM	A-3	100	95-100	85-100	2-10	---	NP
47: Tavares	0-6	Fine sand	SP, SP-SM	A-3	100	95-100	85-100	2-10	---	NP
	6-80	Sand, fine sand	SP, SP-SM	A-3	100	95-100	85-100	2-10	---	NP
Millhopper	0-64	Fine sand	SP-SM, SM	A-3, A-2-4	100	97-100	75-95	5-20	---	NP
	64-76	Loamy sand, loamy fine sand.	SM	A-2-4	100	97-100	75-95	15-22	---	NP
	76-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-4	100	97-100	75-95	18-40	<28	NP-10
48: Tavares	0-6	Fine sand	SP, SP-SM	A-3	100	95-100	85-100	2-10	---	NP
	6-80	Sand, fine sand	SP, SP-SM	A-3	100	95-100	85-100	2-10	---	NP
Urban land.										
49 Terra Ceia	0-74	Muck	PT	A-8	---	---	---	---	---	---
50. Urban land.										
51 Wabasso	0-3	Fine sand	SP, SP-SM	A-3	100	100	95-100	2-10	---	NP
	3-18	Sand, fine sand	SP, SP-SM	A-3	100	100	95-100	2-10	---	NP
	18-21	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	95-100	5-20	---	NP
	21-70	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	100	100	95-100	20-35	20-30	5-13
	70-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	100	100	95-100	5-20	---	NP
52: Wabasso	0-4	Fine sand	SP, SP-SM	A-3	100	100	95-100	2-10	---	NP
	4-16	Sand, fine sand	SP, SP-SM	A-3	100	100	95-100	2-10	---	NP
	16-25	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	95-100	5-20	---	NP
	25-42	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	100	100	95-100	20-35	20-30	5-13
	42-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	100	100	95-100	5-20	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
52: Urban land.										
53---------------- Wauberg	0-8	Fine sand---------	SP-SM, SM	A-3, A-2-4	100	95-100	80-98	5-20	---	NP
	8-28	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	100	95-100	80-95	3-17	---	NP
	28-60	Sandy clay loam	SC	A-2-4, A-2-6, A-4, A-6	100	98-100	90-99	28-42	22-36	9-16
	60-80	Sandy clay, clay	SC, CL, CH	A-6, A-7	100	98-100	90-99	45-65	37-55	21-40
54---------------- Zolfo	0-5	Fine sand---------	SP-SM	A-3, A-2-4	100	100	90-100	5-12	---	NP
	5-55	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	90-100	5-18	---	NP
	55-80	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	90-100	5-18	---	NP
55: Zolfo------------	0-6	Fine sand---------	SP-SM	A-3, A-2-4	100	100	90-100	5-12	---	NP
	6-64	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	90-100	5-18	---	NP
	64-80	Fine sand, sand	SP-SM, SM	A-3, A-2-4	100	100	90-100	5-18	---	NP
Urban land.										

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

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
1. Arents.												
2. Archbold	0-80	0-1	1.50-1.60	>20	0.02-0.05	3.6-6.5	<2	Low	0.10	5	1	.5-1
3. Basinger	0-7	0-4	1.40-1.55	6.0-20	0.05-0.10	4.5-5.5	<2	Low	0.10	5	2	1-8
	7-32	0-4	1.40-1.55	6.0-20	0.05-0.10	4.5-5.5	<2	Low	0.10			
	32-47	1-3	1.40-1.65	6.0-20	0.10-0.15	4.5-5.5	<2	Low	0.10			
	47-80	1-3	1.50-1.70	6.0-20	0.05-0.10	4.5-5.5	<2	Low	0.10			
4. Candler	0-5	<3	1.35-1.55	6.0-20	0.04-0.08	4.5-6.0	<2	Low	0.10	5	2	.5-2
	5-74	<3	1.50-1.65	6.0-20	0.02-0.06	4.5-6.0	<2	Low	0.10			
	74-80	3-8	1.50-1.65	6.0-20	0.05-0.08	4.5-6.0	<2	Low	0.10			
5. Candler	0-4	<3	1.35-1.55	6.0-20	0.04-0.08	4.5-6.0	<2	Low	0.10	5	2	.5-2
	4-61	<3	1.50-1.65	6.0-20	0.02-0.06	4.5-6.0	<2	Low	0.10			
	61-80	3-8	1.50-1.65	6.0-20	0.05-0.08	4.5-6.0	<2	Low	0.10			
6: Candler	0-6	<3	1.35-1.55	6.0-20	0.04-0.08	4.5-6.0	<2	Low	0.10	5	2	.5-2
	6-69	<3	1.50-1.65	6.0-20	0.02-0.06	4.5-6.0	<2	Low	0.10			
	69-80	3-8	1.50-1.65	6.0-20	0.05-0.08	4.5-6.0	<2	Low	0.10			
Apopka	0-69	<3	1.45-1.60	6.0-20	0.03-0.05	4.5-6.0	<2	Low	0.10	5	2	<2
	69-80	18-37	1.55-1.75	0.6-2.0	0.12-0.17	4.5-6.0	<2	Low	0.24			
7: Candler	0-4	<3	1.35-1.55	6.0-20	0.04-0.08	4.5-6.0	<2	Low	0.10	5	2	.5-2
	4-67	<3	1.50-1.65	6.0-20	0.02-0.06	4.5-6.0	<2	Low	0.10			
	67-80	3-8	1.50-1.65	6.0-20	0.05-0.08	4.5-6.0	<2	Low	0.10			
Urban land.												
8: Candler	0-5	<3	1.35-1.55	6.0-20	0.04-0.08	4.5-6.0	<2	Low	0.10	5	2	.5-2
	5-52	<3	1.50-1.65	6.0-20	0.02-0.06	4.5-6.0	<2	Low	0.10			
	52-80	3-8	1.50-1.65	6.0-20	0.05-0.08	4.5-6.0	<2	Low	0.10			
Urban land.												
9. Canova	0-6	---	0.20-0.40	6.0-20	0.10-0.20	5.6-6.5	<2	Low	0.10	5	2	35-75
	6-16	1-6	1.35-1.50	6.0-20	0.02-0.05	6.1-8.4	<2	Low	0.10			
	16-22	15-34	1.60-1.70	0.6-6.0	0.10-0.15	5.6-8.4	<2	Low	0.28			
	22-80	15-25	1.60-1.70	0.6-6.0	0.10-0.15	7.4-8.4	<2	Low	0.28			
10. Chobee	0-7	7-20	1.45-1.50	2.0-6.0	0.10-0.15	6.1-7.3	<2	Low	0.15	5	3	2-7
	7-50	20-35	1.55-1.75	<0.2	0.12-0.17	7.4-8.4	<2	Moderate	0.32			
	50-80	7-20	1.60-1.75	6.0-20	0.06-0.10	7.4-8.4	<2	Low	0.10			
11: Floridana	0-14	3-10	1.40-1.50	6.0-20	0.10-0.20	5.6-7.8	<2	Low	0.10	5	2	6-15
	14-28	1-7	1.50-1.60	6.0-20	0.05-0.10	5.6-7.8	<2	Low	0.10			
	28-80	15-30	1.60-1.70	<0.2	0.10-0.20	5.6-7.8	<2	Low	0.24			
Chobee	0-12	7-20	1.45-1.50	2.0-6.0	0.10-0.15	6.1-7.3	<2	Low	0.15	5	3	2-7
	12-56	20-35	1.55-1.75	<0.2	0.12-0.17	7.4-8.4	<2	Moderate	0.32			
	56-80	7-20	1.60-1.75	0.2-6.0	0.06-0.10	7.4-8.4	<2	Low	0.20			

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

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
12:												
Emeralda	0-7	2-8	1.25-1.50	6.0-20	0.10-0.15	5.1-6.5	<2	Low	0.10	5	1	3-10
	7-12	4-12	1.40-1.70	6.0-20	0.05-0.10	5.1-6.5	<2	Low	0.15			
	12-42	38-60	1.60-1.85	<0.2	0.10-0.20	6.1-8.4	<2	High	0.24			
	42-80	38-60	1.60-1.85	<0.2	0.10-0.20	7.9-8.4	<2	High	0.24			
Holopaw	0-51	2-5	1.20-1.60	6.0-20	0.03-0.07	5.1-7.3	<2	Low	0.10	5	2	1-4
	51-71	16-24	1.50-1.70	0.6-2.0	0.10-0.15	5.6-8.4	<2	Low	0.24			
	71-80	6-12	1.20-1.60	6.0-20	0.05-0.10	5.6-8.4	<2	Low	0.15			
13 Felda	0-22	1-3	1.40-1.55	6.0-20	0.02-0.05	5.1-7.3	<2	Low	0.10	5	2	1-4
	22-53	13-30	1.50-1.65	0.6-6.0	0.10-0.15	6.1-7.8	<2	Low	0.24			
	53-80	1-10	1.50-1.65	6.0-20	0.02-0.05	6.1-8.4	<2	Low	0.10			
14 Felda	0-22	1-3	1.40-1.55	6.0-20	0.02-0.05	5.1-7.3	<2	Low	0.10	5	2	1-4
	22-42	13-30	1.50-1.65	0.6-6.0	0.10-0.15	6.1-7.8	<2	Low	0.24			
	42-80	1-10	1.50-1.65	6.0-20	0.02-0.05	6.1-7.8	<2	Low	0.10			
15 Felda	0-24	1-3	1.40-1.55	6.0-20	0.02-0.05	5.1-7.3	<2	Low	0.10	5	2	1-4
	24-47	13-30	1.50-1.65	0.6-6.0	0.10-0.15	6.1-7.8	<2	Low	0.24			
	47-80	1-10	1.50-1.65	6.0-20	0.02-0.05	6.1-7.8	<2	Low	0.10			
16 Floridana	0-17	3-10	1.40-1.50	6.0-20	0.10-0.20	5.6-7.8	<2	Low	0.10	5	2	6-15
	17-28	1-7	1.50-1.60	6.0-20	0.05-0.10	5.6-7.8	<2	Low	0.10			
	28-80	15-30	1.60-1.70	<0.2	0.10-0.20	5.6-7.8	<2	Low	0.24			
17 Floridana	0-20	3-10	1.40-1.50	6.0-20	0.10-0.20	5.6-7.8	<2	Low	0.10	5	2	6-15
	20-28	1-7	1.50-1.55	6.0-20	0.05-0.10	5.6-7.8	<2	Low	0.10			
	28-80	15-30	1.60-1.70	<0.2	0.10-0.20	5.6-7.8	<2	Low	0.24			
18 Gator	0-28	0-10	0.10-0.30	6.0-20	0.30-0.40	4.5-6.0	<2	Low	---	---	2	55-85
	28-80	13-20	1.60-1.70	<0.2	0.10-0.15	6.1-8.4	<2	Low	0.32			
19 Hontoon	0-80	---	0.20-0.40	6.0-20	0.20-0.50	4.5-5.5	<2	Low	---	---	2	75-85
20 Immokalee	0-5	1-5	1.20-1.50	6.0-20	0.05-0.10	4.5-5.5	<2	Low	0.10	5	2	1-2
	5-35	1-5	1.45-1.70	6.0-20	0.02-0.05	4.5-5.5	<2	Low	0.10			
	35-67	2-7	1.30-1.60	0.6-2.0	0.10-0.25	4.5-5.5	<2	Low	0.15			
	67-80	1-5	1.40-1.60	6.0-20	0.02-0.05	4.5-5.5	<2	Low	0.10			
21 Lake	0-80	1-3	1.45-1.65	>6.0	0.03-0.08	4.5-5.5	<2	Low	0.10	5	2	.5-1
22 Lochloosa	0-29	2-12	1.35-1.65	2.0-20	0.05-0.20	4.5-5.5	<2	Low	0.10	5	2	1-4
	29-58	15-35	1.55-1.70	0.6-0.2	0.12-0.15	4.5-5.5	<2	Low	0.28			
	58-80	15-35	1.55-1.70	0.06-0.2	0.10-0.15	4.5-5.5	<2	Low	0.28			
23 Malabar	0-18	0-4	1.35-1.55	6.0-20	0.03-0.08	5.6-7.3	<2	Low	0.10	5	2	1-2
	18-30	1-5	1.35-1.70	6.0-20	0.05-0.10	5.6-7.3	<2	Low	0.10			
	30-42	1-5	1.40-1.70	6.0-20	0.02-0.05	5.6-7.3	<2	Low	0.10			
	42-58	12-25	1.55-1.75	<0.2	0.10-0.15	6.6-8.4	<2	Low	0.24			
	58-80	1-8	1.40-1.70	6.0-20	0.03-0.08	6.6-8.4	<2	Low	0.15			
24:												
Millhopper	0-65	1-8	1.50-1.67	6.0-20	0.05-0.10	4.5-6.5	<2	Low	0.10	5	2	.5-2
	65-80	12-28	1.80-1.90	0.06-2.0	0.08-0.15	4.5-6.0	<2	Low	0.28			
Urban land.												

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

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodi- bility group	Organic matter
									K	T		
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
25----------------	0-25	---	0.22-0.38	6.0-20	0.30-0.50	4.5-6.5	<2	Low----------	---	---	2	60-90
Okeelanta	25-80	1-5	1.30-1.55	6.0-20	0.05-0.10	5.1-7.8	<2	Low----------	0.15			
26----------------	0-6	1-7	1.40-1.55	6.0-20	0.10-0.15	3.6-6.0	<2	Low----------	0.10	5	2	1-5
Ona	6-15	3-8	1.50-1.65	0.6-2.0	0.10-0.15	3.6-6.0	<2	Low----------	0.15			
	15-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-6.0	<2	Low----------	0.10			
27:												
Ona--------------	0-5	1-7	1.40-1.55	6.0-20	0.10-0.15	3.6-6.0	<2	Low----------	0.10	5	2	1-5
	5-18	3-8	1.50-1.65	0.6-2.0	0.10-0.15	3.6-6.0	<2	Low----------	0.15			
	18-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-6.0	<2	Low----------	0.10			
Urban land.												
28----------------	0-22	1-8	1.35-1.45	6.0-20	0.07-0.12	4.5-6.0	<2	Low----------	0.10	5	2	1-5
Florahome	22-80	1-8	1.40-1.60	6.0-20	0.03-0.10	4.5-6.0	<2	Low----------	0.10			
29:												
Florahome--------	0-22	1-8	1.35-1.45	6.0-20	0.07-0.12	4.5-6.0	<2	Low----------	0.10	5	2	1-5
	22-80	1-8	1.40-1.60	6.0-20	0.03-0.10	4.5-6.0	<2	Low----------	0.10			
Urban land.												
30----------------	0-5	1-6	1.25-1.60	6.0-20	0.05-0.10	5.1-7.3	<2	Low----------	0.10	5	2	.5-6
Pineda	5-37	1-8	1.40-1.70	6.0-20	0.02-0.05	5.1-7.3	<2	Low----------	0.10			
	37-55	10-25	1.50-1.70	<0.2	0.10-0.15	6.6-8.4	<2	Low----------	0.24			
	55-80	3-12	1.45-1.60	2.0-6.0	0.02-0.05	6.6-8.4	<2	Low----------	0.10			
31----------------	0-36	1-8	1.30-1.60	6.0-20	0.02-0.05	5.1-7.3	<2	Low----------	0.10	5	2	.5-6
Pineda	36-80	10-25	1.50-1.70	<0.2	0.10-0.15	6.6-8.4	<2	Low----------	0.24			
32----------------	0-18	1-3	1.15-1.50	6.0-20	0.02-0.05	5.6-7.8	<2	Low----------	0.10	5	2	1-4
Pinellas	18-34	3-8	1.40-1.60	6.0-20	0.10-0.15	6.6-9.0	<2	Low----------	0.17			
	34-46	13-30	1.50-1.65	0.6-2.0	0.10-0.15	6.6-9.0	<2	Low----------	0.24			
	46-80	2-8	1.55-1.65	6.0-20	0.02-0.05	7.9-8.4	<2	Low----------	0.10			
33.												
Pits.												
34----------------	0-40	<2	1.35-1.65	>20	0.02-0.05	4.5-7.3	<2	Low----------	0.10	5	1	<1
Pomello	40-55	<2	1.45-1.60	2.0-6.0	0.10-0.30	5.1-8.4	<2	Low----------	0.15			
	55-80	<2	1.35-1.65	6.0-20	0.02-0.05	5.1-8.4	<2	Low----------	0.10			
35:												
Pomello----------	0-42	<2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	Low----------	0.10	5	1	<1
	42-54	<2	1.45-1.60	2.0-6.0	0.10-0.30	4.5-6.0	<2	Low----------	0.15			
	54-80	<2	1.35-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	Low----------	0.10			
Urban land.												
36----------------	0-80	0-5	1.30-1.65	6.0-20	0.02-0.05	4.5-7.8	<2	Low----------	0.10	5	2	1-5
Pompano												
37----------------	0-12	1-4	1.30-1.50	6.0-20	0.10-0.15	3.6-5.5	<2	Low----------	0.10	5	2	2-4
St. Johns	12-24	1-3	1.50-1.70	6.0-20	0.03-0.08	3.6-5.5	<2	Low----------	0.10			
	24-44	2-6	1.50-1.58	0.2-2.0	0.10-0.30	3.6-5.5	<2	Low----------	0.15			
	44-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-5.5	<2	Low----------	0.10			
38----------------	0-80	0-1	1.50-1.60	>20	0.02-0.05	3.6-7.3	<2	Low----------	0.10	5	1	0-1
St. Lucie												

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

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
39:												
St. Lucie-------	0-80	0-1	1.50-1.60	>20	0.02-0.05	3.6-7.3	<2	Low---------	0.10	5	1	0-1
Urban land.												
40--------------- Samsula	0-40	---	0.25-1.50	6.0-20	0.20-0.25	4.5-5.5	<2	Low---------	---	---	2	>20
	40-80	1-14	1.35-1.55	6.0-20	0.02-0.05	3.6-5.5	<2	Low---------	0.17			
41:												
Samsula---------	0-34	---	0.25-0.50	6.0-20	0.20-0.25	4.5-5.5	<2	Low---------	---	---	2	>20
	34-80	1-14	1.35-1.55	6.0-20	0.02-0.05	3.6-5.5	<2	Low---------	0.17			
Hontoon---------	0-80	---	0.20-0.40	6.0-20	0.30-0.50	4.5-5.5	<2	Low---------	---	---	2	75-85
Basinger--------	0-6	0-4	1.40-1.55	6.0-20	0.05-0.10	4.5-5.5	<2	Low---------	0.10	5	2	1-8
	6-25	0-4	1.40-1.55	6.0-20	0.05-0.10	4.5-5.5	<2	Low---------	0.10			
	25-35	1-3	1.40-1.65	6.0-20	0.10-0.15	4.5-5.5	<2	Low---------	0.10			
	35-80	1-3	1.50-1.70	6.0-20	0.05-0.10	4.5-5.5	<2	Low---------	0.10			
42--------------- Sanibel	0-11	---	0.30-0.55	6.0-20	0.20-0.50	3.6-7.3	<2	Low---------	0.10	4	2	20-50
	11-15	2-6	1.40-1.60	6.0-20	0.10-0.15	3.6-7.3	<2	Low---------	0.10			
	15-80	2-6	1.50-1.65	6.0-20	0.03-0.10	3.6-7.3	<2	Low---------	0.10			
43--------------- Seffner	0-13	1-8	1.35-1.45	6.0-20	0.07-0.12	4.5-7.3	<2	Low---------	0.10	5	2	1-5
	13-19	1-8	1.35-1.45	6.0-20	0.07-0.12	4.5-7.3	<2	Low---------	0.10			
	19-80	1-8	1.50-1.60	6.0-20	0.04-0.08	4.5-7.3	<2	Low---------	0.10			
44--------------- Smyrna	0-17	1-6	1.35-1.45	6.0-20	0.03-0.07	3.6-6.0	<2	Low---------	0.10	5	2	1-5
	17-27	3-8	1.35-1.45	0.6-6.0	0.10-0.20	3.6-5.5	<2	Low---------	0.15			
	27-80	1-6	1.50-1.65	6.0-20	0.03-0.07	4.5-5.5	<2	Low---------	0.10			
45:												
Smyrna----------	0-18	1-6	1.35-1.45	6.0-20	0.03-0.07	3.6-6.0	<2	Low---------	0.10	5	2	1-5
	18-28	3-8	1.35-1.45	0.6-6.0	0.10-0.20	3.6-5.5	<2	Low---------	0.15			
	28-80	1-6	1.50-1.65	6.0-20	0.03-0.07	4.5-5.5	<2	Low---------	0.10			
Urban land.												
46--------------- Tavares	0-6	0-4	1.25-1.60	>6.0	0.05-0.10	3.6-6.0	<2	Low---------	0.10	5	2	.5-2
	6-80	0-4	1.40-1.70	>6.0	0.02-0.05	3.6-6.0	<2	Low---------	0.10			
47:												
Tavares---------	0-6	0-4	1.25-1.60	>6.0	0.05-0.10	3.6-6.0	<2	Low---------	0.10	5	2	.5-2
	6-80	0-4	1.40-1.70	>6.0	0.02-0.05	3.6-6.0	<2	Low---------	0.10			
Millhopper------	0-64	2-8	1.50-1.67	6.0-20	0.05-0.10	4.5-6.5	<2	Low---------	0.10	5	2	.5-2
	64-76	8-14	1.60-1.80	2.0-6.0	0.08-0.12	4.5-6.0	<2	Low---------	0.15			
	76-80	12-28	1.80-1.90	0.06-2.0	0.08-0.15	4.5-6.0	<2	Low---------	0.28			
48:												
Tavares---------	0-6	0-4	1.25-1.60	>6.0	0.05-0.10	3.6-6.0	<2	Low---------	0.10	5	2	.5-2
	6-80	0-4	1.40-1.70	>6.0	0.02-0.05	3.6-6.0	<2	Low---------	0.10			
Urban land.												
49--------------- Terra Ceia	0-74	---	0.15-0.35	6.0-20	0.30-0.50	4.5-8.4	<2	Low---------	---	---	2	60-90
50. Urban land.												

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

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm					Pct
51--------------- Wabasso	0-3	1-5	1.25-1.45	6.0-20	0.03-0.08	3.6-6.5	<2	Low----------	0.10	5	2	1-4
	3-18	0-5	1.35-1.55	6.0-20	0.02-0.05	3.6-6.5	<2	Low----------	0.10			
	18-21	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low----------	0.15			
	21-70	12-30	1.60-1.75	<0.2	0.10-0.15	5.1-8.4	<2	Low----------	0.24			
	70-80	2-12	1.40-1.70	6.0-20	0.05-0.10	7.4-8.4	<2	Low----------	0.10			
52:												
Wabasso----------	0-4	1-5	1.25-1.45	6.0-20	0.03-0.08	3.6-6.5	<2	Low----------	0.10	5	2	1-4
	4-16	0-5	1.35-1.55	6.0-20	0.02-0.05	3.6-6.5	<2	Low----------	0.10			
	16-25	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	Low----------	0.15			
	25-42	12-30	1.60-1.75	<0.2	0.10-0.15	5.1-8.4	<2	Low----------	0.24			
	42-80	2-12	1.40-1.70	6.0-20	0.05-0.10	7.4-8.4	<2	Low----------	0.10			
Urban land.												
53--------------- Wauberg	0-8	1-12	1.05-1.55	>6.0	0.05-0.15	4.5-6.5	<2	Low----------	0.10	5	2	1-4
	8-28	1-10	1.30-1.60	>6.0	0.03-0.10	4.5-6.5	<2	Low----------	0.15			
	28-60	24-35	1.50-1.70	<0.06	0.07-0.13	5.1-7.3	<2	Moderate-----	0.28			
	60-80	36-50	1.60-1.70	<0.06	0.08-0.15	5.1-7.3	<2	High---------	0.32			
54--------------- Zolfo	0-5	1-5	1.40-1.55	6.0-20	0.10-0.15	4.5-7.3	<2	Low----------	0.10	5	2	.5-1
	5-55	1-5	1.50-1.60	6.0-20	0.03-0.10	4.5-7.3	<2	Low----------	0.10			
	55-80	1-5	1.50-1.70	0.6-2.0	0.10-0.25	3.6-6.5	<2	Low----------	0.15			
55--------------- Zolfo	0-6	1-5	1.40-1.55	6.0-20	0.10-0.15	4.5-7.3	<2	Low----------	0.10	5	2	.5-1
	6-64	1-5	1.50-1.60	6.0-20	0.03-0.10	4.5-7.3	<2	Low----------	0.10			
	64-80	1-5	1.50-1.70	0.6-2.0	0.10-0.25	3.6-6.5	<2	Low----------	0.15			

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
1. Arents.											
2 Archbold	A	None	---	---	3.5-6.0	Apparent	Jun-Nov	---	---	Low	Moderate.
3* Basinger	D	None	---	---	+2-1.0	Apparent	Jun-Feb	---	---	High	Moderate.
4, 5 Candler	A	None	---	---	>6.0	---	---	---	---	Low	High.
6:											
Candler	A	None	---	---	>6.0	---	---	---	---	Low	High.
Apopka	A	None	---	---	>6.0	---	---	---	---	Moderate	High.
7, 8:											
Candler	A	None	---	---	>6.0	---	---	---	---	Low	High.
Urban land.											
9* Canova	B/D	None	---	---	+2-0	Apparent	Jan-Dec	3-6	8-12	High	Low.
10 Chobee	B/D	Frequent	Brief to very long.	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.
11:											
Floridana	D	Frequent	Very long.	Jul-Sep	0-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.
Chobee	B/D	Frequent	Brief to very long.	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.
12:											
Emeralda	D	Frequent	Long	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	High	Low.
Holopaw	D	Frequent	Very long.	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	High	High.
13 Felda	B/D	None	---	---	0-1.0	Apparent	Jul-Mar	---	---	High	Moderate.
14 Felda	B/D	Occasional	Brief	Jul-Feb	0-1.0	Apparent	Jul-Mar	---	---	High	Moderate.
15 Felda	B/D	Frequent	Very long.	Jul-Feb	0-1.0	Apparent	Jul-Mar	---	---	High	Moderate.
16 Floridana	D	Frequent	Very long.	Jul-Oct	0-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.

See footnote at end of table.

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

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Dura-tion	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
17*: Floridana	D	None	---	---	+2-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.
18*: Gator	D	None	---	---	+2-1.0	Apparent	Jun-Dec	2-6	20-23	High	High.
19*: Hontoon	B/D	None	---	---	+2-1.0	Apparent	Jan-Dec	16-24	>52	High	High.
20: Immokalee	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	High.
21: Lake	A	None	---	---	>6.0	---	---	---	---	Low	High.
22: Lochloosa	C	None	---	---	2.5-5.0	Apparent	Jul-Oct	---	---	High	High.
23: Malabar	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	Low.
24:											
Millhopper	A	None	---	---	3.5-6.0	Perched	Aug-Feb	---	---	Low	Moderate.
Urban land.											
25*: Okeelanta	B/D	None	---	---	+1-0	Apparent	Jun-Jan	16-20	16-30	High	Moderate.
26: Ona	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	High.
27:											
Ona	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	High.
Urban land.											
28: Florahome	A	None	---	---	4.0-6.0	Apparent	Jun-Dec	---	---	Low	High.
29:											
Florahome	A	None	---	---	4.0-6.0	Apparent	Jun-Dec	---	---	Low	High.
Urban land.											
30: Pineda	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	Low.
31: Pineda	B/D	Frequent	Long	Jul-Sep	0-1.0	Apparent	Jun-Nov	---	---	High	Low.
32: Pinellas	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	Low.
33. Pits.											
34: Pomello	C	None	---	---	2.0-3.5	Apparent	Jul-Nov	---	---	Low	High.

See footnote at end of table.

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

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
35:											
Pomello-------	C	None-------	---	---	2.0-3.5	Apparent	Jul-Nov	---	---	Low------	High.
Urban land.											
36------------ Pompano	B/D	None-------	---	---	0-1.0	Apparent	Jun-Nov	---	---	High-----	Moderate.
37------------ St. Johns	B/D	None-------	---	---	0-1.0	Apparent	Jun-Apr	---	---	High-----	High.
38------------ St. Lucie	A	None-------	---	---	>6.0	---	---	---	---	Low------	Moderate.
39:											
St. Lucie-----	A	None-------	---	---	>6.0	---	---	---	---	Low------	Moderate.
Urban land.											
40*----------- Samsula	B/D	None-------	---	---	+2-1.0	Apparent	Jan-Dec	16-20	30-36	High-----	High.
41:											
Samsula*------	B/D	None-------	---	---	+2-1.0	Apparent	Jan-Dec	16-20	30-36	High-----	High.
Hontoon*------	B/D	None-------	---	---	+2-1.0	Apparent	Jan-Dec	16-24	>52	High-----	High.
Basinger*-----	D	None-------	---	---	+2-1.0	Apparent	Jun-Feb	---	---	High-----	Moderate.
42*----------- Sanibel	B/D	None-------	---	---	+1-1.0	Apparent	Jun-Feb	3-5	5-15	High-----	Low.
43------------ Seffner	C	None-------	---	---	1.5-3.5	Apparent	Jun-Nov	---	---	Low------	Moderate.
44------------ Smyrna	B/D	None-------	---	---	0-1.0	Apparent	Jul-Oct	---	---	High-----	High.
45:											
Smyrna--------	B/D	None-------	---	---	0-1.0	Apparent	Jul-Oct	---	---	High-----	High.
Urban land.											
46------------ Tavares	A	None-------	---	---	3.5-6.0	Apparent	Jun-Dec	---	---	Low------	High.
47:											
Tavares-------	A	None-------	---	---	3.5-6.0	Apparent	Jun-Dec	---	---	Low------	High.
Millhopper----	A	None-------	---	---	3.5-6.0	Perched	Aug-Feb	---	---	Low------	Moderate.
48:											
Tavares-------	A	None-------	---	---	3.5-6.0	Apparent	Jun-Dec	---	---	Low------	High.
Urban land.											
49*----------- Terra Ceia	B/D	None-------	---	---	+1-1.0	Apparent	Jan-Dec	16-20	50-60	Moderate	Moderate.
50. Urban land.											

See footnote at end of table.

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

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Dura-tion	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
51------------- Wabasso	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	---	---	Moderate	High.
52:											
Wabasso--------	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	---	---	Moderate	High.
Urban land.											
53------------- Wauberg	D	None--------	---	---	0-1.0	Apparent	Jun-Dec	---	---	High------	Moderate.
54------------- Zolfo	C	None--------	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low-------	Moderate.
55:											
Zolfo----------	C	None--------	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low-------	Moderate.
Urban land.											

* In the "High water table--Depth" column, a plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Apopka	Loamy, siliceous, hyperthermic Grossarenic Paleudults
Archbold	Hyperthermic, uncoated Typic Quartzipsamments
Arents	Arents
Basinger	Siliceous, hyperthermic Spodic Psammaquents
Candler	Hyperthermic, uncoated Typic Quartzipsamments
Canova	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs
Chobee	Fine-loamy, siliceous, hyperthermic Typic Argiaquolls
Emeralda	Fine, mixed, hyperthermic Mollic Albaqualfs
Felda	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Florahome	Sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts
Floridana	Loamy, siliceous, hyperthermic Arenic Argiaquolls
Gator	Loamy, siliceous, euic, hyperthermic Terric Medisaprists
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Hontoon	Dysic, hyperthermic Typic Medisaprists
Immokalee	Sandy, siliceous, hyperthermic Arenic Haplaquods
Lake	Hyperthermic, coated Typic Quartzipsamments
Lochloosa	Loamy, siliceous, hyperthermic Aquic Arenic Paleudults
Malabar	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Millhopper	Loamy, siliceous, hyperthermic Grossarenic Paleudults
Okeelanta	Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Medisaprists
Ona	Sandy, siliceous, hyperthermic Typic Haplaquods
Pineda	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Pinellas	Loamy, siliceous, hyperthermic Arenic Ochraqualfs
Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods
Pompano	Siliceous, hyperthermic Typic Psammaquents
St. Johns	Sandy, siliceous, hyperthermic Typic Haplaquods
St. Lucie	Hyperthermic, uncoated Typic Quartzipsamments
Samsula	Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists
Sanibel	Sandy, siliceous, hyperthermic Histic Humaquepts
Seffner	Sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts
Smyrna	Sandy, siliceous, hyperthermic Aeric Haplaquods
Tavares	Hyperthermic, uncoated Typic Quartzipsamments
Terra Ceia	Euic, hyperthermic Typic Medisaprists
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods
Wauberg	Loamy, siliceous, hyperthermic Arenic Albaqualfs
Zolfo	Sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods

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