United States Department of Agriculture

Natural Resources Conservation Service

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

Soil Survey of Dade County Area, Florida

How To Use This Soil Survey

General Soil Map

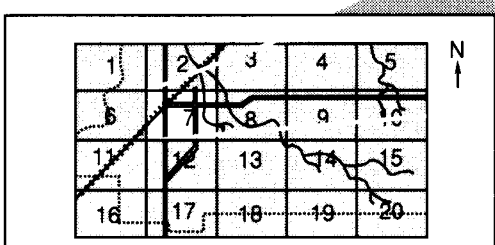
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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.

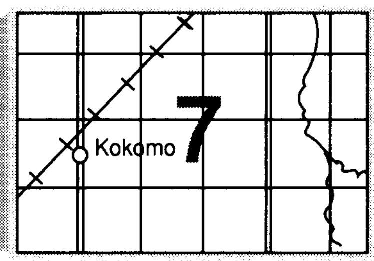
Detailed Soil Maps

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

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



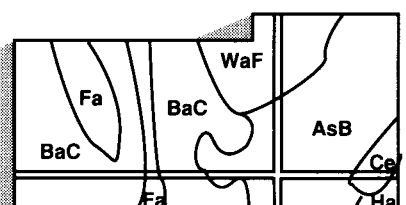
INDEX TO MAP SHEETS



MAP SHEET

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

MAP SHEET



AREA OF INTEREST

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

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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly 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 1986. Soil names and descriptions were approved in 1987. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This survey was made cooperatively by the Natural Resources Conservation Service; the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department; the Florida Department of Agriculture and Consumer Services; and the Florida Department of Transportation. The survey is part of the technical assistance furnished by the South Dade Soil and Water Conservation District. Assistance was provided by the Dade County Board of Commissioners.

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

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

Cover: Urban land, natural wetlands in an area of Vizcaya soils, and farmland in an area of Chekika soils.

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Issued January 1996

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in the survey area. 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 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 ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

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

These and many other soil properties that affect land use are described in this soil survey. 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 Natural Resources Conservation Service or the Cooperative Extension Service.

T. Niles Glasgow
State Conservationist
Natural Resources Conservation Service

Soil Survey of Dade County Area, Florida

By Chris V. Noble, Robert W. Drew, and James D. Slabaugh, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department; Florida Department of Agriculture and Consumer Services; and Florida Department of Transportation

This survey area is in the extreme southeast part of Florida (fig. 1). It is bordered on the north by Broward County, on the west mainly by the Everglades National Park, on the east by the Atlantic Ocean, and on the south by Biscayne Bay.

The survey area makes up 621,080 acres, or about 970 square miles. Miami, the county seat, is in the northeastern part of the survey area, on the west shore of Biscayne Bay.

The economy of the survey area is fairly well diversified. Because of the money generated by tourism and retirement living, the Miami area and adjacent coastal areas are known as the "Gold Coast." The leading industries or economic activities include construction, real state, housing, recreation, the service trades, sports events, motion picture and television filming, transportation, manufacturing, limestone mining, and cement production.

Miami is one of Florida's principal deep-water ports. Commercial and sport fishing and agricultural crops, including such major cash crops as citrus, vegetables, and special tropical fruits and vegetables, are important to the economy. Ornamental nursery plants, for indoor and outdoor landscaping, have surpassed citrus and sugarcane as the major cash crops in Florida.

General Nature of the Survey Area

This section describes the environmental and cultural factors that affect the use and management of soils in the survey area. These factors are climate, history and development, geomorphology, geology, hydrogeology, and transportation facilities.

Climate

This survey area has a subtropical marine climate characterized by long, warm, rainy summers and mild, dry winters. Temperatures are moderated by the Atlantic Ocean and Gulf Stream, but the moderating effects quickly diminish inland. Table 1 gives data on temperature and precipitation for the survey area as recorded at the Miami International Airport. In winter, the average temperature is 68 degrees F and the average daily minimum temperature is 60 degrees. The lowest temperature on record, which occurred in December 1934, is 26 degrees. In summer, the average temperature is 82 degrees and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred in July 1942, is 100 degrees.

Frosts occur about once a year. Killing frosts occurred in February 1917, December and January 1917 and 1918, January 1928, December 1934, January 1940, January and February 1958, December 1962, and January 1970, 1977, and 1981 *(23)*.

Rainfall varies greatly from place to place during the year and on a yearly basis. The total annual precipitation is approximately 57.6 inches. Of this, 10.6 inches, or about 18 percent, usually falls in the period November through March. The growing season for most

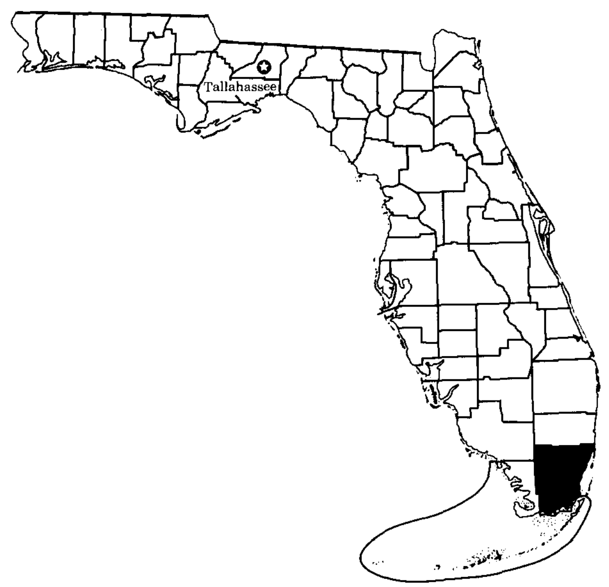

Figure 1.—Location of Dade County area in Florida.

vegetable crops is included in this period. The heaviest one-day rainfall during the period of record was 16 inches in April 1979. Thunderstorms occur about 74 days each year, and most occur in late afternoon *(22)*.

Hurricanes occasionally strike the survey area, especially in September and October. Damaging hurricanes occurred in October 1906, September 1926, November 1935, September 1945 and 1947, October 1950, September 1960, August 1964, and September 1965 *(22)*.

The average relative humidity in midafternoon is about 74 percent. Humidity is higher at dawn, when the average is about 84 percent. The sun shines 78 percent of the time possible in summer and 66 percent in winter. The prevailing wind is from the east-southeast.

History and Development

Tekesta Indians were the first known permanent settlers in the survey area. They were encountered by Ponce de Leon in 1513. They were nonagricultural and lived by hunting, fishing, and trading with other tribes and later with the Spanish. Their numbers were greatly reduced by disease and by warfare with the Creek Indians. The final 80 families moved to Cuba with the Spanish in 1763. The survey area evidently was completely depopulated *(9)*. It came under the control of England in 1763. In that year, Spain again was given control of Florida. The Creek Indians, who later became the Seminoles of north Florida, were known to hunt in the Everglades and make raids as far south as Key West, but they were not permanent settlers until after the Tekesta Indians moved to Cuba. By 1830, the Seminoles had taken over and absorbed any remaining tribes. Florida became part of the United States in 1821.

In 1808, the Spanish Government granted John Egan 100 acres of land along the Miami River, in an area where Miami is now located. Richard Fitzpatrick established a cotton plantation along the Miami River. Early settlers grew oranges, lemons, limes, bananas, coconuts, and grapes *(4)*.

On July 2, 1838, Congress granted one township near present-day Cutler to Dr. Henry Perrine for the purpose of introducing purely tropical plants and trees to south Florida. In 1847, Dr. Perrine was killed by Seminole Indians before his project was implemented *(4)*.

Dade County was established on February 4, 1836. The present boundaries were established after the formation of Palm Beach County in 1909 and Broward County in 1915. The first county seat was on Indian Key, which was the most important settlement. In 1844, the county seat was moved to Miami. In 1889, it was moved to June. In 1900, it was moved back to Miami. The county was named in honor of Major Francis L. Dade, who along with his troops was killed by Seminoles near what is now Bushnell, Florida, in 1835 *(4)*.

The population of the county began to grow after the Homestead Act of 1866. By 1870, small settlements were established in Biscayne, Lemon City, Ft. Dallas (Miami), Coconut Grove, and Cutler. The settlers supported themselves through hunting, fishing, farming, and making starch from Florida arrowroot. Development was hindered because the only way in or out was by boat. In 1896, Henry Flagler extended a railroad into Miami. By 1900, the population had grown to 5,000. In 1915, Dixie Highway, which linked Miami with the rest of the country, was completed.

Construction of water-control structures, which began in 1906 and continues to the present, has allowed farming and urban development in areas in the Everglades that originally were too wet for these uses. A period of large-scale land development and increasing population occurred in the county from 1920 through 1926. The takeover of Cuba by Fidel Castro in 1959 triggered the migration of 500,000 people to the county. The addition of the Mariel Refugees in 1980 also increased the population of the county.

Geomorphology

Richard A. Johnson, Florida Geological Survey, Bureau of Geology, Department of Natural Resources, helped prepare this section and the sections "Geology" and "Hydrogeology."

This survey area is on the southeastern peninsula of Florida, in the southern or distal zone. The area is divided into the Everglades Trough, the Atlantic Coastal Ridge (Miami Ridge), the Southern Slope, and the Gulf Coastal Lagoons (fig. 2).

Most of the northern and western parts of the survey area are made up of the Everglades Trough. This trough formed when dissolution of the underlying limestone lowered the land surface to below the water table.

The Miami Ridge is the southern extension of the Atlantic Coastal Ridge, which extends along the eastern Atlantic shore of Florida south from the vicinity of Jacksonville. The Miami Ridge is along most of the eastern coast of the survey area. In this area, it is made up of oolitic limestone, which formed as a broad, low shoal under warm, shallow marine water during a period of higher Pleistocene sea level, beginning about 2 million years ago. Because of tidal action, swales cut into the top of the ridge generally have a northwest-southwest orientation. A wave-cut cliff, or scarp, formed along the southeast edge of the ridge during a period of higher sea level. This cliff has been called the Silver Bluff Scarp *(12)*.

On aerial photographs the Southern Slope shows a parallel pattern of drainage within an area that generally is covered by water. The apparent parallelism is caused by the coalescence of small islands of trees into linear strings of vegetation. Two small areas of Gulf Coastal Lagoons are between the Southern Slope and Florida Bay to the south. These lagoons are more typical of the southwest coast of Florida and barely extend into the survey area at this location.

Geology

The sediments of south Florida are dominated by limestone and dolostone. The survey area is underlain by at least 11,800 feet of these carbonate sediments *(3)*. Only the section of rocks normally encountered when water wells are drilled, generally to a depth of less than 200 feet, is considered in the following discussion of geology. A geological cross section of the survey area is shown in figure 3.

The Hawthorn Group (undifferentiated) consists of interbedded sand, silt, clay, dolostone, and limestone. All of the lithological components are interbedded and intermixed. This group is intermixed throughout with phosphate, generally in the form of sand-sized grains. In this survey area the top of the group consists of sand and clay *(13)* and forms the base of the Biscayne aquifer. The lower part of the group consists of soft or hard, sandy, phosphatic dolostone or limestone. The group attains a thickness of more than 900 feet in the survey area *(14)*. The upper part of the group acts as a confining unit for the Floridan aquifer system, which yields water to flowing wells in the survey area but is not used because the water is saline.

In some areas the Hawthorn Group is overlain by a thin layer of limy sand containing scattered phosphate grains and small quantities of shell material. This bed is probably equivalent to the Tamiami Formation, but not much information is available concerning this formation in this survey area. Where it occurs in the survey area, it probably forms the base of the Biscayne aquifer.

The Caloosahatchee Formation may occur as scattered remnants as much as 25 feet thick in the survey area, but little definite information is available concerning the occurrence of this formation in the area. The formation consists of shells, sand, and some limestone and sandstone.

The Fort Thompson Formation, which consists of interbedded limestone, sand, and shells, is one of the most productive units within the Biscayne aquifer. It averages 50 to 70 feet in thickness and thickens to the east, as shown in figure 3 *(13)*. It typically consists of alternating freshwater and marine sediments, which generally are permeable. The limestone beds in the Fort Thompson Formation can be cavernous and interconnected, thus providing channels through which water can flow.

The Anastasia Formation, a sandy, shelly limestone unit, extends along the Atlantic coast more than 150 miles to the north of this survey area. Although it does not occur at the surface anywhere in the survey area, it forms a major part of the Biscayne aquifer in coastal areas, where it is as much as 120 feet thick *(13)*. This unit typically has beds of marine limestone, consisting mainly of cemented whole and broken shells (coquina). These beds are extremely permeable. Because they are relatively close to the surface and in close proximity to the ocean, however, the water contained in them can be saline *(10)*.

Key Largo Limestone merges laterally with the Anastasia Formation and with Miami Limestone in the southern and east-central parts of the survey area *(13)*. This formation is at the surface throughout the upper keys, but in this survey area it is generally below the surface. It consists of hard limestone derived from coral, algae, and some shells. It is as much as 60 feet thick in the survey area *(13)*. It is essentially a fossil reef, which formed during a period of higher Pleistocene sea level. It typically is very porous and is a very prolific water-producing part of the Biscayne aquifer *(13)*.

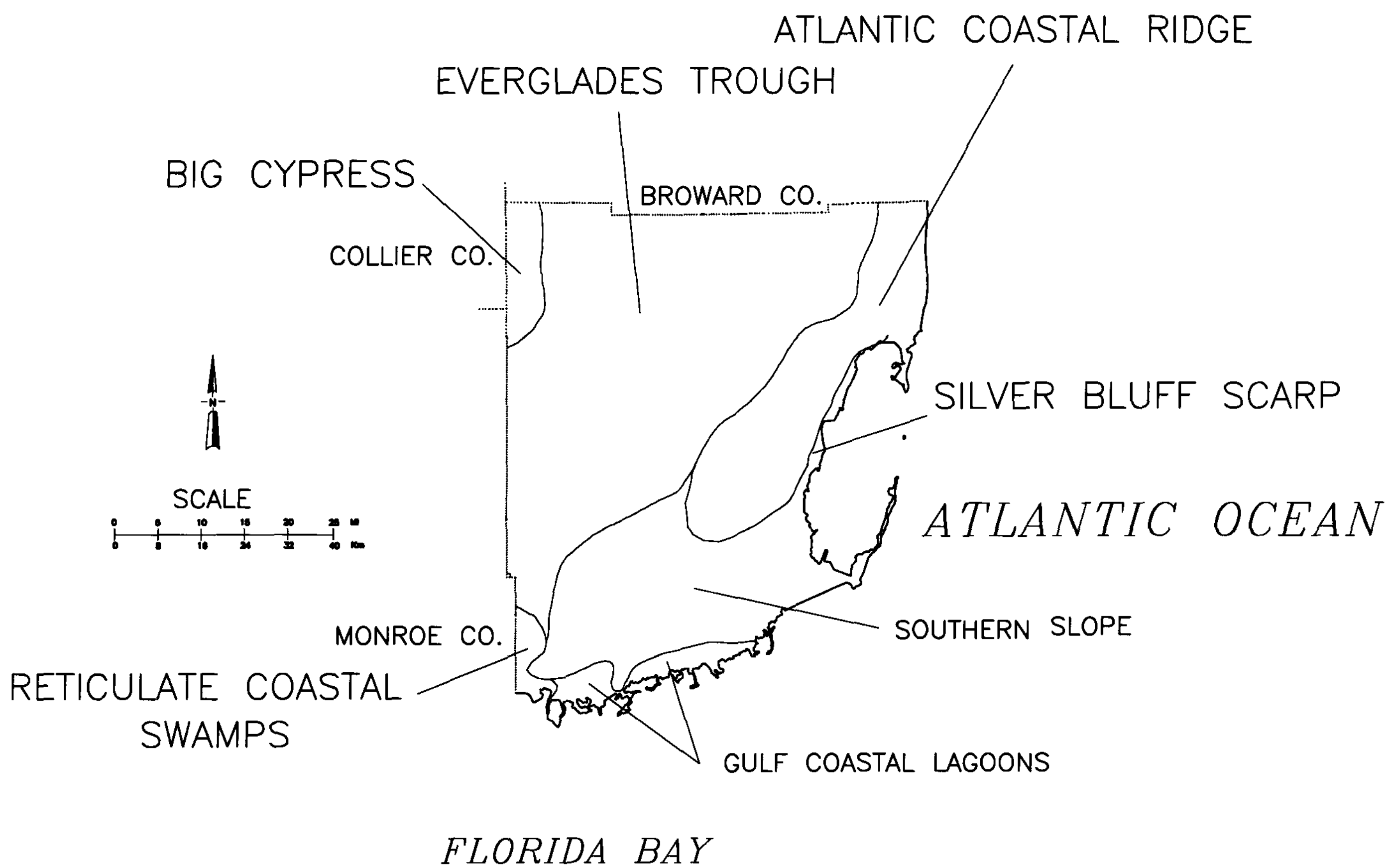

Figure 2.—Geomorphological areas of Dade County.

Miami Limestone is at or near the surface in almost all of the survey area. This formation is a soft, oolitic limestone that is generally less than 40 feet thick *(12)*. It characteristically contains large quantities of ooliths, which are small, spherical particles formed when calcite or aragonite was deposited in concentric layers around a nucleus of some type. Miami Limestone is considered to be a part of the Biscayne aquifer. It is a good source of water, although it yields less water than the underlying formations and does so less easily.

Limestone is the primary mineral resource in the survey area. It is mined from below water level by draglines in at least 31 pits *(5)*. Most of the pits are mined for Miami Limestone. Some of the pits in the north-central part of the survey area, however, are mined for material similar to Tamiami Limestone, which is at the surface in Collier County, along the Tamiami Trail. The limestone is used as a source of base material for roads, in the manufacture of cement products, and in a variety of other ways.

Hydrogeology

The Biscayne aquifer of the surficial aquifer system provides copious quantities of water to wells in the survey area. It extends from the surficial material near or at the surface to a depth of almost 200 feet in the northeast corner of the county *(13)*. The base of the aquifer is generally considered to be the deepest porous limestone bed in the section above the relatively impermeable sand, silt, and clay of the Hawthorn Group or "tight" sand in the Tamiami Formation *(13)*. The water in the aquifer begins as rainfall, which percolates into the sand or limestone at the surface and flows by gravity below the water table, where it can be tapped by wells. Most wells that are not municipal or commercial are less than 100 feet deep and have casing that extends from the surface to below the water table. Many commercial or municipal wells are 100 to 200 feet deep. The lower part of all the wells is left uncased in the limestone or shell beds. The water is derived from

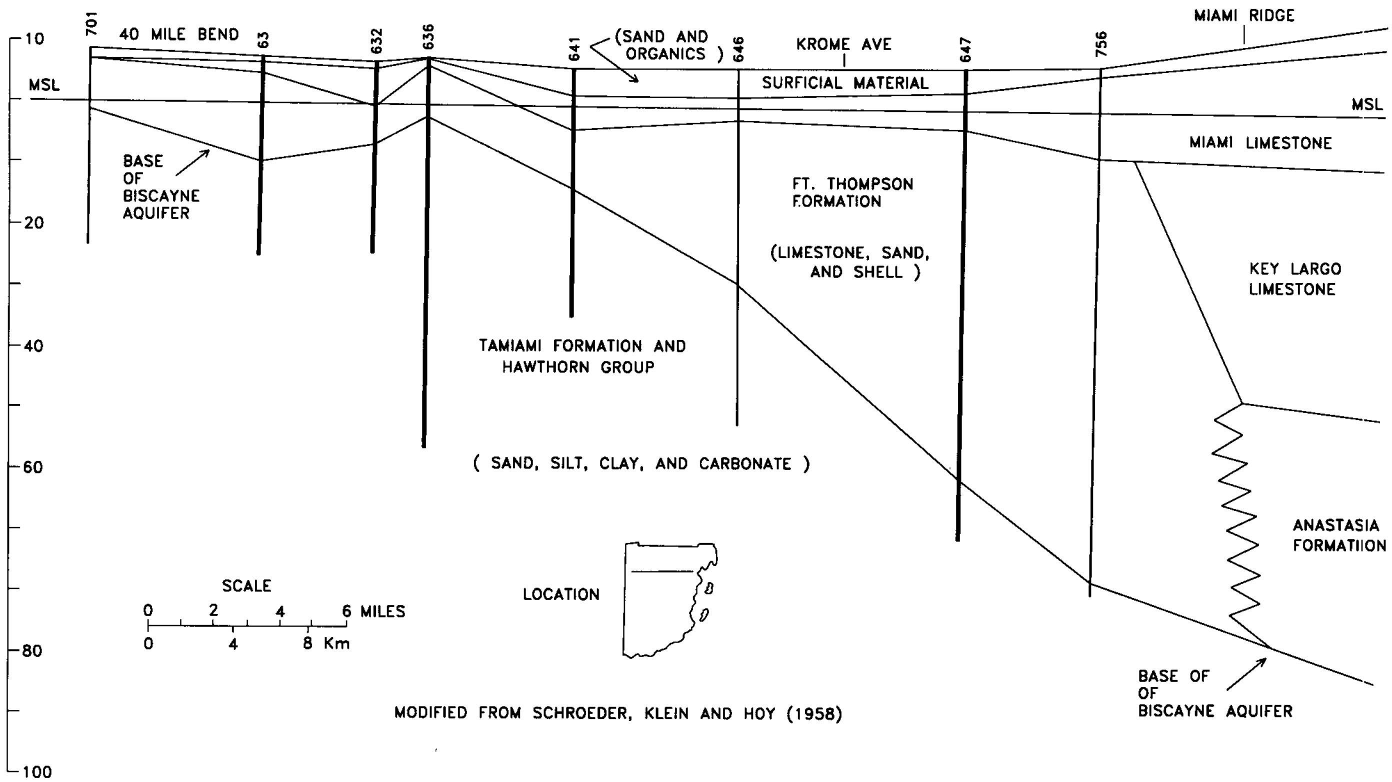

Figure 3.—A geological cross section of Dade County area.

these beds. The formations that make up the Biscayne aquifer are identified in the section "Geology."

Because of relatively low elevations throughout the survey area and a close proximity to the ocean, salty ocean water moving into canals toward the west can infiltrate the Biscayne aquifer during dry periods, when the amount of rainfall is low. The upward flow of saline water toward the surface and evaporation at the surface can cause contamination of the soil by salt in agricultural areas and elsewhere *(10)*.

Transportation Facilities

This survey area is served by several major highways. U.S. Highway 1 runs in a north-south direction in the eastern part of the survey area. It is the only highway that runs the entire length of the county. Highway A1A connects the barrier islands. U.S. Interstate 95 runs in a north-south direction, merging with U.S. Highway 1 in Miami. The Homestead Extension of the Florida Turnpike runs in a north-south direction near the center of the survey area. It connects with U.S. Highway 1 near Florida City. Okeechobee Road (U.S. Highway 27) runs in a northwest-southeast direction, connecting Miami with the Homestead Extension and with Krome Avenue (County Road 997). Krome Avenue runs in a north-south direction from the Homestead Extension to near the north end of the county. It is the westernmost through road. Tamiami Trail (U.S. Highway 41) runs in an east-west direction. It is the only road that runs across the entire width of the county. State Road 9 extends from U.S. Highway 1 north into Broward County. U.S. Highway 441 parallels U.S. Interstate 95 north into Broward County.

Miami is served by a complex urban loop highway system, a commuter rail, and a bus system. Seven bridges connect the barrier islands with the mainland. The Port of Miami receives goods from and ships them to areas throughout the world. The port also serves as a point of departure for many cruise ships.

Two railroad lines serve the survey area. Amtrak service is available from Miami. Access to the Intracoastal Waterway and the Atlantic Ocean is readily available. Miami International Airport is a major metropolitan airport. It provides direct flights to many parts of the world. Other commercial airports include Homestead General Aviation Airport, New Tamiami Airport, Opa-Locka Airport, and Opa-Locka West Airport. The survey area has many private landing fields.

How This Survey Was Made

This soil survey updates the survey of Dade County published in 1958 *(18)*. It describes the soils to a greater depth than the previous survey. Many of the soil and map unit names have been changed because of new information. Though some soil boundaries have been readjusted, most are essentially the same as those in the original survey.

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; and the kinds of native plants or crops. 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 parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles that they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to uniform nationwide procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under the headings "General Soil Map Units" and "Detailed Soil Map Units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. The characteristics of all the soils are determined through field tests. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and State and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then should be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

Soil Classification and Soil Mapping

After describing the soils in a survey area and measuring or characterizing their properties, soil scientists systematically classify the soils into taxonomic classes that have a specified range of characteristics. The system of taxonomic classification used for soils in the United States, described in "Soil Taxonomy" *(19)*, has categories that are based mainly on the kind and character of soil properties and the arrangement of soil horizons within the profile. Once the individual soils in a survey area are classified, they can be compared and correlated with similar soils in the same taxonomic class that have been recognized in other areas.

Soils occur on the landscape in an orderly pattern that is related to the geology, the landforms, and the vegetation. 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, the soil scientists can evolve a concept, or model, of how the soils formed. During mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the location of specific soils on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate soil map, the soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Compared to the whole three-dimensional soil volume, the areas examined are little more than points. These few observations, however, 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. The delineated map units are based on inferences derived from this small sample.

A ground-penetrating radar (GPR) system and hand transects were used to document the type and variability of the soils occurring in the map units *(7, 8, 11, 15)*. The GPR system was used successfully on all soils to measure the depth to and determine the variability of major soil horizons or other soil features. In this survey area 133 random transects were made by

GPR or by hand. Information from notes and ground-truth observations made in the field were used, along with radar data, to classify the soils and to determine the composition of map units. The map units described in the section "Detailed Soil Map Units" are based on these data and on data in the survey published in 1958.

Soil Variability and 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 two or three 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. These areas of differing soils are called inclusions.

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 referred to as similar inclusions. Their properties are noted in the description of the dominant soil or soils. Some inclusions have properties and behavior different enough to affect use or require different management. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The dissimilar inclusions 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 soil 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.

Confidence Limits of Soil Survey Information

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, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy 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.

Confidence limits in soil surveys are statistical expressions of the probability that a soil property or the composition of a map unit will vary within prescribed limits. These limits can be assigned numerical values based on a random sample. In the absence of specific data for determining 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 are derived largely from extrapolations made from a small sample. Also, information about the soils does not extend below a depth of about 6 feet. The information in the soil survey is not meant to be used as a substitute for onsite investigation. Soil survey information can be used to select from among 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 this survey area were determined by random transects made by ground-penetrating radar or by hand across mapped areas. The data are given in the description of each soil under the heading "Detailed Soil Map Units." Soil scientists made enough transects and took enough samples to characterize each map unit at a specific confidence level. For example, map unit 40 was characterized at a 95 percent confidence level based on transect data. The composition is described as follows: "On 95 percent of the acreage mapped as Pomello sand, Pomello and similar soils make up 98 to 99 percent of the mapped areas." On the other 5 percent of the acreage, the percentage of Pomello and similar soils may be higher than 99 percent or lower than 98 percent.

The composition of some of the map units in this survey area, such as Urban land and other miscellaneous areas, was determined on the basis of the judgment of the soil scientist rather than by a statistical procedure.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another 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 building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils of the Coastal Ridge and Barrier Islands

Areas of this group consist of Urban land and nearly level to gently sloping, moderately well drained or well drained soils. The soils consist of mixed stony loam fill spread over natural soils that are underlain by marl or limestone.

1. Urban Land-Udorthents Association

Built-up areas and nearly level to very steep, moderately well drained or well drained soils consisting of fill material that is 8 to more than 80 inches deep over limestone bedrock

This association is primarily in the northeastern part of the survey area, along the Atlantic Coastal Ridge south to Black Creek Canal and on the Barrier Islands.

This association makes up about 34.9 percent of the survey area. It is about 70 percent Urban land, 23 percent Udorthents, and 7 percent soils of minor extent.

Urban land is covered by streets, sidewalks, parking lots, buildings, and other structures that so obscure the soils that identification of the soil series is not feasible.

Udorthents are nearly level areas of extremely stony fill material. Typically, the fill material is light gray and white extremely stony loam about 55 inches thick. Below this is hard, porous limestone bedrock. These soils are intricately mixed with areas of Urban land.

Of minor extent in this association are Basinger, Biscayne, Cardsound, Dade, Demory, Hallandale, Krome, Margate, Opalocka, Pennsuco, Perrine, Plantation, St. Augustine, and Terra Ceia soils and Rock outcrop.

Almost all of this association is used for urban or recreational development. Farming is of no importance because of the extensive urban development. Wetness is a limitation affecting most nonfarm uses. Established drainage systems and additions of fill material have helped to overcome this limitation. Udorthents that overlie organic material are severely limited as sites for roads and buildings. The organic material is compressible and cannot support heavy loads. This limitation can be overcome by replacing the organic material with stable fill material or by constructing foundations on pilings.

Soils of the Freshwater and Sawgrass Marsh

These soils are nearly level and are somewhat poorly drained to very poorly drained. They are organic soils that are shallow to deep over limestone bedrock and soils that consist of marl and are very shallow to deep over oolitic limestone bedrock.

2. Lauderhill-Dania-Pahokee Association

Nearly level, very poorly drained soils consisting of organic material that is 8 to more than 51 inches deep over limestone bedrock

This association consists of shallow to deep, organic soils in sawgrass and freshwater marshes and ponds. These soils extend west from the Atlantic Coastal Ridge into the Everglades.

The native vegetation is sawgrass, willows, and cattails. Melaleuca trees have invaded many areas.

This association makes up about 17 percent of the survey area. It is about 41 percent Lauderhill soils, 34 percent Dania soils, 22 percent Pahokee soils, and 3 percent soils of minor extent.

Typically, Lauderhill soils are black and very dark brown muck to a depth of about 30 inches. They are underlain by hard, porous limestone bedrock.

Typically, Dania soils are black muck to a depth of about 15 inches. They are underlain by soft, porous limestone bedrock.

Typically, Pahokee soils are black and very dark brown muck to a depth of about 46 inches. They are underlain by hard, porous limestone bedrock.

Of minor extent in this association are Tamiami, Biscayne, and Perrine soils.

Most areas of this association support native vegetation and are used for wildlife habitat. Some areas are used for urban development.

3. Rock Outcrop-Biscayne-Chekika Association

Areas of limestone outcrop and nearly level, poorly drained, very poorly drained, and somewhat poorly drained soils that have been mechanically scarified in places and are 1 to 10 inches deep over limestone bedrock

This association consists mainly of outcrops of Miami oolitic limestone and Biscayne and Chekika soils. Chekika soils formed through scarification of the oolitic limestone outcrops and the loamy residuum that partially covers the limestone and fills the many cavities or solution holes. They are in transitional areas between the Miami Ridge and soils that consist of marl. Biscayne soils formed through the precipitation of calcium carbonates by algae. In some areas the outcrops of oolitic limestone have very jagged pinnacles extending as much as 12 inches above the surface.

The native vegetation on the Chekika soils, which consisted of sawgrass, gulf muhly, sedges, scattered south Florida slash pine, and saw palmetto, was removed prior to rock-plowing. The native vegetation on the Biscayne soils is sawgrass, cattails, sedges, scattered saw palmetto, and willows.

This association makes up about 15 percent of the survey area. It is about 39 percent Rock outcrop, 25 percent Biscayne soils, 18 percent Chekika soils, and 18 percent soils of minor extent.

Biscayne soils are poorly drained or very poorly drained. Typically, the surface layer is about 5 inches of gray marl that has a texture of silt loam. Below this is gray and light gray marl. Hard, porous limestone is at a depth of about 15 inches.

Chekika soils are somewhat poorly drained. Typically, the surface layer is dark grayish brown very gravelly loam about 5 inches thick. Below this is hard, porous limestone bedrock.

Of minor extent in this association are Dania, Krome, Lauderhill, Matecumbe, Opalocka, and Vizcaya soils.

Most areas of this association are used as wildlife habitat. Some areas are used for crops, such as malanga, corn, and beans, or for citrus or mango groves.

4. Perrine-Biscayne-Pennsuco Association

Nearly level, poorly drained and very poorly drained soils consisting of marl that is 8 to more than 80 inches deep over hard limestone bedrock

This association consists of very shallow to deep soils that consist of marl. These soils are on low coastal plains to the south and southeast of the Atlantic Coastal Ridge, adjacent to Biscayne Bay, and in transverse glades.

The natural vegetation consists of sawgrass, whitetop sedge, yellowtop, goldenrod, gulfdune paspalum, broom sedge, glades lobelia, dogfennel, gulf muhly, bluejoint panicum, bushy beard bluestem, and south Florida bluestem.

This association makes up about 17 percent of the survey area. It is about 45 percent Perrine soils, 38 percent Biscayne soils, 10 percent Pennsuco soils, and 7 percent soils of minor extent.

Perrine soils are poorly drained or very poorly drained. Typically, the surface layer is about 11 inches of grayish brown marl that has a texture of silt loam. The next 15 inches is light brownish gray and light gray marl that has a texture of silt loam. Soft limestone bedrock is at a depth of about 26 inches.

Biscayne soils are poorly drained or very poorly drained. Typically, the surface layer is about 5 inches of gray marl that has a texture of silt loam. The next 10 inches is gray and light gray marl that has a texture of silt loam. Hard limestone bedrock is at a depth of about 15 inches.

Pennsuco soils are poorly drained or very poorly drained. Typically, the surface layer is about 8 inches of dark grayish brown marl that has a texture of silt loam. The underlying material extends to a depth of about 44 inches. It is marl that has a texture of silt loam. It is grayish brown in the upper 19 inches and dark gray in the lower 17 inches. Soft limestone bedrock is at a depth of about 44 inches.

Of minor extent in this association are Dania, Lauderhill, and Pahokee soils.

Most areas of this association support natural vegetation. Some areas are used for urban development. Some are used for potatoes, sweet corn, malanga, or ornamental nursery plants.

Soils of the Miami Ridge

These soils are nearly level and gently sloping and are moderately well drained. They formed through mechanical scarification or rock-plowing. They are very shallow over oolitic limestone bedrock.

5. Krome Association

Nearly level and gently sloping, moderately well drained soils that have been mechanically scarified or rock-plowed and are 3 to 9 inches deep over limestone bedrock

This association consists of very shallow, gravelly, mineral soils on the Miami Ridge. They formed through scarification of oolitic limestone outcrops and the loamy residuum or sandy overwash that partially covers the limestone and fills the many cavities or solution holes.

The native vegetation, which consisted of south Florida slash pine, saw palmetto, and various shrubs and grasses, was removed prior to rock-plowing.

This association makes up about 12 percent of the survey area. It is about 81 percent Krome soils and 19 percent soils of minor extent.

Typically, the surface layer of the Krome soils is dark brown very gravelly loam about 7 inches thick. Below this is hard, porous limestone bedrock.

Of minor extent in this association are Matecumbe and Opalocka soils, Rock outcrop, Urban land, and Udorthents.

Most areas of this association are planted to row crops, such as tomatoes, beans, and squash. Some areas are used for urban development. Some are used for avocado, mango, or citrus groves.

Soils of the Tidal Swamps

These soils are nearly level and are poorly drained or very poorly drained. They consist of marl that is deep or very deep over limestone or of deep or very deep muck.

6. Perrine-Terra Ceia-Pennsuco Association

Nearly level, poorly drained and very poorly drained soils consisting of marl that is 40 to 80 inches deep over limestone or of organic material that is more than 51 inches thick

This association consists of nearly level soils in mangrove swamps that are inundated daily by high tides. It generally is in the southeastern part of the survey area, in a narrow band adjoining Biscayne Bay.

The natural vegetation in areas of this association consists of red, black, and white mangrove.

This association makes up about 4.1 percent of the survey area. It is about 34 percent Perrine soils, 30 percent Terra Ceia soils, 14 percent Pennsuco soils, and 22 percent soils of minor extent.

Perrine soils are poorly drained or very poorly drained. Salt water inundates most areas of these soils at high tide. The soils are farther from the coast than the Terra Ceia soils and in areas between the small streams that drain into Biscayne Bay. They dominantly support stunted red mangrove. Typically, the surface layer is about 12 inches of dark brown marl that has a texture of silt loam. The next 14 inches is dark gray marl that has a texture of silt loam. Soft limestone bedrock is at a depth of about 26 inches.

Terra Ceia soils are very poorly drained. Salt water inundates most areas of these soils at high tide. The soils are closer to the coast than the other major soils and in areas along small streams that drain into Biscayne Bay. They dominantly support large red mangrove. Typically, they are very dark brown and black muck to a depth of about 80 inches.

Pennsuco soils are poorly drained or very poorly drained. Salt water inundates most areas of these soils at high tide. The soils are farther from the coast than the Terra Ceia soils and in areas between the small streams that drain into Biscayne Bay. They dominantly support stunted red mangrove. Typically, they consist of about 51 inches of light gray marl that has a texture of silt loam. Below this is soft limestone bedrock.

Of minor extent in this association are soils consisting of muck that is less than 51 inches deep over limestone bedrock.

Most areas of this association support natural vegetation.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "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 number identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

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

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

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, 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. Biscayne-Rock outcrop complex is an example.

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

This survey includes *miscellaneous areas*. 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 2 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.

2—Biscayne gravelly marl, drained. This very shallow, nearly level, poorly drained soil is on broad, low flats, in sloughs, and in transverse glades that extend from the Pineland Ridge. Individual areas are irregularly shaped or rectangular and range from 6 to 100 acres in size. Slopes are smooth or concave and are less than 2 percent.

On 95 percent of the acreage mapped as Biscayne gravelly marl, drained, Biscayne and similar soils make up 78 to 99 percent of the mapped areas.

Typically, the surface layer is about 7 inches of dark gray gravelly marl that has a texture of silt loam. It is underlain by hard, porous limestone having less than 20 percent solution holes that are 4 to 12 inches deep and 6 to 18 inches wide and contain very dark grayish brown silty clay. The content of limestone fragments is mainly 15 to 25 percent, by volume, but ranges to as much as 35 percent. The fragments range from 2 millimeters to 7.5 centimeters in diameter.

Included in mapping are soils that are similar to Biscayne gravelly marl, drained, but have less than 15 or more than 35 percent gravel, by volume, are ponded and may have a continuous layer or layers of organic material that are more than 8 inches thick but make up less than half of the total soil depth, or have limestone bedrock at a depth of 20 to 40 inches.

Dissimilar soils that are included with this soil in mapping occur as small areas of Chekika and Pennsuco soils. Also included are areas of rock outcrop. Dissimilar inclusions make up 1 to 22 percent of most mapped areas. Chekika soils are somewhat poorly drained and are in the higher positions on the landscape. Pennsuco soils are on broad, low coastal flats. They are deep or very deep.

The water table in the Biscayne soil remains within 10 inches of the surface for 2 to 4 months during most years, receding to as deep as 36 inches during dry periods. Permeability is moderate.

All areas have been drained, rock-plowed or mechanically scarified, and cultivated at some time in the past. The natural vegetation no longer remains. Abandoned fields rapidly become overgrown with thick stands of Brazilian pepper, leatherleaf fern, and a variety of shrubs, broadleaf weeds, and grasses.

In most areas a water-control system has been installed. If the water-control system is properly maintained, this soil is well suited to a variety of shallow-rooted cultivated crops. Much of the cultivated acreage is used for corn, snap beans, potatoes, malanga, or bananas. Land grading and smoothing fill in the small depressions that are common in areas of this soil and thus generally permit more efficient use of farm equipment and more uniform application of irrigation water. Yearly rock-plowing may be necessary to incorporate some of the finer textured soil material in solution holes. Bedding is necessary if root crops are grown. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth. Disking during wet periods normally results in cloddiness. Important management practices include preparing a good seedbed and applying fertilizer according to the results of soil tests and the needs of the crop. Because of a high pH, some micronutrients may not be available to certain crops. Boron toxicity may affect some crops.

This soil is poorly suited to the production of ornamental trees and shrubs for nursery stock because of the depth to bedrock. It is poorly suited to the production of citrus and mangos because of the wetness. It is unsuited to the production of avocados.

This soil is suited to pasture. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed. Regular applications of fertilizer are needed. Irrigation is needed during dry periods. Controlled grazing helps to prevent overgrazing and maintains plant vigor. Deferred grazing during wet periods helps to prevent compaction of the soil.

This soil is not used as rangeland or forest land. It is in the Sawgrass Marsh and Freshwater Marsh ecological plant communities.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the wetness and the depth to bedrock. Additional drainage measures and large amounts of suitable fill material are needed.

The capability subclass is IIIw.

3—Lauderhill muck, depressional. This moderately deep, nearly level, very poorly drained soil is in narrow drainageways and broad open areas within sawgrass marshes. It is ponded for 9 to 12 months in most years. Individual areas are long and narrow or broad and irregularly shaped and range from 10 to several thousand acres in size. Slopes are smooth or concave and are less than 2 percent.

On 95 percent of the acreage mapped as Lauderhill muck, depressional, Lauderhill and similar soils make up 98 to 99 percent of the mapped areas.

Typically, the soil is muck to a depth of about 30 inches. The upper 7 inches is black, and the lower 23 inches is very dark brown. Hard, porous, oolitic limestone bedrock is at a depth of about 30 inches.

Included in mapping are soils that are similar to Lauderhill muck, depressional, but are more than 36 or less than 20 inches deep over limestone bedrock, may be saline because of a close proximity to the coast, or have continuous layers of marl more than 4 inches thick.

Dissimilar soils that are included with this soil in mapping occur as small areas of Biscayne, Matecumbe, Pennsuco, and Perrine soils. Dissimilar soils make up 2 percent or less of most mapped areas. Biscayne and Perrine soils are in positions on the landscape similar to those of the Lauderhill soil. They are made up of marl. Biscayne soils are shallow over bedrock, and Perrine soils are moderately deep over limestone bedrock. Matecumbe soils are in the higher positions on the landscape and are moderately well drained. Pennsuco soils are in the slightly higher positions on the landscape. They are made up of marl and are deep or very deep over limestone bedrock.

Under natural conditions, the Lauderhill soil is ponded for 9 to 12 months during most years. The water table is within 10 inches of the surface for the rest of the year. Permeability is rapid. If drained, the organic material initially shrinks to about half the original thickness and then subsides further as a result of compaction and oxidation. These losses are most rapid during the first 2 years. If drained, the soil continues to subside at a rate of about 1 inch per year. The lower the water table, the more rapid the loss.

Most areas support natural vegetation, which consists of cattail and sawgrass. Areas that have been drained or disturbed, however, may be dominated by Brazilian pepper and melaleuca. Areas of this soil provide cover for deer and excellent habitat for wading birds and other kinds of wetland wildlife.

Under natural conditions, this soil generally is not suited to cultivation. If water is controlled through a system of dikes, ditches, and pumps, however, the soil is well suited to most winter vegetable crops. A well designed and maintained water-control system can remove excess water during periods when crops are growing on the soil and can keep the soil saturated at all other times. Keeping the soil saturated minimizes oxidation. Important management practices include good seedbed preparation and a suitable crop rotation. Cover crops and crop residue should be left on the surface or plowed under. Fertilizer should be applied according to the needs of the crop.

This soil is not suited to the production of citrus, avocados, or pine trees because of the wetness.

This soil is not used as rangeland. It is in the Freshwater Marsh ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the ponding, excess humus, subsidence, low strength, and the depth to bedrock. Water-control measures are needed to prevent ponding. The organic material should be removed, and suitable backfill material should be provided. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

4—Pennsuco marl, drained. This deep, nearly level, poorly drained soil is on broad, low coastal flats and in transverse glades. Individual areas are broad and irregularly shaped and range from 10 to 350 acres in size. Slopes are smooth or concave and are less than 1 percent.

On 95 percent of the acreage mapped as Pennsuco marl, drained, Pennsuco and similar soils make up 87 to 99 percent of the mapped areas.

Typically, the surface layer is about 8 inches of dark grayish brown marl that has a texture of silt loam. The underlying material extends to a depth of about 44 inches. It is marl that has a texture of silt loam. It is grayish brown in the upper 19 inches and dark gray in the lower 17 inches. Common very pale brown, soft accumulations of calcium carbonate are between depths of 8 and 44 inches. Common very dark gray pockets and vertical streaks are below a depth of about 27 inches. Soft, porous limestone bedrock is at a depth of about 44 inches.

Included in mapping are soils that are similar to Pennsuco marl, drained, but have limestone bedrock at a depth of less than 40 or more than 80 inches or are ponded and in the upper 40 inches may have continuous layers of muck that are more than 8 inches thick.

Dissimilar soils that are included with this soil in mapping occur as small areas of Biscayne and Lauderhill soils and small areas of Udorthents. Dissimilar soils make up 1 to 13 percent of most mapped areas. Biscayne soils are in positions on the landscape similar to those of the Pennsuco soil. They are shallow or very shallow over limestone bedrock. Lauderhill soils are in the lower positions on the landscape. They have an organic surface layer. Udorthents are in the slightly higher areas of mineral fill material.

During most years the water table in the Pennsuco soil remains within a depth of 10 inches for 2 to 4 months and is at a depth of 10 to 40 inches for the rest of the year. Permeability is moderately slow.

All areas have been drained and cultivated at some time in the past. The native vegetation no longer remains. Abandoned fields quickly become overgrown with thick stands of Brazilian pepper, Australian pine, leatherleaf fern, and a variety of shrubs, broadleaf weeds, sedges, and grasses.

A water-control system has been installed in most areas. If the water-control system is properly maintained, this soil is well suited to a variety of cultivated vegetable and grain crops. Much of the cultivated acreage is used for corn, potatoes, snap beans, sorghum (fig. 4), malanga, or ornamental trees and shrubs. Land grading and smoothing fill in the small depressions that are common in areas of this soil and thus improve surface drainage and permit more efficient use of farm equipment and more uniform application of irrigation water. Bedding generally is necessary if ornamental plants or root crops are grown. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth and increases the rate of water intake. Prolonged cultivation with heavy equipment can result in the formation of a tillage pan. Subsoiling during dry periods helps to break up the pan and thus permits deeper root penetration. Disking during wet periods often results in cloddiness. Important management practices include preparing a good seedbed, applying fertilizer according to the results of soil tests and the needs of the crop, and controlling weeds and brush. Because of a high pH, some micronutrients may not be available to certain crops. Boron toxicity may affect some crops.

Figure 4.—Sorghum in an area of Pennsuco marl, drained.

This soil is poorly suited to the production of citrus and mangos because of the wetness. It is unsuited to the production of avocados.

This soil is suited to pasture. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed. Regular applications of fertilizer are needed. Irrigation is needed during dry periods. Controlled grazing helps to prevent overgrazing and maintains plant vigor. Deferred grazing during wet periods helps to prevent compaction of the soil.

This soil generally is not used as rangeland or forest land. Under natural conditions, it is in the Freshwater Marsh and Sawgrass Marsh ecological plant communities.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the wetness and the depth to bedrock. Additional drainage measures and large amounts of suitable fill material generally are needed to overcome these limitations.

The capability subclass is IIIw.

5—Pennsuco marl. This deep, nearly level, very poorly drained soil is in broad, low coastal marshes and sloughs and in small depressional areas. Individual areas are broad and irregularly shaped and range from 6 to 200 acres in size. Slopes are smooth or concave and are less than 1 percent.

On 95 percent of the acreage mapped as Pennsuco marl, Pennsuco and similar soils make up 99 percent of the mapped areas.

Typically, the surface layer is about 4 inches of light brownish gray marl that has a texture of silt loam and has common black streaks in old root channels. The underlying material, to a depth of about 46 inches, is light gray marl that has a texture of silt loam and has a few black streaks. The soil has common whole snail shells and shell fragments that are sand sized to 1 inch in diameter. Soft, porous limestone bedrock is at a depth of about 46 inches.

Included in mapping are soils that are similar to Pennsuco marl but have limestone bedrock at a depth of less than 40 or more than 80 inches, in the upper 40 inches may have continuous layers of muck that are more than 8 inches thick, or have been drained.

Dissimilar soils that are included with this soil in mapping occur as small areas of Biscayne, Lauderhill, Pahokee, and Tamiami soils and small areas of Udorthents. Dissimilar soils make up about 1 percent of most mapped areas. Biscayne soils are in positions on the landscape similar to those of the Pennsuco soil. They are shallow or very shallow over limestone bedrock. Lauderhill, Pahokee, and Tamiami soils are in the lower positions on the landscape. They have an organic surface layer.

The water table in the Pennsuco soil remains within a depth of 6 inches for 2 to 4 months during most years and is at a depth of 10 to 30 inches for most of the rest of the year. Permeability is moderately slow.

All areas have been cleared, drained, and cultivated at some time in the past. The native vegetation no longer remains. Abandoned fields quickly become overgrown with thick stands of Brazilian pepper, Australian pine, leatherleaf fern, and a variety of shrubs, broadleaf weeds, ferns, and grasses.

A water-control system has been installed in most areas. If the water-control system is properly maintained, this soil is well suited to a variety of cultivated vegetable and grain crops. Much of the cultivated acreage is used for corn, potatoes, snap beans, sorghum, malanga, or ornamental trees and shrubs. Land grading and smoothing fill in the small depressions that are common in areas of this soil and thus improve surface drainage and permit more efficient use of farm equipment and more uniform application of irrigation water. Bedding generally is necessary if ornamental plants or root crops are grown. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth and increases the rate of water intake. Prolonged cultivation with heavy equipment can result in the formation of a tillage pan. Subsoiling during dry periods helps to break up the pan and thus permits deeper root penetration. Disking during wet periods often results in cloddiness. Important management practices include good seedbed preparation.

This soil generally is not used as rangeland or forest land. It is in the Freshwater Marsh and Sawgrass Marsh ecological plant communities.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the ponding. Extensive water-control measures and large amounts of suitable fill material are needed to overcome this limitation.

The capability subclass is IIIw.

6—Perrine marl, drained. This moderately deep, nearly level, poorly drained soil is on broad, low coastal flats and in transverse glades. Individual areas are broad and irregularly shaped and range from 6 to 3,000 acres in size. Slopes are smooth or concave and are less than 1 percent.

On 95 percent of the acreage mapped as Perrine marl, drained, Perrine and similar soils make up 98 to 99 percent of the mapped areas.

Typically, the surface layer is about 10 inches of grayish brown marl that has a texture of silt loam. The underlying layer, to a depth of about 26 inches, is light brownish gray marl that has a texture of silt loam. Few to many light gray, soft accumulations of calcium carbonate and few grayish brown stains are in pockets or around pores and root channels between depths of 11 and 26 inches. Soft, porous limestone bedrock is at a depth of about 26 inches.

Included in mapping are soils that are similar to Perrine marl, drained, but have limestone bedrock at a depth of less than 20 or more than 40 inches or are ponded and may have continuous layers of muck more than 8 inches thick.

Dissimilar soils that are included with this soil in mapping occur as small areas of Lauderhill soils and small areas of Udorthents. Dissimilar soils make up about 1 percent of most mapped areas. Lauderhill soils are in the lower positions on the landscape. They have an organic surface layer. Udorthents are in the slightly higher areas of mineral fill material.

Under natural conditions, the Perrine soil has water above the surface for 1 to 3 months during most years. During most years the water table remains within 10 inches of the surface for 2 to 4 months and is at a depth of 10 to 30 inches for most of the rest of the year. Permeability is moderately slow.

All areas have been cleared, drained, and cultivated at some time in the past. The native vegetation no longer remains. Abandoned fields quickly become overgrown with thick stands of Brazilian pepper, Australian pine, leatherleaf fern, and a variety of shrubs, broadleaf weeds, ferns, and grasses.

A water-control system has been installed in most areas. If the water-control system is properly maintained, this soil is well suited to a variety of cultivated vegetable and grain crops. Much of the cultivated acreage is used for corn, potatoes, snap beans, sorghum, malanga, or ornamental trees and shrubs. Land grading and smoothing fill in the small depressions that are common in areas of this soil and thus improve surface drainage and permit more efficient use of farm equipment and more uniform application of irrigation water. Bedding generally is necessary if ornamental plants or root crops are grown. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth and increases the rate of water intake. Prolonged cultivation with heavy equipment can result in the formation of a tillage pan. Subsoiling during dry periods helps to break up the pan and thus permits deeper root penetration. Disking during wet periods often results in cloddiness. Important management practices include preparing a good seedbed, applying fertilizer according to the results of soil tests and the needs of the crop, and controlling weeds and brush. Because of a high pH, some micronutrients may not be available to certain crops. Boron toxicity may affect some crops.

This soil is suited to pasture. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed. Regular applications of fertilizer are needed. Irrigation is needed during dry periods. Controlled grazing helps to prevent overgrazing and maintains plant vigor. Deferred grazing during wet periods helps to prevent compaction of the soil.

This soil is poorly suited to the production of citrus and mangos because of the wetness. It is unsuited to the production of avocados.

This soil generally is not used as rangeland or forest land. Under natural conditions, it is in the Sawgrass Marsh and Freshwater Marsh ecological plant communities.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the wetness and the depth to bedrock. Additional drainage measures and large amounts of suitable fill material generally are needed to overcome these limitations.

The capability subclass is IIIw.

7—Krome very gravelly loam. This very shallow, nearly level, moderately well drained soil is on broad, very low hills on the Miami Ridge. Individual areas are broad and irregularly shaped and range from 6 to 100 acres in size. Slopes are smooth and range from 0 to 2 percent.

On 95 percent of the acreage mapped as Krome very gravelly loam, Krome and similar soils make up 98 to 99 percent of the mapped areas.

Typically, the soil is dark brown very gravelly loam about 7 inches thick. Hard, porous limestone bedrock is at a depth of about 7 inches. Solution holes in the limestone extend to a depth of about 10 inches. They contain silty clay loam or silty clay.

Included in mapping are soils that are similar to the Krome soil but contain more than 60 percent or less than 35 percent gravel or have slopes of as much as 5 percent. Also included are some areas in groves where as much as 2 inches of accumulated leaf litter is on the surface.

Dissimilar soils that are included with this soil in mapping occur as small areas of Biscayne, Chekika, Cardsound, and Matecumbe soils. Also included are areas of rock outcrop. Dissimilar inclusions make up 2 percent or less of most mapped areas. Biscayne soils are in the lower positions on the landscape. They have a surface layer of marl. Chekika, Cardsound, and Matecumbe soils are in positions on the landscape similar to those of the Krome soil. They do not have a gravelly surface layer.

The water table in areas of the Krome soil is within the limestone bedrock. It is at a depth of 40 to 60 inches in most years. Permeability is moderate.

All areas have been rock-plowed or mechanically scarified and cultivated at some time in the past. The natural vegetation no longer remains. This soil is suitable for a wide variety of fruit and vegetable crops, but special management is needed. This management includes yearly rock-plowing, bedding, regularly adding fertilizer, and irrigating during the winter growing season. Because of a favorable climate, the water available for irrigation, and the demand by northern markets, this high level of management is practical.

This soil is suitable for the production of fruit and citrus, but this production requires trenching, drilling, or blasting into the limestone. Regular applications of fertilizer and irrigation water also are needed.

This soil is suited to pasture. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed. Regular applications of fertilizer are needed. Irrigation is needed during dry periods. Controlled grazing helps to prevent overgrazing and maintains plant vigor.

This soil generally is not used as rangeland or forest land. It is in the Everglades Flatwoods ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the depth to bedrock and small stones. Local construction methods generally can overcome these limitations. The soil commonly is used for urban development.

The capability subclass is Vs.

9—Udorthents-water complex. This map unit consists of Udorthents and open bodies of water. The Udorthents are very shallow to deep over limestone bedrock. They consist of unconsolidated or heterogeneous geologic material removed during the excavation of ditches, canals, lakes, ponds, and quarries. The material commonly is piled along banks or in scattered areas. Slopes are 15 to 60 percent. About 65 percent of this map unit is Udorthents, and about 20 percent is water. Included in this map unit are small areas of a Udorthents-Urban land complex, which makes up less than 15 percent of any one area.

Typically, the Udorthents consist of mixed light gray and white limestone gravel and loamy carbonatic material, which extend to a depth of 80 inches or more.

The water table in areas of the Udorthents is within the limestone bedrock. Permeability is moderate.

Weeds and native grasses have become established in some areas. Other areas support little or no vegetation.

This map unit is not used as cropland. In many areas it is used as a source of road-building material and as a source of fill for new homesites, golf courses, and other purposes.

No capability classification is assigned.

10—Udorthents, limestone substratum-Urban land complex. About 40 to 70 percent of this map unit consists of Udorthents in open areas, and 25 to 60 percent consists of Urban land, or areas covered by concrete and buildings. The Udorthents and Urban land occur as areas so intermixed or so small that mapping them separately is impractical. Slopes are 0 to 2 percent.

The Udorthents are in areas of lawns, vacant lots, parks, and playgrounds. The Urban land consists of streets, driveways, sidewalks, parking lots, buildings, and other structures in areas where the soil is covered and cannot be readily observed.

Typically, the Udorthents consist of fill material that is light gray and white extremely stony loam about 55 inches thick. The fill material is underlain by hard, porous limestone bedrock.

Included in this map unit are small areas of Krome and Cardsound soils and areas in which the fill material is less than 8 or more than 80 inches thick. Also included are areas where a few inches of marl is between the fill and the limestone and areas where 2 to 4 inches of marl overlies the stony fill. Included soils make up 10 percent or less of any one area. Cardsound and Krome soils are in positions on the landscape similar to those of the Udorthents. They are very shallow over limestone bedrock.

The water table in areas of the Udorthents is within the limestone bedrock. Permeability is moderate in the stony fill material.

This map unit is not used as cropland. The Udorthents consist mostly of stony limestone fragments used as fill material in low areas. The fill material improves the suitability of the low areas for building site development or other urban uses. If lawns and ornamental plants are to be established and maintained on the soils in this map unit, a layer of good topsoil about 6 inches thick is needed. Proper watering and regular applications of fertilizer also are needed.

No capability classification is assigned.

11—Udorthents, marl substratum-Urban land complex. About 40 to 70 percent of this map unit consists of Udorthents in open areas, and 25 to 60 percent consists of Urban land, or areas covered by concrete and buildings. The Udorthents consist of heterogeneous geologic material that has been excavated and spread. The Udorthents and Urban land occur as areas so intermixed or so small that mapping them separately is impractical. Slopes are 0 to 2 percent.

The Udorthents are in areas of lawns, vacant lots, parks, and playgrounds. The Urban land consists of streets, driveways, sidewalks, parking lots, buildings, and other structures in areas where the soil is covered and cannot be readily observed.

Typically, the upper 12 inches of the Udorthents is fill material that is light gray very gravelly loam. The next 29 inches is brown gravelly sandy loam. Below this to a depth of 60 inches or more is natural soil, which is predominantly marl that has a texture of silt loam. Hard, porous limestone bedrock is at a depth of 60 inches or more.

Included in this map unit are small areas in which the fill material is less than 40 or more than 80 inches thick. Also included are areas where the fill material directly overlies limestone bedrock or muck. Included soils make up 10 percent or less of any one area.

Depth to the water table in the Udorthents is dominantly more than 40 inches, but it varies, depending on the thickness of the fill material. Permeability is moderately slow or moderate in the layers of marl.

This map unit is not used as cropland. The Udorthents consist of gravelly limestone fragments used as fill material in low areas of marl. The fill material improves the suitability of the low areas for building site development or other urban uses. If lawns and ornamental plants are to be established and maintained on the soils in this map unit, a layer of good topsoil about 6 inches thick is needed. Proper watering and regular applications of fertilizer also are needed.

No capability classification is assigned.

12—Perrine marl. This moderately deep, nearly level, very poorly drained soil is in broad, low coastal marshes and sloughs and in small depressional areas. It is ponded for 9 to 12 months in most years. Individual areas are broad and irregularly shaped and range from 6 to 600 acres in size. Slopes are smooth or concave and are less than 1 percent.

On 95 percent of the acreage mapped as Perrine marl, Perrine and similar soils make up 82 to 99 percent of the mapped areas.

Typically, the surface layer is about 4 inches of grayish brown marl that has a texture of silt loam. The underlying material, to a depth of about 29 inches, is marl that has a texture of silt loam, is mottled in shades of light brownish gray and light gray, and has common or many very dark grayish brown pockets and streaks. Soft, porous limestone bedrock is at a depth of about 29 inches.

Included in mapping are soils that are similar to Perrine marl but have limestone bedrock at a depth of less than 20 or more than 40 inches and may have continuous layers of muck more than 8 inches thick.

Dissimilar soils that are included with this soil in mapping occur as small areas of Dania, Lauderhill, and Tamiami soils and small areas of Udorthents. Dissimilar soils make up 1 to 18 percent of most mapped areas. Dania, Lauderhill, and Tamiami soils are in positions on the landscape similar to those of the Perrine soil. They have an organic surface layer. Udorthents are in the slightly higher areas of mineral fill material.

The water table in the Perrine soil remains at or above the surface for 2 to 6 months in most years and is within a depth of 12 inches for the rest of the year. Permeability is moderately slow.

The natural vegetation consists of sawgrass, cattail, primrose willow, smooth cordgrass, buttonbush, boneset, gulf muhly, broom sedge, and a variety of water-tolerant weeds, ferns, grasses, and sedges. Calcium carbonate crusted periphyton covers the surface and bases of plants in many areas. Exotic tree species, including Australian pine, Brazilian pepper, and melaleuca, have become established in some areas. Areas of this soil provide excellent habitat for wading birds, aquatic reptiles, small crustaceans, and other kinds of wetland wildlife.

This soil is poorly suited to cultivated crops and the production of nursery plants because of the ponding. In areas nearest to the coast, the soil is too saline for most cultivated crops and ornamental plants. If a complete water-control system that can remove excess water rapidly were installed and carefully maintained, many areas of the soil would be well suited to a variety of cultivated crops, ornamental plants, and pasture. Bedding is needed if ornamental plants are grown. Because of a high pH, some micronutrients may not be available to certain crops. Boron toxicity may affect some crops.

This soil is unsuited to the production of citrus, mangos, and avocados because of the ponding.

This soil generally is not used as rangeland or forest land. It is in the Sawgrass Marsh and Freshwater Marsh ecological plant communities.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development, mainly because of the ponding and the depth to bedrock. Extensive water-control measures and large amounts of suitable fill material are needed to overcome these limitations.

The capability subclass is VIIw.

13—Biscayne marl. This very shallow or shallow, nearly level, very poorly drained soil is on broad, low coastal flats, in freshwater marshes and sloughs, and in small depressional areas. It is ponded for 2 to 4 months in most years. Individual areas are broad and irregularly shaped and range from 6 to 200 acres in size. Slopes are smooth or slightly concave and are less than 2 percent.

On 95 percent of the acreage mapped as Biscayne marl, Biscayne and similar soils make up 82 to 99 percent of the mapped areas.

Typically, the surface layer is about 5 inches of gray marl that has a texture of silt loam. Below this, to a depth of about 17 inches, is gray or grayish brown marl that has a texture of silt loam. Hard, porous limestone bedrock is at a depth of about 17 inches.

Included in mapping are soils that are similar to Biscayne marl but have more than 15 percent gravel, have been drained, are less than 1 inch deep over bedrock, have continuous organic layers that are more than 8 inches thick but make up less than half of the total soil depth, or are 20 to 40 inches deep over bedrock.

Dissimilar soils that are included with this soil in mapping occur as small areas of Dania, Hallandale, Lauderhill, Pennsuco, and Tamiami soils. Dissimilar soils make up 1 to 18 percent of most mapped areas. Dania, Lauderhill, and Tamiami soils are in positions on the landscape similar to those of the Biscayne soil. They have an organic surface layer. Hallandale soils are in the higher positions on the landscape. They do not have marl in the surface layer. Pennsuco soils are in the slightly higher positions on the landscape. They are deep or very deep over limestone bedrock.

The water table in the Biscayne soil remains at or above the surface for 2 to 4 months during most years, receding to as deep as 20 inches during dry periods. Permeability is moderate.

The natural vegetation consists of sawgrass, cattail, primrose willow, smooth cordgrass, buttonbush, boneset, gulf muhly, broom sedge, and a variety of water-tolerant sedges and grasses. Calcium carbonate crusted periphyton covers the surface and bases of plants in many areas. Exotic tree species, including Australian pine, Brazilian pepper, and melaleuca, have become established in some areas. Areas of this soil provide habitat for wading birds, aquatic reptiles, small crustaceans, and other kinds of wetland wildlife.

This soil is poorly suited to cultivated crops, nursery plants, and pasture because of the ponding. In areas nearest to the coast, the soil is too saline for most cultivated crops and ornamental nursery plants. If a complete water-control system, including canals and field ditches, were installed and carefully maintained, many areas of the soil would be well suited to a variety of vegetable crops, ornamental nursery plants, and pasture.

This soil is unsuited to the production of citrus, mangos, and avocados because of the ponding.

This soil is not used as rangeland or forest land. It is in the Sawgrass Marsh and Freshwater Marsh ecological plant communities.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the ponding and the depth to bedrock. Extensive water-control measures and large amounts of suitable fill material are needed to overcome these limitations.

The capability subclass is VIIw.

14—Dania muck, depressional. This shallow, nearly level, very poorly drained soil is in poorly defined drainageways and adjacent to deeper organic soils within sawgrass marshes. It is ponded for 9 to 12 months in most years. Individual areas are long and are narrow or broad. They range from 6 to 3,000 acres in size. Slopes are smooth and are less than 2 percent.

On 95 percent of the acreage mapped as Dania muck, depressional, Dania and similar soils make up 83 to 99 percent of the mapped areas.

Typically, the surface layer is black muck about 15 inches thick. Soft, porous limestone bedrock is at a depth of about 15 inches.

Included in mapping are soils that are similar to Dania muck, depressional, but have limestone bedrock at a depth of more than 20 or less than 8 inches or have a layer of periphyton or marl in the upper 1 to 8 inches.

Dissimilar soils that are included with this soil in mapping occur as small areas of Biscayne soils and small areas of Udorthents. Dissimilar soils make up 1 to 17 percent of most mapped areas. Biscayne soils are in positions on the landscape similar to those of the Dania soil. They have a surface layer of marl. Udorthents are in the slightly higher areas of mineral fill material.

Under natural conditions, the Dania soil usually is ponded throughout most of the year. The water table is within 10 inches of the surface for the rest of the year. Permeability is rapid in the organic material. Oxidation decreases the amount of organic material each year. If drained, the organic material initially shrinks to about half the original thickness and then subsides further as a result of compaction and oxidation. These losses are most rapid during the first 2 years. The lower the water table, the more rapid the loss. The marl does not subside.

Most areas support native vegetation, which consists of sawgrass and cattail. Melaleuca trees have invaded some areas. Areas of this soil provide cover for deer and excellent habitat for wading birds and other kinds of wetland wildlife.

Under natural conditions, this soil generally is not suited to cultivation. If water is controlled through a system of dikes, ditches, and pumps, however, the soil is well suited to most winter vegetable crops. A well designed and maintained water-control system can remove excess water during periods when crops are growing on the soil and can keep the soil saturated at all other times. Keeping the soil saturated minimizes oxidation. Cover crops and crop residue should be left on the surface or plowed under. Fertilizer should be applied according to the needs of the crop. In some areas the soil is used as improved pasture. Improved bahiagrass and pangolagrass are suitable.

This soil is not suited to the production of citrus, mangos, or avocados because of the wetness.

This soil is not used as native rangeland or forest land. It is in the Sawgrass Marsh ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the ponding, excess humus, low strength, and the depth to bedrock. Water-control measures are needed to prevent ponding. The organic material should be removed, and suitable backfill material should be provided. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

15—Urban land. This map unit is in areas where more than 85 percent of the surface is covered by shopping centers, parking lots, streets, sidewalks, airports, large buildings, houses, and other structures. The natural soil cannot be observed. The soils in open areas, mostly lawns, vacant lots, playgrounds, and parks, are mainly Udorthents. These soils generally have been altered by land grading and shaping or have been covered with about 18 inches of extremely stony, loamy fill material. Areas of these soils are so small that mapping them separately is impractical.

No capability classification is assigned.

16—Biscayne marl, drained. This very shallow or shallow, nearly level, poorly drained soil is on broad, low coastal flats and in transverse glades that extend into the Pineland Ridge. Individual areas are broad and irregularly shaped or are rectangular. They range from 6 to 3,000 acres in size. Slopes are smooth or concave and are less than 2 percent.

On 95 percent of the acreage mapped as Biscayne marl, drained, Biscayne and similar soils make up 80 to 99 percent of the mapped areas.

Typically, the surface layer is about 5 inches of gray marl that has a texture of silt loam. The underlying layer, to a depth of about 15 inches, is gray and light gray marl that has a texture of silt loam. Hard, porous limestone bedrock is at a depth of about 15 inches. It has scattered small solution holes containing very dark gray, noncalcareous mucky silt loam.

Included in mapping are soils that are similar to Biscayne marl, drained, but have more than 15 percent gravel, by volume, are ponded and may have a continuous layer or layers of organic material that are more than 8 inches thick but make up less than half of the total soil depth, or have limestone bedrock at a depth of more than 20 or less than 40 inches.

Dissimilar soils that are included with this soil in mapping occur as small areas of Chekika, Dania, Lauderhill, and Pennsuco soils. Also included are areas of rock outcrop. Dissimilar inclusions make up about 1 to 20 percent of most mapped areas. Chekika soils are in the slightly higher positions on the landscape. They have more than 35 percent gravel in the surface layer. Dania and Lauderhill soils are in the slightly lower positions on the landscape. They have an organic surface layer. Pennsuco soils are in positions on the landscape similar to those of the Biscayne soil. They are deep or very deep over limestone bedrock.

The water table in the Biscayne soil remains within 10 inches of the surface for 4 to 6 months during most years, receding to as deep as 20 inches during dry periods. Permeability is moderate.

All areas have been drained and cultivated at some time in the past. The native vegetation no longer remains. Abandoned fields quickly become overgrown with thick stands of Brazilian pepper, leatherleaf fern, and a variety of shrubs, broadleaf weeds, and grasses.

A water-control system has been installed in most areas. If the water-control system is properly maintained, this soil is well suited to a variety of shallow-rooted cultivated crops. Much of the cultivated acreage is used for corn, potatoes, snap beans, sorghum, malanga, or ornamental trees and shrubs. Land grading and smoothing fill in the small depressions that are common in areas of this soil and thus improve surface drainage and permit more efficient use of farm equipment and more uniform application of irrigation water. Bedding is necessary if ornamental plants or root crops are grown. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth and increases the rate of water intake. Prolonged cultivation with heavy equipment can result in the formation of a tillage pan. Subsoiling during dry periods helps to break up the pan and thus permits deeper root penetration. Disking during wet periods often results in cloddiness. Important management practices include preparing a good seedbed, applying fertilizer according to the results of soil tests and the needs of the crop, and controlling weeds and brush. Because of a high pH, some micronutrients may not be available to certain crops. Boron toxicity may affect some crops.

This soil is suited to pasture. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed. Regular applications of fertilizer are needed. Irrigation is needed during dry periods. Controlled grazing helps to prevent overgrazing and maintains plant vigor. Deferred grazing during wet periods helps to prevent compaction of the soil.

This soil is poorly suited to the production of citrus and mangos because of the wetness. It is unsuited to the production of avocados.

This soil generally is not used as rangeland or forest land. Under natural conditions, it is in the Freshwater Marsh and Sawgrass Marsh ecological plant communities.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the wetness and the depth to bedrock. Additional drainage measures and large amounts of suitable fill material are needed to overcome these limitations.

The capability subclass is IIIw.

18—Tamiami muck, depressional. This moderately deep or deep, nearly level, very poorly drained soil is in freshwater swamps and marshes. It is ponded for 9 to 12 months in most years. Individual areas are broad and irregularly shaped and range from 50 to 1,000 acres in size. Slopes are smooth or slightly concave and are less than 2 percent.

On 95 percent of the acreage mapped as Tamiami muck, depressional, Tamiami and similar soils make up 83 to 99 percent of the mapped areas.

Typically, the surface layer is black muck about 4 inches thick. The next 8 inches is gray marl that has a texture of silt loam. Below this, to a depth of about 31 inches, is very dark gray muck. Hard, porous limestone bedrock is at a depth of about 31 inches.

Included in mapping are soils that are similar to Tamiami muck, depressional, but have layers of marl less than 6 inches thick or consist of muck that is more than 51 inches deep over limestone.

Dissimilar soils that are included with this soil in mapping occur as small areas of Biscayne soils and areas where the layers of marl make up more than half of the total soil depth. Dissimilar soils make up 1 to 17 percent of most mapped areas. Biscayne soils are in positions on the landscape similar to those of the Tamiami soil. They consist of marl and are shallow or very shallow over limestone.

Under natural conditions, the Tamiami soil is ponded for 9 to 12 months during most years. The water table is within 10 inches of the surface for the rest of the year. Permeability is moderate. The organic layers are subject to oxidation, which decreases the amount of organic material each year. If drained, the organic material initially shrinks to about half the original thickness and then subsides further as a result of compaction and oxidation. These losses are most rapid during the first 2 years. If drained, the soil continues to subside at a rate of about 1 inch per year. The lower the water table, the more rapid the loss.

Most areas support natural vegetation, which consists of cattail, sawgrass, gulf muhly, star rush, milkwort, and sedges. Some areas that have been drained or disturbed may be dominated by Brazilian pepper and melaleuca. Areas of this soil provide cover for deer and excellent habitat for wading birds and other kinds of wetland wildlife.

Under natural conditions, this soil generally is not suited to cultivation. If water is controlled through a system of dikes, ditches, and pumps, however, the soil is well suited to most winter vegetable crops. A well designed and maintained water-control system can remove excess water during periods when crops are growing on the soil and can keep the soil saturated at all other times. Keeping the soil saturated minimizes oxidation. Important management practices include good seedbed preparation and a suitable crop rotation. Cover crops and crop residue should be left on the surface or plowed under. Fertilizer should be applied according to the needs of the crop.

This soil is not suited to the production of citrus, avocados, or pine trees because of the wetness.

This soil is not used as rangeland or forest land. It is in the Freshwater Marsh ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the ponding, excess humus, low strength, and the depth to bedrock. Water-control measures are needed to prevent ponding. The organic material should be removed, and suitable backfill material should be provided. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

20—Cardsound-Rock outcrop complex. This map unit consists of a Cardsound soil intermingled with areas of Rock outcrop. The Cardsound soil and Rock outcrop occur as areas so intermixed or so small that mapping them separately is impractical. Individual areas are irregularly shaped or rectangular and range from 5 to 100 acres in size. Slopes are smooth and range from 0 to 2 percent.

About 54 percent of this map unit is Cardsound and similar soils, and 38 percent is Rock outcrop.

Typically, the surface layer of the Cardsound soil is dark yellowish brown silty clay loam about 4 inches thick. Hard, porous limestone bedrock is at a depth of about 4 inches. It has solution holes that contain silty clay loam or silty clay.

Included in mapping are soils that are similar to the Cardsound soil but are darker or are very gravelly and loamy. Also included are areas where a mat of pine needles overlies the limestone bedrock.

Dissimilar soils that are included with the Cardsound soil in mapping occur as small areas of Matecumbe soils and small areas of Udorthents. Dissimilar soils make up less than 10 percent of most mapped areas. Matecumbe soils are in the slightly higher positions on the landscape. They have an organic surface layer. Udorthents are in the slightly higher areas of mineral fill material.

Under natural conditions, the water table in areas of the Cardsound soil is within the limestone bedrock. It is at a depth of 60 to 72 inches in most years. Permeability is moderately slow.

Under natural conditions, this map unit is not used for fruit or vegetable crops or as rangeland. It is in the Everglades Flatwoods ecological plant community.

This map unit is severely limited as a site for urban uses because of the depth to bedrock. Local construction methods generally can overcome this limitation. The map unit commonly is used for urban development.

The Cardsound soil is in capability subclass IVw.

The Rock outcrop is not assigned a capability classification.

22—Opalocka-Rock outcrop complex. This map unit consists mainly of a Opalocka soil intermingled with areas of Rock outcrop. The Opalocka soil and Rock outcrop occur as areas so intermixed or so small that mapping them separately is impractical. Individual areas range from 5 to 100 acres in size. Slopes are smooth and range from 0 to 2 percent.

On 95 percent of the acreage mapped as Opalocka-Rock outcrop complex, Opalocka and similar soils and Rock outcrop make up 98 to 99 percent of the mapped areas. About 60 percent of this map unit is Opalocka and similar soils, and 40 percent is Rock outcrop.

Typically, the surface layer of the Opalocka soil is brown sand about 6 inches thick. Hard, porous limestone bedrock is at a depth of about 6 inches. It has solution holes that contain sand. Sandy loam, sandy clay loam, or sandy clay is next to the limestone, lining the bottom and sides of some solution holes.

Dissimilar soils that are included with the Opalocka soil in mapping occur as small areas of Krome soils. These soils make up about 1 to 2 percent of most mapped areas. They are in positions on the landscape similar to those of the Opalocka soil. They have a gravelly surface layer.

Permeability is very rapid in the Opalocka soil. The water table is always within the limestone bedrock. It is at a depth of 60 to 72 inches.

Under natural conditions, this map unit is not used for fruit or vegetable crops. If cleared and rock-plowed, however, the map unit becomes Krome very gravelly loam, which commonly is used for crop production.

This map unit is not used as rangeland. It is in the Everglades Flatwoods ecological plant community.

This map unit is severely limited as a site for urban uses because of the depth to bedrock. Local construction methods generally can overcome this limitation. The map unit commonly is used for urban development.

The Opalocka soil is in capability subclass VIs. The Rock outcrop is not assigned a capability classification.

23—Chekika very gravelly loam. This very shallow, nearly level, somewhat poorly drained soil is in transitional areas between the Miami Ridge and the Everglades. Individual areas are broad and irregularly shaped and range from 6 to 100 acres in size. Slopes are smooth and range from 0 to 2 percent.

On 95 percent of the acreage mapped as Chekika very gravelly loam, Chekika and similar soils make up 77 to 99 percent of the mapped areas.

Typically, the surface layer is dark grayish brown very gravelly loam about 5 inches thick. Hard, porous limestone bedrock is at a depth of about 5 inches. Solution holes in the limestone extend to a depth of about 9 inches. They contain silt loam or silty clay loam.

Included in mapping are soils that are similar to the Chekika soil but contain less than 35 percent or more than 60 percent gravel.

Dissimilar soils that are included with this soil in mapping occur as small areas of Biscayne, Krome, Matecumbe, and Opalocka soils. Also included are areas of rock outcrop. Dissimilar inclusions make up 1 to 23 percent of most mapped areas. Biscayne soils are on low flats and are poorly drained. Krome soils are on low hills and are moderately well drained. Matecumbe soils are on hammocks. They have an organic surface layer. Opalocka soils are in the slightly higher positions on the landscape. They have a sandy surface layer.

The water table in areas of the Chekika soil is within the limestone bedrock. It is at a depth of 12 to 36 inches in most years. Permeability is moderate.

All areas have been rock-plowed and used for vegetable crops at some time in the past (fig. 5). This soil is suitable for a wide variety of fruit and vegetable crops, but special management is needed. This management includes yearly rock-plowing, bedding, regularly adding fertilizer, and irrigating during the winter growing season. Because of a favorable climate, the water available for irrigation, and the demand by northern markets, this high level of management is practical.

This soil is suitable for the production of fruit and citrus, but this production requires trenching, drilling, or blasting into the limestone. Regular applications of fertilizer and irrigation water also are needed.

This soil is suited to pasture. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed. Regular applications of fertilizer are needed. Irrigation is needed during dry periods. Controlled grazing helps to maintain plant vigor.

This soil is not used as rangeland or forest land. It is in the Everglades Flatwoods ecological plant community.

This soil is severely limited as a site for urban uses because of the depth to bedrock and the wetness. Water-control measures are needed to prevent excessive wetness. Mounding may be needed on sites for septic tank absorption fields and buildings.

The capability subclass is IIIw.

24—Matecumbe muck. This very shallow, moderately well drained soil is on small tropical hardwood hammocks on the Miami Ridge and in the Everglades. It is occasionally flooded. Individual areas range from 5 to 40 acres in size. Slopes are smooth or

Figure 5.—Rock-plowing in an area of Chekika very gravelly loam. This measure helps to prepare the soil for planting.

slightly convex and are less than 2 percent.

On 80 percent of the acreage mapped as Matecumbe muck, Matecumbe and similar soils make up 80 to 100 percent of the mapped areas.

Typically, the surface layer is a thin bed of leaf litter, twigs, and branches in varying stages of decomposition. Soft limestone bedrock is at a depth of about 3 inches. Solution holes in the limestone extend to a depth of about 40 inches. They contain silty clay loam, silty clay, or muck. Sinkholes vary in size and depth.

Dissimilar soils that are included with this soil in mapping occur as small areas of Cardsound and Lauderhill soils. Also included are areas of rock outcrop. Dissimilar inclusions make up 20 percent or less of most mapped areas. Cardsound soils are in the slightly higher positions on the landscape and are well drained. Lauderhill soils are in the lower positions on the landscape. They are moderately deep over limestone bedrock.

The water table in areas of the Matecumbe soil is within the limestone bedrock. It is at a depth of 18 to 36 inches in most years. Permeability is rapid.

This soil is not suited to pasture, vegetable crops, or the production of fruit or citrus because of the depth to bedrock. Clearing and rock-plowing cause rapid depletion of this shallow, organic soil. If the soil is cleared and rock-plowed, it generally is included in the surrounding map unit.

This soil is not used as rangeland. It is in the Tropical Hammocks ecological plant community.

This soil is well suited to wildlife habitat. It provides habitat for many endangered and threatened species.

This soil is severely limited as a site for urban uses because of the depth to bedrock.

The capability subclass is VIIs.

25—Biscayne-Rock outcrop complex. This map unit consists mainly of Biscayne marl intermingled with areas of Rock outcrop. The Biscayne soil and Rock outcrop occur as areas so intermixed or so small that mapping them separately is impractical. Individual areas are broad and irregularly shaped and range from 6 to 500 acres in size. Slopes are smooth and are less than 2 percent.

On 95 percent of the acreage mapped as Biscayne-Rock outcrop complex, Biscayne and similar soils and Rock outcrop make up 86 to 97 percent of the mapped areas. About 55 percent of this map unit is Biscayne and similar soils, and 42 percent is Rock outcrop.

Typically, the surface layer of the Biscayne soil is about 4 inches of grayish brown marl that has a texture of silt loam. Hard, porous limestone bedrock is at a depth of about 4 inches. It has solution holes that contain silty clay or clay.

Included in mapping are soils that are similar to the Biscayne soil but are gravelly.

Dissimilar soils that are included with the Biscayne soil in mapping occur as small areas of Chekika, Dania, and Krome soils. Dissimilar soils make up 3 to 14 percent of most mapped areas. Chekika and Krome soils have coarse fragments in the surface layer. Chekika soils are in the higher positions on the landscape. Krome soils are moderately well drained. Dania soils are in concave areas. They are organic.

The water table in the Biscayne soil is below the surface for the majority of most years, but the soil can be briefly ponded during extremely wet periods. Permeability is moderate.

Most areas support natural vegetation, which consists of scattered cabbage-palm and melaleuca. The understory includes South Florida bluestem, sawgrass, gulf muhly, boneset, milkwort, Carolina willow, and various water-tolerant grasses. Dense stands of natural vegetation are in rock cavities or solution holes.

Under natural conditions, this map unit is not used for fruit or vegetable crops, ornamental plants, or pasture. If rock-plowed, the map unit becomes either Biscayne gravelly marl or Chekika very gravelly loam, depending on the depth to limestone bedrock and the amount and type of material incorporated from the solution holes.

This map unit is not used as rangeland or forest land. It is in the Freshwater Marsh ecological plant community.

This map unit is severely limited as a site for urban uses and recreational development because of the wetness and the depth to bedrock. Additional drainage measures and large amounts of suitable fill material are needed to overcome these limitations.

The Biscayne soil is in capability subclass IVw. The Rock outcrop is not assigned a capability classification.

26—Perrine marl, tidal. This moderately deep, nearly level, very poorly drained soil is in tidal mangrove swamps near the coast in southeastern Florida and is subject to tidal flooding. Individual areas range from 6 to 100 acres in size. Slopes are smooth or concave and are less than 1 percent.

On 95 percent of the acreage mapped as Perrine marl, tidal, Perrine and similar soils make up 82 to 99 percent of the mapped areas.

Typically, the surface layer is about 12 inches of dark brown marl that has a texture of silt loam. Below this, to a depth of about 26 inches, is dark gray marl that has a texture of silt loam. Soft, porous limestone bedrock is at a depth of about 26 inches.

Included in mapping are soils that are similar to Perrine marl, tidal, but have limestone bedrock at a depth of more than 40 inches or are nonsaline and in the upper 40 inches may have layers of organic material that are more than 8 inches thick.

Dissimilar soils that are included with this soil in mapping occur as small areas of Lauderhill and Terra Ceia soils and small areas of organic soils having layers of marl that are more than 4 inches thick but make up less than half of the total soil depth. Dissimilar soils make up 1 to 18 percent of most mapped areas. Lauderhill soils are in shallow depressions. They are organic. Terra Ceia soils are in positions on the landscape similar to those of the Perrine soil. They are organic to a depth of more than 51 inches.

Under natural conditions, the Perrine soil remains saturated and the water table fluctuates with the tides. The soil is moderately saline or saline. Permeability is moderately slow.

The natural vegetation consists of scattered and stunted red mangrove. Areas of this soil provide excellent habitat for birds and small marine crustaceans.

Because of tidal flooding and salinity, this soil is not suited to cropland, groves, or improved pasture.

This soil generally is not used as rangeland. It is in the Mangrove Swamp ecological plant community.

This soil is severely limited as a site for all urban uses because of the tidal flooding, the depth to bedrock, and the wetness.

This soil is in mangrove swamps, which are unique and biologically productive areas that are very important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds. Mangrove swamps along coastal areas and in estuaries also serve as protective barriers against excessive wave action during tropical storms.

The capability subclass is VIIIw.

28—Demory-Rock outcrop complex. This map unit consists of a nearly level, poorly drained, very shallow Demory soil intermingled with areas of Rock outcrop. The unit is in transitional areas between organic soils and poorly drained, sandy soils. The Demory soil and Rock outcrop occur as areas so intermingled or so small that mapping them separately is impractical. Individual areas range from 5 to 500 acres in size. Slopes are smooth and are less than 2 percent.

On 95 percent of the acreage mapped as Demory-Rock outcrop complex, Demory and similar soils and Rock outcrop make up 86 to 99 percent of the mapped areas. About 70 percent of this map unit is Demory and similar soils, and 25 percent is Rock outcrop.

Typically, the surface layer of the Demory soil is about 7 inches thick. The upper 4 inches is very dark brown sandy clay loam, and the lower 3 inches is black sandy clay loam. Below this is about 3 inches of dark brown sandy loam. Hard, porous limestone bedrock is at a depth of about 10 inches.

Dissimilar soils that are included with the Demory soil in mapping occur as small areas of Biscayne, Chekika, and Dania soils. Dissimilar soils make up 1 to 14 percent of most mapped areas. Biscayne soils are in the higher positions on the landscape. They have a surface layer of marl. Chekika soils are somewhat poorly drained. They have coarse fragments in the surface layer. Dania soils are organic.

The water table in the Demory soil is below the surface for the majority of most years. The soil is flooded on rare occasions during periods of high rainfall. Permeability is moderately slow.

Most areas support natural vegetation. Water-tolerant vegetation, such as South Florida bluestem, sawgrass, gulf muhly, cabbage-palm, and willow, dominates the landscape.

This map unit is not used as rangeland or forest land. It is in the Freshwater Marsh ecological plant community.

This map unit is severely limited as a site for urban development and recreational development because of the wetness and the depth to bedrock. Additional drainage measures and large amounts of suitable fill material are needed to overcome these limitations.

The Demory soil is in capability subclass VIIs. The Rock outcrop is not assigned a capability classification.

30—Pahokee muck, depressional. This moderately deep, nearly level, very poorly drained soil is in freshwater swamps and marshes. It is ponded for 6 to 9 months in most years. Individual areas range from 30 to 1,000 acres in size. Slopes are smooth or concave and are less than 1 percent.

On 95 percent of the acreage mapped as Pahokee muck, depressional, Pahokee and similar soils make up 99 percent of the mapped areas.

Typically, the soil is muck to a depth of about 46 inches. The upper 11 inches is black, and the lower 35 inches is very dark brown. Hard, porous limestone bedrock is at a depth of about 46 inches.

Included in mapping are soils that are similar to Pahokee muck, depressional, but are less than 36 or more than 51 inches deep over limestone bedrock or have small, discontinuous lenses or pockets of marl within a depth of 30 inches.

Dissimilar soils that are included with this soil in mapping occur as small areas of Dania soils and small areas of soils that are more than 80 inches deep over limestone bedrock. Dissimilar soils make up 1 percent or less of most mapped areas. Dania soils are very shallow or shallow over limestone bedrock.

Under natural conditions, the Pahokee soil is ponded for 9 to 12 months during most years. The water table is within 10 inches of the surface for the rest of the year. Permeability is rapid. This soil is subject to oxidation, which decreases the amount of the organic material each year. If drained, the organic material initially shrinks to about half the original thickness and then subsides further as a result of compaction and oxidation. These losses are most rapid during the first 2 years. If drained, the soil continues to subside at a rate of about 1 inch per year. The lower the water table, the more rapid the loss.

Most areas support natural vegetation, which consists of cattail and sawgrass. Areas that have been drained or disturbed, however, may be dominated by Brazilian pepper and melaleuca. Areas of this soil provide cover for deer and excellent habitat for wading birds and other kinds of wetland wildlife.

Under natural conditions, this soil generally is not suited to cultivation. If water is controlled through a system of dikes, ditches, and pumps, however, the soil is well suited to most winter vegetable crops. A well designed and maintained water-control system can remove excess water during periods when crops are growing on the soil and can keep the soil saturated at all other times. Keeping the soil saturated minimizes oxidation. Important management practices include good seedbed preparation and a suitable crop rotation. Cover crops and crop residue should be left on the surface or plowed under. Fertilizer should be applied according to the needs of the crop.

This soil is not suited to the production of citrus, avocados, or pine trees because of the wetness.

This soil is not used as rangeland. It is in the Freshwater Marsh ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the ponding, excess humus, low strength, and the depth to bedrock. Water-control measures are needed to prevent ponding. The organic material should be removed, and suitable backfill material should be provided. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

31—Pennsuco marl, tidal. This deep, nearly level, very poorly drained soil is in tidal mangrove swamps near the coast in southeastern Florida and is subject to tidal flooding. Individual areas range from 6 to 100 acres in size. Slopes are smooth or concave and are less than 1 percent.

On 95 percent of the acreage mapped as Pennsuco marl, tidal, Pennsuco and similar soils make up 75 to 99 percent of the mapped areas.

Typically, the surface layer is about 51 inches of light gray marl that has a texture of silt loam. Soft, porous limestone bedrock is at a depth of about 51 inches.

Included in mapping are soils that are similar to Pennsuco marl, tidal, but have limestone bedrock at a depth of less than 40 or more than 80 inches or in the upper 40 inches have layers of organic material that are more than 8 inches thick.

Dissimilar soils that are included with this soil in mapping occur as small areas of Lauderhill and Terra Ceia soils and small areas of organic soils having layers of marl that are more than 4 inches thick but make up less than half of the total soil depth. Dissimilar soils make up 1 to 25 percent of most mapped areas. Lauderhill soils are in shallow depressions. They are organic. Terra Ceia soils are in positions on the landscape similar to those of the Pennsuco soil. They are organic to a depth of more than 51 inches.

Under natural conditions, this soil remains saturated and the water table fluctuates with the tides. The soil is moderately saline or saline. Permeability is moderately slow.

The natural vegetation is scattered and stunted red mangrove. Areas of this soil provide excellent habitat for birds and small marine crustaceans.

Because of tidal flooding and salinity, this soil is not suited to cropland, groves, or improved pasture. It generally is not used as rangeland. It is in the Mangrove Swamp ecological plant community.

This soil is severely limited as a site for all urban uses because of tidal flooding and ponding.

This soil is in mangrove swamps, which are unique and biologically productive areas that are very important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds. Mangrove swamps along coastal areas and in estuaries also serve as protective barriers against excessive wave action during tropical storms.

The capability subclass is VIIIw.

32—Terra Ceia muck, tidal. This deep, level, very poorly drained soil is in saltwater swamps and marshes and is subject to tidal flooding. Individual areas are long and narrow and range from 100 to 500 acres in size. Slopes are less than 1 percent.

On 95 percent of the acreage mapped as Terra Ceia muck, tidal, Terra Ceia and similar soils make up 82 to 99 percent of the mapped areas.

Typically, the soil is muck to a depth of 80 inches or more. The upper 8 inches is very dark brown, and the lower 72 inches or more is black.

Included in mapping are soils that are similar to Terra Ceia muck, tidal, but are less than 51 inches deep over limestone bedrock or have discontinuous lenses or pockets of marl within the control section.

Dissimilar soils that are included with this soil in mapping occur as small areas of Lauderhill soils and small areas of the tidal Pennsuco and Perrine soils. Dissimilar soils make up 1 to 18 percent of most mapped areas. Lauderhill soils are in positions on the landscape similar to those of the Terra Ceia soil. They are moderately deep over limestone bedrock. Pennsuco and Perrine soils have a surface layer and subsurface layer of marl.

Under natural conditions, the Terra Ceia soil remains saturated. Fluctuating tides cover the surface twice daily. Permeability is rapid.

The natural vegetation consists mainly of red and black mangrove. White mangrove grows in some areas.

Because of tidal flooding, this soil is not suited to cropland, citrus, or improved pasture.

This soil is not used as rangeland. It is in the Mangrove Swamp ecological plant community.

This soil is not suited to urban uses because of tidal flooding and low strength.

This soil is in mangrove swamps, which are unique and biologically productive areas that are very important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds. Mangrove swamps in estuaries also serve as protective barriers against excessive wave action during tropical storms.

The capability subclass is VIIIw.

33—Plantation muck. This moderately deep, nearly level, very poorly drained soil is in transitional areas between the organic soils of the Everglades and the sandy soils of the Everglades Flatwoods. Individual areas range from 50 to 600 acres in size. Slopes are less than 1 percent.

On 95 percent of the acreage mapped as Plantation muck, Plantation and similar soils make up 90 to 99 percent of the mapped areas.

Typically, the surface layer is muck about 14 inches thick. The upper 6 inches is black, and the lower 8 inches is dark reddish brown. The underlying material extends to a depth of about 30 inches. It is very dark grayish brown fine sand in the upper 7 inches, light gray fine sand in the next 7 inches, and brown very gravelly fine sand in the lower 2 inches. Soft, porous limestone bedrock is at a depth of about 30 inches.

Included in mapping are soils that are similar to Plantation muck but have a surface layer of muck that is less than 8 or more than 16 inches thick or are less than 20 or more than 40 inches deep over limestone bedrock.

Dissimilar soils that are included with this soil in mapping occur as small areas of Lauderhill soils and small areas of Udorthents. Dissimilar soils make up 1 to 10 percent of most mapped areas. Lauderhill soils are in the lower positions on the landscape. They are organic to a depth of more than 16 inches. Udorthents are in the slightly higher areas of mineral fill material.

Under natural conditions, the Plantation soil has water above the surface for 1 to 3 months during most years. During most years the water table is at or near the surface for 4 to more than 6 months. It may recede to as deep as 20 inches during the rest of the year. Permeability is rapid. If drained, the organic material initially shrinks to about half the original thickness and then subsides further as a result of compaction and oxidation. These losses are most rapid during the first 2 years. If drained, the soil continues to subside at a rate of about 1 inch per year. The lower the water table, the more rapid the loss.

The natural vegetation consists of sawgrass, willow, and cattail. Under natural conditions, this soil generally is not suited to cultivation. If water is controlled through a system of dikes, ditches, and pumps, however, the soil is well suited to most winter vegetable crops. A well designed and maintained water-control system can remove excess water during periods when crops are growing on the soil and can keep the soil saturated at all other times. Keeping the soil saturated minimizes oxidation. Important management practices include good seedbed preparation and a suitable crop rotation. Cover crops and crop residue should be left on the surface or plowed under. Fertilizer should be applied according to the needs of the crop.

This soil is not suited to the production of citrus, avocados, or pine trees because of the wetness.

This soil is suited to pasture. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed. Maintaining the water table near the surface helps to prevent excessive subsidence of the organic material. Regular applications of fertilizer and controlled grazing are needed.

This soil is not used as rangeland. It is in the Freshwater Marsh ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the ponding, excess humus, low strength, and the depth to bedrock. Water-control measures are needed to prevent excessive wetness. The organic material should be removed, and suitable backfill material should be provided. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent seepage. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is IVw.

34—Hallandale fine sand. This shallow, nearly level, poorly drained soil is on broad flats between the Everglades and the low, sandy coastal ridge. Individual areas are broad and irregularly shaped and range from 50 to 1,000 acres in size. Slopes are smooth and are less than 2 percent.

On 95 percent of the acreage mapped as Hallandale fine sand, Hallandale and similar soils make up 82 to 99 percent of the mapped areas.

Typically, the surface layer is very dark gray fine sand about 4 inches thick. Below this is 8 inches of light brownish gray fine sand that has common black and very dark gray streaks in old root channels. The subsoil is brown fine sand about 4 inches thick. Soft, porous limestone bedrock is at a depth of about 16 inches.

Included in mapping are small areas of Margate soils and soils that are similar to Hallandale fine sand but have limestone bedrock at a depth of less than 7 or more than 20 inches or have an organic surface layer that is less than 8 inches thick.

Dissimilar soils that are included with this soil in mapping occur as small areas of Plantation soils, small areas of Udorthents, and small areas where more than 20 inches of fill material has been added to the surface. Dissimilar soils make up 1 to 18 percent in most mapped areas. Plantation soils are in the lower positions on the landscape. They have an organic surface layer. Udorthents are in the higher filled areas that have coarse fragments.

During most years the water table in the Hallandale soil is within a depth of 12 inches for 4 to 6 months and is at a depth of 12 to more than 24 inches for the rest of the year. Permeability is rapid.

Most of the acreage is pasture or idle land. The natural vegetation consists of slash pine, melaleuca, and Australian pine. The understory includes pineland threeawn, chalky bluestem, paspalum, bluejoint panicum, and scattered saw palmetto.

This soil generally is not suited to cultivation. Under natural conditions, it is poorly suited to the production of citrus and pine trees and unsuited to the production of avocados because of the wetness. If a good water-control system is maintained and proper management is applied, however, the soil is well suited to most vegetable crops, citrus, ornamental plants, and improved pasture. Important management practices include bedding in areas used for citrus, ornamental plants, or root crops. The proper kinds and amounts of fertilizer, lime, and irrigation water should be applied according to the needs of the crop. Cover crops and crop residue should be left on the surface or plowed under. In areas of improved pasture, controlled grazing is needed to prevent overgrazing and the subsequent invasion of the less desirable forage species.

This soil is not used as rangeland or forest land. It is in the Everglades Flatwoods ecological plant community.

This soil is severely limited as a site for urban uses because of the wetness and the depth to bedrock. Local construction methods generally can overcome these limitations. The soil commonly is used for urban development.

The capability subclass is IVw.

35—Margate fine sand. This moderately deep, nearly level, poorly drained soil is on low terraces between the Everglades and the sandy coastal ridge. Individual areas are broad and irregularly shaped and range from 10 to 500 acres in size. Slopes are smooth and are less than 2 percent.

On 95 percent of the acreage mapped as Margate fine sand, Margate and similar soils make up 98 to 99 percent of the mapped areas.

Typically, the surface layer is very dark gray fine sand about 9 inches thick. The subsurface layer, to a depth of about 18 inches, is light brownish gray fine sand. The next 10 inches is brown fine sand. Below this, to a depth of about 36 inches, is dark grayish brown fine sand. Soft, porous limestone bedrock is at a depth of about 36 inches.

Included in mapping are small areas of Hallandale and Plantation soils and soils that are similar to Margate fine sand but are more than 40 inches deep over limestone bedrock.

Dissimilar soils that are included with this soil in mapping occur as small areas of Udorthents and small areas where more than 20 inches of fill material has been added to the surface. Dissimilar soils make up 2 percent or less of most mapped areas. Udorthents are in the higher filled areas that have coarse fragments.

During most years the water table in the Margate soil is within a depth of 12 inches for 4 to 6 months and is at a depth of 12 to more than 24 inches for the rest of the year. Permeability is rapid.

Most areas are used as improved pasture. The natural vegetation consists of scattered slash pine and cabbage-palm, melaleuca, and Australian pine. The understory includes scattered saw palmetto, pineland threeawn, chalky bluestem, bluejoint panicum, and paspalum.

This soil generally is not suited to cultivation. Under natural conditions, it is poorly suited to the production of citrus and pine trees and unsuited to the production of avocados because of the wetness. If a good water-control system is maintained and proper management is applied, however, the soil is well suited to most vegetable crops, citrus, and improved pasture. The proper kinds and amounts of fertilizer, lime, and irrigation water should be applied according to the needs of the crop. Cover crops and crop residue should be left on the surface or plowed under. In areas of improved pasture, controlled grazing is needed to prevent overgrazing and the subsequent invasion of the less desirable forage species. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed.

This soil is not used as rangeland or forest land. It is in the Everglades Flatwoods ecological plant community.

This soil is severely limited as a site for urban uses because of the wetness, the depth to bedrock, and the hazard of seepage. Local construction methods generally can overcome these limitations. The soil commonly is used for urban development.

The capability subclass is IVw.

37—Basinger fine sand. This deep, nearly level, poorly drained soil is in sloughs and poorly defined drainageways. Individual areas range from 80 to 147 acres in size. Slopes are less than 2 percent.

On 95 percent of the acreage mapped as Basinger fine sand, Basinger and similar soils make up 90 to 100 percent of the mapped areas.

Typically, the surface layer is very dark gray fine sand about 6 inches thick. The next 24 inches is light gray fine sand. The subsoil is brown and light brownish gray fine sand about 20 inches thick. Below this to a depth of more than 80 inches is light brownish gray fine sand.

Included in mapping are soils that are similar to Basinger fine sand but have limestone bedrock within a depth of 80 inches, have a subsurface layer that is more than 30 inches thick, or become lighter colored with increasing depth.

Dissimilar soils that are included with this soil in mapping occur as small areas of Dade, Plantation, and Pomello soils and small areas of Udorthents. Dissimilar soils make up less than 10 percent of most mapped areas. Dade soils are on low hills and are well drained. Plantation soils have an organic surface layer. They are in the lower positions on the landscape. Pomello soils have a well developed, sandy subsoil. They are in the higher positions on the landscape. Udorthents are in filled areas that have coarse fragments.

The water table in the Basinger soil is within a depth of 12 inches for 1 to 6 months in most years. Permeability is rapid.

Most of the acreage has been cleared and is used as improved pasture or is idle land. The natural vegetation consists of waxmyrtle, pineland threeawn, and scattered slash pine.

Under natural conditions this soil is poorly suited to row crops, citrus, avocados, and improved pasture because of the wetness. If a good water-control system is maintained and proper management is applied, however, the soil is well suited to most vegetable crops, citrus, and improved pasture. The proper kinds and amounts of fertilizer, lime, and irrigation water should be applied according to the needs of the crop. Cover crops and crop residue should be left on the surface or plowed under. In areas of improved pasture, controlled grazing is needed to prevent overgrazing and the subsequent invasion of the less desirable forage species. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed.

This soil is not used as rangeland or forest land. It is in the Slough ecological plant community.

This soil is severely limited as a site for most kinds of urban development, sanitary facilities, and recreational development because of the wetness, the hazard of seepage, and the sandy texture.

The capability subclass is IVw.

38—Rock outcrop-Vizcaya-Biscayne complex. This map unit consists mainly of Rock outcrop intermingled with areas of Vizcaya and Biscayne soils. The Rock outcrop and Vizcaya and Biscayne soils occur as areas so intermixed or so small that mapping them separately is impractical. Individual areas range from 5 to several thousand acres in size. Slopes are less than 2 percent.

On 95 percent of the acreage mapped as Rock outcrop-Vizcaya-Biscayne complex, Rock outcrop and Vizcaya, Biscayne, and similar soils make up 91 to 100 percent of the mapped areas. About 56 percent of this map unit is Rock outcrop; 28 percent is Vizcaya soil, which is in the lower positions on the landscape; and 14 percent is Biscayne soil, which is on flats.

Typically, the Vizcaya soil is black mucky silt loam in the upper 6 inches. Below this, to a depth of about 15 inches, is black clay. Hard, porous limestone bedrock is at a depth of about 15 inches.

Typically, the Biscayne soil consists of about 4 inches of grayish brown marl that has a texture of silt loam. Hard, porous limestone bedrock is at a depth of about 4 inches.

Included in mapping are soils that are similar to the Vizcaya soil but are less than 8 or more than 20 inches deep over limestone bedrock.

Dissimilar soils that are included with the Vizcaya and Biscayne soils in mapping occur as small areas of Lauderhill, Pahokee, and Terra Ceia soils. Dissimilar soils make up 9 percent or less of most mapped areas. They are organic. They are on the lowest part of the landscape.

Under natural conditions, the water table in the Vizcaya soil is at or above the surface for 2 to 6 months and at a depth of more than 12 inches for the rest of the year. The water table in the Biscayne soil is at the surface for 2 to 4 months. Permeability is slow in the Vizcaya soil and moderate in the Biscayne soil.

Most areas support natural vegetation. Water-tolerant vegetation, such as South Florida bluestem, sawgrass, gulf muhly, cabbage-palm, and willow, dominates the landscape. Dense stands of vegetation are in rock cavities and solution holes.

Under natural conditions, this map unit is not suitable for fruit or vegetable crops, ornamental plants, or pasture. If drained and rock-plowed, the map unit becomes Biscayne gravelly marl or Chekika very gravelly loam, depending on the depth to limestone and the amount and type of material incorporated from the solution holes during plowing.

This map unit is not used as rangeland or forest land. It is in the Freshwater Marsh ecological plant community.

This map unit is severely limited as a site for urban uses and recreational development because of the wetness and the depth to bedrock. Additional drainage measures and large amounts of suitable fill material are needed to overcome these limitations.

The Rock outcrop is not assigned a capability classification. The Vizcaya and Biscayne soils are in capability subclass VIIw.

39—Beaches. This map unit consists of nearly level to sloping, narrow strips of tide- and surf-washed sandy material and shell fragments along the shoreline of the Atlantic Ocean. It commonly is a mixture of moderately alkaline sandy material and fine shell fragments.

The beaches are less than 100 to 300 feet wide. As much as half of the beach area may be flooded daily during high tides, and all of it can be flooded by storm tides. Most of the beaches have a uniform gentle slope that extends to the edge of the water, although the shape and gradient of the slope can change with every storm.

This map unit generally supports no vegetation, although some clumps of seaoats, railroad vine, and other salt-tolerant plants are near some of the inland edges.

Depth to the water table varies considerably, commonly ranging from 0 to 6 feet, depending on distance from the shore, elevation of the beach, and the tides.

This map unit can be used only as recreational areas and wildlife habitat. Severe erosion is often a problem during severe storms. Because they have great esthetic value, the beaches are an important part of the coastline.

No capability classification is assigned.

40—Pomello sand. This deep, nearly level, moderately well drained soil is on moderately high, broad hills on the Miami Ridge. Individual areas are irregularly shaped and range from 10 to 100 acres in size. Slopes are smooth. They generally are less than 2 percent but range to 5 percent.

On 95 percent of the acreage mapped as Pomello sand, Pomello and similar soils make up 98 to 99 percent of the mapped areas.

Typically, the surface layer is dark gray sand about 5 inches thick. The subsurface layer, to a depth of about 35 inches, is sand. It is light gray in the upper 10 inches and gray in the lower 20 inches. The upper 41 inches of the subsoil is very dark grayish brown sand. The lower part to a depth of 80 inches or more is dark yellowish brown sand.

Included in mapping are soils that are similar to Pomello sand but are well drained or somewhat poorly drained, have a weakly developed subsoil, have limestone bedrock below a depth of 70 inches, or have a surface layer that is as much as 10 inches thick.

Dissimilar soils that are included with this soil in mapping occur as small areas of the poorly drained Basinger soils on the lower part of the landscape. These soils make up 1 to 2 percent of the map unit.

Under natural conditions, the water table in the Pomello soil is at a depth of 24 to 42 inches for about 1 to 4 months in most years and is at a depth of 40 to 60 inches during the drier periods. Permeability is moderately rapid.

Most of the acreage has been cleared for development or is idle land. Some areas support natural vegetation, which consists of slash pine and scattered post oak. The understory vegetation in these areas includes pineland threeawn, opuntia, and various weeds and grasses.

Under natural conditions, this soil is poorly suited to cultivated crops because of droughtiness. Irrigation is needed. Important management practices include timely applications of the proper amounts of fertilizer and lime.

The suitability of this soil for pasture is fair. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed. Regular applications of fertilizer are needed. Irrigation is needed during dry periods. Controlled grazing helps to prevent overgrazing and maintains plant vigor.

This soil is poorly suited to the production of citrus and mangos. Only fair yields can be obtained even 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 for maximum yields. A suitable cover crop between the tree rows can help to control soil blowing. The soil is unsuited to avocado production.

This soil generally is not used as rangeland or forest land. Under natural conditions, it is in the Sand Pine Scrub ecological plant community.

This soil is severely limited as a site for sanitary facilities and recreational development. It is moderately limited as a site for dwellings without basements and for small commercial buildings. Water-control measures are needed to prevent excessive wetness. Enlargement of septic tank absorption fields may be needed because of the wetness. Because of a poor filtering capacity, the effluent from these fields can pollute ground water. Community sewage systems help to prevent the contamination of ground water in areas of moderate or high housing density. The sandy surface layer should be stabilized in areas used for recreational purposes. Water-control measures are needed. The sides of shallow excavations should be shored.

The capability subclass is VIs.

41—Dade fine sand. This moderately deep, nearly level, well drained soil is on broad, low hills on the Miami Ridge. Individual areas are irregularly shaped and range from 10 to 100 acres in size. Slopes are smooth and are less than 2 percent.

On 95 percent of the acreage mapped as Dade fine sand, Dade and similar soils make up 99 to 100 percent of the mapped areas.

Typically, the surface layer is dark gray fine sand about 6 inches thick. Below this is light brownish gray fine sand about 18 inches thick. The subsoil is dark grayish brown fine sand about 3 inches thick. Soft, porous limestone bedrock is at a depth of about 27 inches.

Included in mapping are soils that are similar to Dade fine sand but have limestone bedrock within a depth of 20 inches and do not have a subsoil layer that is well coated with organic matter, have limestone bedrock at a depth of more than 80 inches, or are moderately well drained.

Dissimilar soils that are included with this soil in mapping occur as small areas of Pomello soils in the slightly lower positions on the landscape. These soils are not underlain by limestone bedrock. They make up about 1 percent of the map unit.

Under natural conditions, the water table in the Dade soil is at a depth of 60 to 72 inches for 1 to 3 months during most years and is below a depth of 72 inches for the rest of the year. Permeability is very rapid throughout the profile.

Most areas have been cleared for development. Some areas support natural vegetation, which consists of pineland threeawn, slash pine, live oak, scrub oak, and saw palmetto.

Under natural conditions, this soil is not suited to cultivation or the production of citrus, avocados, or pine trees. It is poorly suited to pasture because of droughtiness. If irrigated and properly managed, the soil is well suited to most cultivated crops, citrus, ornamental plants, and improved pasture. Important management practices include applying the proper kinds and amounts of fertilizer and irrigation water according to the needs of the crop. Cover crops and crop residue should be left on the surface or plowed under. In areas of improved pasture, controlled grazing is needed to prevent overgrazing and the subsequent invasion of the less desirable forage species. Common bermudagrass and improved bahiagrass grow well if the pasture is properly managed.

This soil is not used as rangeland or forest land. It is in the Everglades Flatwoods ecological plant community.

Most of the acreage of this soil is in areas that are being developed for urban uses. The soil is moderately limited as a site for local roads and streets, small commercial buildings, and dwellings without basements. It is severely limited as a site for dwellings with basements because of the depth to bedrock and as a site for septic tank absorption fields and sanitary landfills because of the depth to bedrock and a poor filtering capacity or seepage.

The capability subclass is VIs.

42—Udorthents, limestone substratum, 0 to 5 percent slopes. These nearly level or gently sloping, moderately well drained or well drained soils consist of thin or thick deposits of fill material. The fill material has been excavated from nearby areas and spread over the surface. It commonly is about 30 inches thick. Individual areas range from 40 to 800 acres in size.

No one pedon represents these soils, but in one of the most common profiles, the surface layer is dark gray gravelly sand about 4 inches thick. Below this, to a depth of about 30 inches, are light gray, unconsolidated limestone fragments. Hard, porous limestone bedrock is at a depth of about 30 inches.

Included with these soils in mapping are small areas of soils that have slopes of more than 5 percent. Also included are small areas of Urban land, which makes up 15 percent or less of the map unit.

Depth to the water table in the Udorthents varies, depending on the amount of fill material and the drainage measures in a given area. In most areas the water table is below a depth of 40 inches. Permeability generally is rapid.

Most areas are used as sites for golf courses. The existing vegetation consists of grasses and ornamental trees and shrubs.

No capability classification is assigned.

45—Canaveral sand. This very deep, nearly level or gently sloping, moderately well drained soil is on low, dunelike ridges. Individual areas are long and narrow and range from 10 to 200 acres in size. Slopes are dominantly less than 3 percent but range to 5 percent.

On 95 percent of the acreage mapped as Canaveral sand, Canaveral and similar soils make up 99 to 100 percent of the mapped areas.

Typically, the surface layer is dark grayish brown sand about 4 inches thick. About 10 percent of this layer is sand-sized shell fragments. The next 46 inches is pale brown sand in which the content of sand-sized shell fragments is about 20 percent. The lower 30 inches is gray sand in which the content of sand-sized shell fragments is about 25 percent.

Included in mapping are soils that are similar to Canaveral sand but are better drained.

Dissimilar soils that are included with this soil in mapping occur as small areas of poorly drained soils that have a black surface layer. These soils make up about 1 percent of the map unit.

During most years the water table in the Canaveral soil is at a depth of 24 to 36 inches for 2 to 4 months and is at a depth of 36 to 60 inches for the rest of the year. It is at a depth of 12 to 24 inches after periods of heavy rainfall. Permeability is very rapid.

The natural vegetation consists of sand live oak, cabbage-palm, and scattered saw palmetto. Exotic tree species, including Australian pine and Brazilian pepper, have become established in some areas.

This soil is not suited to cultivated crops or improved pasture. A low available water capacity and low natural fertility severely reduce the variety of grasses that can be grown on the soil.

This soil is poorly suited to the production of citrus, mangos, and avocados. The suitability for these crops is fair, however, if intensive management measures, including irrigation and regular applications of fertilizer, are applied. A close-growing crop between the trees helps to control soil blowing.

This soil is not used as rangeland or forest land. It is in the South Florida Coastal Strand ecological plant community.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development because of the wetness. Extensive water-control measures and large amounts of suitable fill material are needed to overcome this limitation. The sandy surface layer should be stabilized in areas used for recreational purposes. Water-control measures are needed. Sealing or lining trench sanitary landfills and sewage lagoons with impervious soil material helps to prevent seepage. The sides of shallow excavations should be shored. Because of the droughtiness of the soil, native plants should be selected for landscaping.

The capability subclass is VIs.

47—St. Augustine sand. This deep, nearly level, somewhat poorly drained soil is on Key Biscayne. Individual areas range from 20 to 400 acres in size. Slopes are smooth and are less than 2 percent.

On 95 percent of the acreage mapped as St. Augustine sand, St. Augustine and similar soils make up 85 to 99 percent of the mapped areas.

Typically, the surface layer is dark brown sand about 3 inches thick. Below this is 48 inches of gray and light gray sand that has common fine lenses of gray marl in the lower 22 inches. The subsoil is gray and light gray sand about 29 inches thick. It has few fine lenses of gray marl in the upper 6 inches.

Included in mapping are soils that are similar to St. Augustine sand but do not have pockets of loamy material or marl, have a thin or weakly pronounced organic layer at a depth of more than 60 inches, have pockets of organic material or shell fragments, or are poorly drained.

Dissimilar soils that are included with this soil in mapping occur as small areas of poorly drained soils that have a dark surface layer. These soils are in the lower positions on the landscape. They make up less than 10 percent of most mapped areas.

In most years the water table in the St. Augustine soil is at a depth of 18 to 36 inches for 2 to 6 months. In some areas daily tides influence the water table, depending on the amount of fill material. Permeability is moderately rapid.

Most of the acreage supports Australian pine and weedy grasses. Some areas have been developed for urban uses.

This soil is not used for cropland, improved pasture, citrus, ornamental plants, or pine trees. It consists of mixed soil material used as fill in low tidal areas. The fill improves the suitability of the low areas for building site development and other urban uses. The suitability of this soil for urban uses is only fair because of brief periods of wetness. The soil is severely limited as a site for most recreational uses because of the sandy texture. Onsite investigation is needed to determine the suitability for any use.

The capability subclass is VIIs.

48—Kesson muck, tidal. This deep, nearly level, very poorly drained soil is in tidal mangrove swamps along the coast in southeastern Florida and is subject to tidal flooding. Individual areas range from 10 to 200 acres in size. Slopes are less than 1 percent.

On 95 percent of the acreage mapped as Kesson muck, tidal, Kesson and similar soils make up 90 to 99 percent of the mapped areas.

Typically, the surface layer is black muck about 6 inches thick. The next 6 inches is dark gray fine sand mixed with shell fragments. The substratum to a depth of 80 inches is grayish brown and light gray fine sand mixed with shell fragments.

Included in mapping are soils that are similar to Kesson muck, tidal, but have an organic surface layer that is more than 8 inches thick or have a thin surface layer of marl.

Dissimilar soils that are included with this soil in mapping occur as small areas of the tidal Pennsuco soils and small areas of Udorthents. Dissimilar soils make up less than 10 percent of most mapped areas. Pennsuco soils are in positions on the landscape similar to those of the Kesson soil. They are made up of marl and are underlain by limestone bedrock. Udorthents are in the slightly higher filled areas that have coarse fragments.

Under natural conditions, the Kesson soil remains saturated. Fluctuating tides cover the surface twice daily. Permeability is moderately rapid.

The native vegetation consists mainly of red and black mangrove. White mangrove grows in some areas.

Because of tidal flooding, this soil is not suited to cropland, citrus, or improved pasture.

This soil is not used as rangeland. It is in the Mangrove Swamp ecological plant community.

This soil is not suited to urban uses because of tidal flooding.

This soil is in mangrove swamps, which are unique and biologically productive areas that are important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds. Mangrove swamps in estuaries also serve as protective barriers against excessive wave action during tropical storms.

The capability subclass is VIIIw.

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 to prevent 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 behavioral 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 sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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 *(17)*.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, 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

Richard Tyson, Dr. Mary Lamberts, Kirk Larson, and De Armand Hull, agricultural agents, Dade County Cooperative Extension Service, helped prepare this section.

General management needed for crops is suggested in this section. The crops best suited to the soils are identified, and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information, such as estimated yields of the main crops, can be obtained from the Natural Resources Conservation Service or the Dade County Cooperative Extension Service.

Vegetable Crops

Vegetables were grown on 54,100 acres in Dade County during the 1983-84 growing season. The wholesale value of these vegetables was $188,416,000. The vegetables are grown mainly during the period November through March, when mild winter weather conditions allow production of tender vegetable crops and most other vegetable-growing areas are inactive. Some vegetable crops, especially tropical vegetables, are grown throughout the year.

Dade County currently produces about one-quarter of the fresh market tomatoes grown in Florida, nearly half of the snap beans, and one-third of the squash. Essentially all of the tropical vegetables, such as bonito, malanga, yuca, and calabaza, are grown on 7,400 acres in the county. The combined annual value of these tropical vegetables is $27,460,000.

Vegetable production is considerably diverse within the survey area. The wholesale value of 13 of the vegetable commodities was more than $1 million each during the 1983-84 season. Most of the vegetables are grown on Krome and Chekika soils. Irish potatoes and much of the sweet corn and malanga, however, are grown on Biscayne, Perrine, and Pennsuco soils.

Most growers plant sequentially over a period of time to spread their risk and to increase accessibility to a rather wide marketing season. Returns per acre are higher than those in northern areas, but the risk of adverse weather conditions, including rain, wind, frost, and freezing temperatures, is high. Most of the growers are successful because of the diversity of production and the wide marketing season. The major market competitors are other production areas in south Florida and imports from Mexico.

During the 1983-84 growing season, tomatoes were grown on 12,790 acres in the county. The wholesale value of the tomatoes was almost $100 million. Full-bed plastic mulch production methods were used on about 95 percent of the acreage. Essentially all of the tomatoes in the county are grown in areas of Krome and Chekika soils, where ground culture, or unstaked, methods are used.

Extensive field preparation is required before the tomatoes can be planted in the beds. After final bed shaping with a bed press, fertilizer is applied. About 15 percent of the fertilizer is broadcast in the beds and the rest is applied in narrow bands 8 to 12 inches from the center of the plant row. The total fertilizer requirements are approximately 1,600 pounds per acre of an 8-16-16 analysis fertilizer, which includes micronutrients. Because of the unavailability of some micronutrients, foliar micronutrient sprays are applied during the growing season to supplement the basic application.

After the fertilizer is applied, the tomato beds are fumigated and plastic mulch is applied in a single operation. After a waiting period, holes are punched in the plastic for water penetration. The plug-mix method of planting is used almost exclusively. This method entails mixing about 1 ounce of tomato seed in 4 cubic feet of plug-mix (peat moss and fine vermiculite) and then placing about one-quarter cup (60 cubic centimeters) in each hole with a planter. Two to six plants germinate per hole. The number is later thinned to two plants per hole. An in-row spacing of 12 to 15 inches is used.

Tomato production practices result in high plant populations per acre. Fields generally are harvested only twice. Yields are expressed as the number of 25-pound boxes per acre. The average yields in the survey area are about 1,100 boxes per acre. The tomatoes generally are harvested at the green-mature stage. They are then graded, packed, and placed in ripening rooms, where a metered amount of ethylene gas is used to initiate the ripening process. The majority of the product is shipped to northern markets outside of the State. The two major tomato varieties currently grown are Duke and F.T.E. 12.

During the 1983-84 growing season, approximately 8,500 acres in Florida was used for tropical vegetables. Most of the tropical vegetables produced in the United States are grown in Dade County because many of these commodities require a very long growing season (9 months), which is typical of the southern tip of Florida.

The estimated acreage of the tropical vegetable crops for 1982, 1983, and 1984, respectively, were as follows: boniato—5,000, 3,600, and 4,000 acres; calabaza—900, 900, and 1,000 acres; cassava (yuca)—350, 750, and 850 acres; chayote—35, 20, and 10 acres; coriander—40, 40, and 100 acres; malanga—2,100, 2,500, and 2,500 acres; and pigeon peas—45, 20, and 25 acres. Of these crops, boniato, calabaza, and coriander are double or triple cropped. In 1983, typical crop yields, expressed as the number of 50-pound bags per acre, were—boniato, 365 bags; cassava, 290 bags; and malanga, 165 bags. The yield of tropical root crops is 50 to 75 more bags per acre in areas of the Perrine-Biscayne-Pennsuco association than in areas of the Krome association. These associations are described under the heading "General Soil Map Units."

Fruit Crops

A wide variety of tropical and subtropical fruits are grown on approximately 22,000 acres in Dade County. While more than two dozen species are grown commercially, production is based principally on avocado, lime, mango, mamey sapote, banana, papaya, lychee, longan, carambola, sugar apple, and atemoya. Much of the commercial fruit is produced in areas of Krome soils on slightly elevated ridges. Chekika soils also are used for fruit crops (fig. 6).

In spite of the relatively high water table in the survey area, drainage in the porous soils and underlying limestone is excessive. Fruit trees grown in areas where the soils are underlain by oolitic limestone are very shallow rooted and are subject to moisture stress during periods of drought. Because of a high pH in the limestone, they also are subject to minor element deficiencies. The trees commonly are planted in single or crossed trenches carved in the bedrock. This measure results in deeper rooting and better anchorage. The trenches are 12 to 18 inches deep and 12 to 18 inches wide, and the trees are planted along the trenches or at points where the trenches intersect.

Mangos are grown on approximately 2,400 acres in the county. They are more tolerant of a high water table than most other fruit trees. In recent years they have been extensively planted on raised beds in some of the lower areas that are subject to ponding and thus are unsuitable for avocados, limes, and most other fruit crops. The principal varieties of mangos are Tommy Atkins, Keitt, Kent, Van Dyke, and Palmer. Many other varieties also are grown.

The annual yield of mangos can easily be 500 bushels or more per acre in the survey area if good varieties are selected for planting and proper management is applied. For some varieties, an annual yield of 700 bushels or more per acre is not uncommon.

Mangos are most commonly planted in spring or at

Figure 6.—Bananas in an area of Chekika very gravelly loam.

the onset of the rainy season in May or June. Plant density varies considerably. The older plantings commonly are spaced 30 or more feet apart. The more recent plantings are more closely spaced, at such intervals as 20 by 20 feet, 15 by 20 feet, and 12 by 25 feet. The more closely spaced plantings are often mechanically topped and hedged each year so that the size of the trees is controlled. Pruning immediately after harvest helps to ensure adequate time for regrowth before the next year's bloom.

The porous soils in the survey area are medium in natural fertility. Good mango production requires high rates of fertilization. These rates vary with variety and spacing. In general, the amount of nitrogen that should be applied each year ranges from 170 pounds per acre in areas of the more widely spaced trees to more than 250 pounds in areas of the more closely spaced trees. Small, frequent applications are preferable. Large amounts of potassium and generally smaller amounts of phosphorus are needed.

Minor element deficiencies can occur in calcareous soils. Zinc sulfate (or oxide) and manganese sulfate are applied as foliar sprays at least three times per year. Chelated iron should be applied as a soil drench at least once a year. Magnesium is applied as magnesium surface in dry fertilizer or as a magnesium nitrate foliar spray. "Fertigation," or the injection of fertilizer into drip irrigation systems, is an especially useful means of applying iron chelates.

Sprinklers are used for irrigation and protection against frost. During periods of insufficient rainfall, 1 to 1½ acre-inches of water is applied each week. For effective protection against frost, the sprinklers should apply approximately one-quarter acre-inch of water per hour. Overtree and undertree sprinkler systems are common. Drip or low-volume systems also are common, particularly in areas of young trees.

Anthracnose is the most serious problem affecting commercial mango production in the survey area. It can infect leaves, stems, flowers, and fruit. Planting resistant varieties and fungicidal sprays helps to control this disease. Powdery mildew can infect flower panicles and leaves, particularly during dry periods. Red alga can attack leaves and branches, but it is easily controlled by copper sprays. Verticillium wilt may be a problem in areas formerly used for vegetables. Mango malformation caused by fusarium moniliform is becoming more common in the survey area. This fungus attacks vegetative as well as reproductive tissues, resulting in growth abnormalities and no fruit set.

A disease of undetermined origin results in tree decline on approximately 10 percent of the acreage used for mangos in the survey area, particularly in young groves. Recommendations for treating the decline call for removal of diseased plant parts, careful applications of minor elements, and the use of organic nitrogen sources, but results are not always consistent. Young trees should not be subject to stress, and diseased plant parts and deceased trees should be removed promptly.

Measures that control scale, thrips, and mites may be needed in the mango groves. The Dade County Cooperative Extension Service can provide information about these measures.

Ornamentals

The wholesale value of commercial ornamentals in Dade County is more than $120 million per year. Nursery plants are grown on 1,230 sites totaling 4,319 acres. The county has 916 nurseries. More than 22 million plants are sold each year.

The overall industry consists of garden centers, retail nurseries, woody container wholesale nurseries, field nurseries, foliage nurseries, "interiorscape" businesses, a grounds maintenance industry, bedding plant growers, landscape architects, landscape contractors, and pest controllers. This industry generates more than $1 million a day.

Approximately 2,000 acres in the Perrine-Biscayne-Pennsuco association is used for field-grown trees and shrubs, ranging from 600 to 800 trees or shrubs per acre. The major landscape ornamentals grown in areas of this association are queenpalm, schefflera, bottlebrush, arecapalm, pitch apple, seagrape, coconut palm, buttonwood, dracaena marginata, ficus benjamina, ligustrum (glossy privet), black olive, mahogany, and live oak. More than 200 different foliage and woody landscape plants are grown in container nurseries, which make up approximately 2,200 acres in the county. The nurseries in Dade County ship foliage throughout the world.

Yields per Acre

The yields per acre that can be expected of crops under a high level of management vary from year to year, mainly because of variations in rainfall and other climatic factors. Estimated 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 estimated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for the 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 identified under the heading "Crops" are grown in the survey area, but the yields are not estimated because the acreage of such crops is small. The Natural Resources Conservation Service and the Dade County Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

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

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

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

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

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and provide shade. 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 ensure 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 the Natural Resources Conservation Service, the Dade County Cooperative Extension Service, or a nursery.

Recreation

A wide variety of areas are available for recreational activities in this survey area. These areas include 55 miles of coastline, Biscayne Bay, the Atlantic Ocean, Everglades National Park, and Biscayne National Park. Beaches make up 7.5 miles of the 55 miles of coastline. The recreational areas offer opportunities for many activities, including freshwater and saltwater fishing, boating, birding, swimming, and sunbathing.

The recreational attractions at Miami include the Orange Bowl, Miami Dolphins football, and the Metro-Dade Zoo. The survey area has numerous golf courses, tennis courts, marinas, swimming pools, playgrounds, and parks.

In table 3, 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 sewer lines. 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 uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 3, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 3 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 6 and interpretations for dwellings without basements and for local roads and streets in table 5.

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 has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders 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, stones, or boulders 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 free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or 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, and are not subject to flooding more than once a year during the period of use. They have few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John F. Vance, Jr., biologist, Natural Resources Conservation Service, helped prepare this section.

This survey area has extensive areas of good wildlife habitat, even though much of the highly desirable habitat in the coastal areas has been lost to urban development. The beaches, mangrove swamps, pine rock land, and tropical hammock areas are under heavy pressure for development. Freshwater marshes provide excellent wildlife habitat, but they are being rapidly degraded or lost because of the spread of introduced plant species, such as Brazilian pepper and melaleuca trees.

The most extensive areas of good wildlife habitat are in undeveloped freshwater marshes in the western and southern parts of the survey area. These areas are inhabited by wetland wildlife, including various species of birds, reptiles, and amphibians. The main game species in these areas are white-tailed deer, bobwhite quail, and mourning dove, and the main nongame species are songbirds, woodpeckers, raptorial birds, otter, raccoon, and gray fox. These marshes also are inhabited by the endangered wood stork and Everglades kite and the threatened sandhill crane. Other endangered or threatened species that inhabit the survey area include the bald eagle, the American crocodile, and the West Indian manatee.

Although they are of minor extent in the survey area, ocean beaches and tropical hammocks provide valuable habitat for wildlife. Beaches are used as nesting areas by the endangered leatherback turtle. They also serve as feeding grounds for gulls, sandpipers, and plovers.

The mangrove areas in the southern part of the survey area provide rookery and roosting sites for all types of wading birds. The areas of mangroves and the adjacent aquatic areas provide nursery and feeding sites for many marine fish and crustaceans.

The tropical hammocks in the survey area provide cover for many types of wildlife. Also, they support several species of endangered plants *(20)*.

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 4, 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, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn and grain sorghum.

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, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bahiagrass 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, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, and beggarweed.

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, available water capacity, and wetness. Examples of these plants are oak, cabbage-palm, 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, cedar, and cypress.

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, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, maidencane, saltgrass, 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 depth to bedrock, wetness, surface stoniness, 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. Wildlife attracted to these areas include bobwhite quail, mourning dove, meadowlark, field sparrow, and cottontail.

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, geese, herons, shore birds, egrets, otter, mink, and alligator.

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. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

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

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

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should 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, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, 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 kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

Building Site Development

Table 5 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm, dense layer; stone content; 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 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 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, shrinking and swelling, and organic layers can cause the movement of footings. Depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, depth to a high water table, flooding, large stones, 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 bedrock, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 6 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 6 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock 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 6 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 bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in 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 bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

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 should be considered.

The ratings in table 6 are based on soil properties, site features, and observed performance of the soils.

Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench 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 sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, rock 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 large stones or 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 bedrock 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 7 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 to 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, a 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 a 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* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 7, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Fragments of soft bedrock, such as shale and siltstone, 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 a large amount of gravel, stones, or soluble salts, 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 nutrients as it decomposes.

Water Management

Table 8 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

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 a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

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 bedrock 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, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, 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, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

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

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

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

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

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

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

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, 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 9 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 the heading "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.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

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

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

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

Physical and Chemical Properties

Table 10 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the 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 earthmoving operations.

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

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

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 classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more 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 soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, 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 coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous 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 soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of rock fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 10, 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 in 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 11 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

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

If a soil is assigned to two hydrologic groups in table 11, the first letter is for drained areas and the second is for undrained areas.

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

Table 11 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. 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 little or no horizon development.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 11 are the depth to the seasonal high water table, the kind of water table, 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 11. 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.

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

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

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally 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 11 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

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 results in a severe hazard of corrosion. 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 *(19)*. 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 12 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

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

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

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, 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 siliceous, hyperthermic Typic Psammaquents.

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.

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" *(21)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(19)*. 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."

Basinger Series

Soils of the Basinger series are siliceous, hyperthermic Spodic Psammaquents. They are very deep, poorly drained, rapidly permeable soils that formed in thick beds of sandy marine sediments. These soils are in sloughs and depressions. Slopes are less than 2 percent.

Basinger soils are closely associated with Dade, Pomello, and Plantation soils. Dade soils are well drained. They have limestone bedrock at a depth of 20 to 40 inches. Pomello soils are moderately well drained. Plantation soils have a histic epipedon and have limestone bedrock at a depth of 20 to 40 inches.

Typical pedon of Basinger fine sand, approximately 700 feet south of the Snapper Creek Canal and 200 feet west of Douglas Road (NW. 37th Avenue); 300 feet north and 200 feet west of the southeast corner of sec. 31, T. 51 S., R. 41 E.

A—0 to 6 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; many fine and very fine roots; slightly acid; clear smooth boundary.

E—6 to 30 inches; light gray (10YR 7/2) fine sand; single grained; loose; common fine and very fine roots; slightly acid; gradual wavy boundary.

B/E—30 to 50 inches; brown (7.5YR 5/4) and light brownish gray (10YR 6/2) fine sand; common medium distinct very dark gray (10YR 3/1) streaks along root channels; single grained; loose; few very fine roots; moderately acid; clear wavy boundary.

C—50 to 80 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; moderately acid.

The sandy material is more than 80 inches thick.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. It is 3 to 6 inches thick. Reaction is slightly acid to strongly acid. In some pedons a thin layer of muck overlies the A horizon.

The E horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. It is 24 to 30 inches thick. Reaction is slightly acid to strongly acid. The texture is fine sand or sand. In some pedons a transitional E/B horizon is between the E and B/E horizons.

The B part of the B/E horizon has hue of 7.5YR and has value of 4 and chroma of 2 or value of 5 and chroma of 4, or it has hue of 5YR, value of 3, and chroma of 4. The E part of this horizon is 15 to 20 inches thick. Reaction is strongly acid or moderately acid. The texture is fine sand or sand. In some pedons a Bh horizon is beneath the B/E horizon. The Bh horizon has colors similar to those of the B part of the B/E horizon.

The C horizon has hue of 10YR, value of 6, and chroma of 2 or 3. Reaction is strongly acid or moderately acid. The texture is fine sand or sand.

Biscayne Series

Soils of the Biscayne series are loamy, carbonatic, hyperthermic, shallow Typic Fluvaquents. They are shallow or very shallow, poorly drained or very poorly drained, moderately permeable soils underlain by limestone bedrock. They formed in calcareous, silty recent sediments of marine or freshwater origin. These soils are on broad, low coastal flats and in freshwater marshes and sloughs. Slopes are less than 2 percent.

Biscayne soils are closely associated with Chekika, Dania, Hallandale, Krome, Lauderhill, Pennsuco, Perrine, and Tamiami soils. Chekika and Krome soils contain more than 35 percent gravel, by volume, have less than 50 percent silt in the fine-earth fraction, and are better drained than the Biscayne soils. Dania, Lauderhill, and Tamiami soils consist dominantly of organic material. Hallandale soils formed in sandy material. Pennsuco soils have limestone bedrock at a depth of more than 40 inches. Perrine soils have limestone bedrock at a depth of 20 to 40 inches.

Typical pedon of Biscayne marl, in a freshwater marsh approximately 0.25 mile south of North Canal and 700 feet west of a power line; 1,500 feet south and 2,100 feet west of the northeast corner of sec. 27, T. 57 S., R. 39 E.

Ap—0 to 5 inches; gray (10YR 6/1) marl that has a texture of silt loam; moderate medium granular structure parting to weak fine granular; very friable; few very fine and fine continuous pores; few fine roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Cg1—5 to 9 inches; gray (10YR 6/1) marl that has a texture of silt loam; moderate medium angular blocky structure; friable; few fine continuous pores; few fine roots; strongly effervescent; mildly alkaline; abrupt smooth boundary.

Cg2—9 to 15 inches; light gray (10YR 7/1) marl that has a texture of silt loam; moderate medium angular blocky structure; friable; few fine continuous pores; common fine roots; strongly effervescent; mildly alkaline; abrupt irregular boundary.

2R—15 inches; hard, porous, oolitic limestone.

The depth to limestone bedrock ranges from 1 to 20 inches. Gravel-sized limestone fragments make up less than 35 percent of the whole soil volume. The soils are nonsaline to moderately saline. In many pedons some or all horizons have whole snail shells and shell fragments 2 millimeters to 3 centimeters in diameter. Reaction is mildly alkaline or moderately alkaline in the A and C horizons.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 3 or less and in some pedons has light brownish gray or light gray mottles. It is 1 to 12 inches thick. Where matrix values are 3.5 or less, the horizon is less than 7 inches thick or is less than 4 inches thick if it directly overlies limestone bedrock. A thin layer of organic material overlies the A horizon in some pedons. The calcium carbonate equivalent ranges from 70 to nearly 100 percent. The A horizon is marl that has a texture of silt loam or gravelly silt loam. The content of limestone fragments in rock-plowed or mechanically scarified areas is dominantly 15 to 25 percent, by volume, but ranges to 35 percent. The fragments range from 2 millimeters to 7.5 centimeters in diameter. Rock outcrops interrupt the A horizon in some pedons.

The Cg horizon, if it occurs, generally has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 or less and in some pedons has streaks and pockets with hue of 10YR, value of 2 or 3, and chroma of 3 or less. It is 2 to 12 inches thick. This horizon is dominantly marl that has a texture of silt or silt loam. In some pedons it has pockets and lenses of black or very dark brown sapric material. A thin, discontinuous layer of noncalcareous silt loam, mucky silt loam, or silty clay loam with value of 2 or 3 and chroma of 3 or less is within or below the Cg horizon in some pedons. The calcium carbonate equivalent in the Cg horizon ranges from 80 to nearly 100 percent.

The 2R horizon is hard, porous, oolitic limestone that has a smooth or irregular surface. In many pedons it has solution holes several inches to several feet wide and as much as 3 feet deep.

Canaveral Series

Soils of the Canaveral series are hyperthermic, uncoated Aquic Quartzipsamments. They are very deep, moderately well drained, very rapidly permeable soils that formed in thick beds of sandy marine sediments and shell fragments. Slopes are 0 to 3 percent.

Canaveral soils are closely associated with Beaches and with St. Augustine soils. St. Augustine soils formed in sandy dredged material that has loamy pockets and lenses. They are moderately well drained.

Typical pedon of Canaveral sand, approximately 2,300 feet east and 900 feet south of the northwest corner of sec. 28, T. 54 S., R. 42 E., in Crandon County Park:

A—0 to 4 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; about 10 percent multicolored shell fragments, by volume; moderately alkaline; clear smooth boundary.

C1—4 to 50 inches; pale brown (10YR 6/3) sand; single grained; loose; about 20 percent multicolored shell fragments, by volume; moderately alkaline; clear smooth boundary.

C2—50 to 80 inches; gray (10YR 6/1) sand; single grained; loose; about 25 percent multicolored shell fragments, by volume; moderately alkaline.

The sandy material is more than 80 inches thick. Reaction ranges from neutral to moderately alkaline throughout the profile. Shell fragments, which are in all horizons, range from 2 millimeters to 2 centimeters in diameter.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. It is 4 to 8 inches thick. The content of shell fragments ranges from about 5 to 10 percent, by volume.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4. The texture is sand or fine sand. The content of shell fragments ranges from about 10 to 35 percent, by volume.

Cardsound Series

Soils of the Cardsound series are loamy, mixed (calcareous), hyperthermic Lithic Udorthents. They are very shallow, well drained, moderately slowly permeable soils underlain by oolitic limestone bedrock. They formed in loamy marine sediments and organic material that overlie limestone or are in shallow solution holes within the limestone. These soils are dominantly in natural areas on the Pineland Ridge. Slopes are smooth and are 0 to 2 percent.

Cardsound soils are closely associated with Krome soils. Krome soils have been rock-plowed and are used for crops.

Typical pedon of Cardsound silty clay loam, in an area of Cardsound-Rock outcrop complex, 2,000 feet north and 1,200 feet east of the southwest corner of sec. 26, T. 38 E., R. 57 S.

A—0 to 4 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine granular structure; friable; about 12 percent limestone gravel; strongly effervescent; moderately alkaline; many fine and medium roots; abrupt irregular boundary.

2R—4 inches; hard, porous, oolitic limestone.

The depth to limestone bedrock is 2 to 8 inches. Reaction is slightly acid or neutral in the A and C horizons.

The A horizon has hue of 5YR, 7.5YR, or 10YR and has value of 3 and chroma of 4 or value of 4 and chroma of 3 to 6. The content of limestone fragments is dominantly less than 15 percent, by volume. The fragments range from 2 millimeters to 25 centimeters (10 inches) in diameter.

The C horizon, if it occurs, has hue of 7.5YR or 5YR, value of 4, and chroma of 4 to 6. The texture is silty clay loam or silty clay. This horizon is noneffervescent.

Chekika Series

Soils of the Chekika series are loamy-skeletal, carbonatic, hyperthermic Lithic Udorthents. They are very shallow, somewhat poorly drained, moderately permeable soils underlain by limestone bedrock. They formed through scarification of oolitic limestone outcrops and marly sediments that partially cover the limestone and fill the many cavities or solution holes. These soils are adjacent to the Miami Ridge. Slopes are smooth and are 0 to 2 percent.

Chekika soils are closely associated with Biscayne, Krome, Cardsound, Matecumbe, Opalocka, Pennsuco, and Perrine soils. Biscayne, Pennsuco, and Perrine soils consist of limnic material (marl) and are very poorly drained or poorly drained. Biscayne soils have less than 35 percent gravel. Pennsuco and Perrine soils are nongravelly. Pennsuco soils are more than 40 inches deep over limestone bedrock. Perrine soils are 20 to 40 inches deep over limestone bedrock. Krome and Cardsound soils are well drained or somewhat excessively drained. They have dry value of less than 5.5. Cardsound and Opalocka soils are in unscarified areas of the pine woods. They are mapped in complexes with Rock outcrop. Matecumbe soils are nongravelly, very shallow, and organic. They are underlain by limestone bedrock.

Typical pedon of Chekika very gravelly loam, 500 feet east of canal C-111; 800 feet west and 200 feet north of the southeast corner of sec. 6, T. 57 S., R. 38 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) very gravelly loam, gray (10YR 6/1) dry; weak fine granular structure; very friable; about 45 percent limestone gravel; strongly effervescent; mildly alkaline; abrupt irregular boundary.

R—5 inches; hard, porous, oolitic limestone.

The depth to limestone bedrock ranges from 2 to 10 inches.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3 when moist. It has hue of 10YR, value of 6 or 7, and chroma of 1 or 2 when dry. The content of limestone fragments is dominantly 35 to 60 percent, by volume. The fragments range from 2 millimeters to 7.5 centimeters in diameter. Reaction is mildly alkaline or moderately alkaline.

The C horizon, if it occurs, has hue of 10YR, value of 2 to 4, and chroma of 1 to 4. The texture is silt loam or silty clay loam. The material in solution holes is noneffervescent. Some of the solution holes have dark gray or very dark gray pockets of silty clay loam or silty clay in root channels.

Dade Series

Soils of the Dade series are hyperthermic, uncoated Spodic Quartzipsamments. They are moderately deep, well drained, very rapidly permeable, mineral soils underlain by limestone bedrock. They formed in moderately thick beds of sandy marine sediments. These soils are on broad, low hills on the Miami Ridge. Slopes are smooth and are less than 2 percent.

Dade soils are closely associated with Basinger, Biscayne, Opalocka, Pomello, Plantation, and Terra Ceia soils. Basinger soils are poorly drained. Biscayne soils consist of limnic material (marl) and are poorly drained. Opalocka soils have limestone bedrock within a depth of 20 inches. They are mapped in a complex with Rock outcrop. Pomello soils are moderately well drained and do not have limestone bedrock within a depth of 80 inches. Plantation soils have an organic surface layer that is 8 to 16 inches thick and are poorly drained. Terra Ceia soils consist of organic material and are very poorly drained.

Typical pedon of Dade fine sand, approximately 2,100 feet east and 400 feet south of the northwest corner of sec. 31, T. 51 S., R. 42 E., in an abandoned pasture:

A—0 to 6 inches; dark gray (10YR 4/1) fine sand; single grained; loose; common fine and very fine roots; slightly acid; clear wavy boundary.

E—6 to 24 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; common fine and very fine roots; moderately acid; gradual wavy boundary.

Bh—24 to 27 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; common very fine roots; mildly alkaline; abrupt irregular boundary.

2Cr—27 inches; soft, porous limestone.

The depth to limestone bedrock ranges from 20 to 40 inches. It varies considerably within short distances. Solution holes are at a depth of more than 60 inches in some pedons.

The A horizon has hue of 10YR and has value of 3 or 4 and chroma of 2 or less or value of 5 and chroma of 1. It is 3 to 8 inches thick. Reaction ranges from moderately acid to mildly alkaline.

The E horizon has hue of 10YR and has value of 6 and chroma of 3 or less, value of 7 and chroma of 2 or less, or value of 8 and chroma of 1. It is 10 to 36 inches thick. Reaction ranges from moderately acid to mildly alkaline. The texture is fine sand or sand.

The Bh horizon has hue of 5YR and value and chroma of 3; hue of 7.5YR, value of 3, and chroma of 2; hue of 10YR, value of 3, and chroma of 2; or hue of 10YR, value of 4, and chroma of 2 to 4. It is 2 to 12 inches thick. Reaction ranges from slightly acid to mildly alkaline. The texture is fine sand or sand. In some pedons this horizon is discontinuous because of the contour of the underlying limestone. In these pedons the horizon occurs as pockets or lenses of Bh material. The matrix material has the same texture as the overlying E horizon and is similar in color.

Dania Series

Soils of the Dania series are euic, hyperthermic, shallow Lithic Medisaprists. They are very shallow or shallow, very poorly drained, rapidly permeable, organic soils underlain by limestone bedrock. They formed in thin layers of highly decomposed hydrophytic, nonwoody plant remains and may have layers of recent calcareous deposits that precipitated from fresh water. These soils are on the fringe of deeper organic soils in freshwater marshes. Slopes are less than 2 percent.

Dania soils are closely associated with Biscayne, Chekika, Hallandale, Lauderhill, Margate, Pahokee, Plantation, and Tamiami soils. Biscayne soils formed in marl that has a texture of silt loam. Chekika soils are of mineral origin, have more than 35 percent gravel, by volume, and are better drained than the Dania soils. Hallandale and Margate soils are of mineral origin. Also, Margate soils have limestone bedrock at a depth of 20 to 40 inches. Lauderhill soils have limestone bedrock at a depth of 20 to 36 inches. Pahokee soils have limestone bedrock at a depth of 36 to 51 inches. Plantation soils are dominantly sandy and have limestone bedrock at a depth of 20 to 40 inches. Tamiami soils are 21 to 51 inches deep over bedrock.

Typical pedon of Dania muck, depressional, in a freshwater marsh approximately 0.5 mile north of Tamiami Trail (U.S. Highway 41) and 0.75 mile west of SW. 137th Avenue; 0.25 mile east and 1,900 feet south of the northwest corner of sec. 3, T. 54 S., R. 39 E.

Oa—0 to 15 inches; muck, black (10YR 2/1) rubbed and unrubbed; about 8 percent fiber, 2 percent rubbed; massive; nonsticky and nonplastic; many fine and very fine roots; common fine and very fine tubular pores; noneffervescent; neutral; abrupt irregular boundary.

2R—15 inches; soft, porous, oolitic limestone.

The depth to limestone bedrock ranges from 8 to 20 inches. These soils can have one or more continuous layers of marl at any depth. The cumulative thickness of these layers is less than half of the total soil depth. Reaction is neutral in the Oa horizon and mildly alkaline or moderately alkaline in the marl.

The Oa horizon has hue of 10YR, value of 2, and chroma of 2 or less. It is 8 to 20 inches thick. The content of fiber is less than 33 percent before rubbing and less than 5 percent after rubbing. The sodium pyrophosphate extract has hue of 10YR, value of 3, and chroma of 2.

The 2C horizon, if it occurs, has hue of 10YR, value of 3 to 7, and chroma of 3 or less. It is 2 to 4 inches thick. The calcium carbonate equivalent ranges from 70 to nearly 100 percent. Reaction is moderately alkaline.

Demory Series

Soils of the Demory series are loamy, siliceous, hyperthermic Lithic Haplaquolls. They are very shallow or shallow, poorly drained, moderately slowly permeable soils underlain by limestone bedrock. They formed in loamy marine sediments and organic material over limestone bedrock. These soils are on narrow, low hammocks in areas between organic soils and poorly drained, sandy soils. Slopes are smooth and are less than 2 percent.

Demory soils are closely associated with Biscayne, Chekika, Dania, and Hallandale soils. Biscayne and Dania soils are very poorly drained. Biscayne soils formed in limnic material (marl). Dania soils are organic. Chekika soils formed through mechanical scarification of limestone bedrock and are better drained than the Demory soils. Hallandale soils are light colored and sandy.

Typical pedon of Demory sandy clay loam, in an area of Demory-Rock outcrop complex, approximately 1,800 feet west and 100 feet south of the northeast corner of sec. 10, T. 54 S., R. 39 E.

A1—0 to 4 inches; very dark brown (10YR) sandy clay loam; moderate fine granular structure; friable; many fine and very fine roots; neutral; clear wavy boundary.

A2—4 to 7 inches; black (10YR 2/1) sandy clay loam; weak fine subangular blocky structure; slightly sticky and nonplastic; common fine and very fine roots; many fine and very fine pores; neutral; abrupt smooth boundary.

C—7 to 10 inches; very dark brown (10YR 3/3) sandy loam that has black (10YR 2/1) streaks in old root channels; moderate fine subangular blocky structure; slightly sticky and nonplastic; few fine roots and pores; neutral; abrupt irregular boundary.

2R—10 inches; hard, porous limestone.

The depth to limestone bedrock ranges from 3 to 20 inches.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is 1 to 9 inches thick. Reaction is slightly acid or neutral. The texture is sandy clay loam, loamy sand, or sandy loam.

The A2 horizon, if it occurs, has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. In some pedons it has mottles or streaks in shades of brown, black, or gray. It is 0 to 8 inches thick. Reaction is slightly acid or neutral.

The C horizon, if it occurs, has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. It has mottles or streaks in shades of brown, black, or gray. It is 0 to 17 inches thick. Reaction ranges from neutral to moderately alkaline. The texture is fine sandy loam, sandy loam, or loamy fine sand.

The 2R horizon is hard, porous limestone that has a smooth or irregular surface. In some pedons a thin, discontinuous layer consisting of soft accumulations of calcium carbonate is directly over the bedrock.

Hallandale Series

Soils of the Hallandale series are siliceous, hyperthermic Lithic Psammaquents. They are very shallow or shallow, poorly drained, rapidly permeable soils underlain by limestone bedrock. They formed in thin beds of sandy marine sediments. These soils are on broad, low flats between the Everglades and the low, sandy coastal ridge. Slopes are less than 2 percent.

Hallandale soils are closely associated with Biscayne, Dania, Margate, and Plantation soils. Biscayne soils formed in limnic material (marl). Dania soils are organic. Margate soils have limestone bedrock at a depth of more than 20 inches. Plantation soils have a histic epipedon and have limestone bedrock at a depth of 20 to 40 inches.

Typical pedon of Hallandale fine sand, in an area of improved pasture about 1.7 miles west of State Road 26 and 2.9 miles north of U.S. Highway 41; approximately 1,800 feet east and 2,500 feet north of the southwest corner of sec. 28, T. 53 S., R. 40 E.

A—0 to 4 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; many fine and very fine roots; slightly acid; abrupt smooth boundary.

E—4 to 12 inches; light brownish gray (10YR 6/2) fine sand that has common black (10YR 2/1) and very dark gray (10YR 3/1) streaks in root channels; single grained; loose; common fine and very fine roots; neutral; clear smooth boundary.

Bw—12 to 16 inches; brown (10YR 5/3) fine sand; single grained; loose; mildly alkaline; abrupt irregular boundary.

2R—16 inches; soft, porous limestone that has a smooth or irregular surface.

The depth to limestone bedrock ranges from 7 to 20 inches.

The A or Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1. It is 2 to 7 inches thick. Reaction ranges from strongly acid to neutral. A thin, continuous layer of organic material overlies the A horizon in some areas.

The E horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 2. It is 0 to 8 inches thick. Reaction ranges from strongly acid to neutral.

The Bw1 horizon, if it occurs, has hue of 10YR, value of 5 to 7, and chroma of 3. It is 0 to 7 inches thick. The Bw2 horizon, if it occurs, has hue of 10YR and value and chroma of 4. The Bw1 and Bw2 horizons range from moderately acid to moderately alkaline. They are fine sand.

The C horizon, if it occurs, has hue of 10YR and has value of 4 and chroma of 2 or value of 5 and chroma of 2 or 3. Reaction is moderately acid. The texture is fine sand.

In some pedons the 2R horizon has solution holes several inches to several feet wide and as much as 3 feet deep. The soil material in the solution holes is fine sand, loamy fine sand, or the gravelly analogs of those textures. Reaction is mildly alkaline or moderately alkaline. Thin, discontinuous layers consisting of soft accumulations of calcium carbonate directly overlie the limestone.

Kesson Series

Soils of the Kesson series are siliceous, hyperthermic Typic Psammaquents. They are very deep, very poorly drained, moderately rapidly permeable soils that formed in thick deposits of sandy marine sediments and shell fragments. These soils are in tidal swamps and marshes. They are flooded twice daily. Slopes are 0 to 1 percent.

Kesson soils are closely associated with Beaches and with Canaveral and St. Augustine soils. Canaveral and St. Augustine soils are somewhat poorly drained and are in the higher landscape positions.

Typical pedon of Kesson muck, tidal, on Key Biscayne; approximately 1,900 feet west and 1,800 feet south of the northeast corner of sec. 32, T. 54 S., R. 42 E., in a mangrove swamp:

Oa—0 to 6 inches; black (10YR 2/1) muck; massive; nonsticky and nonplastic; less than 33 percent fiber unrubbed, less than 5 percent rubbed; many very fine and fine roots; neutral; clear smooth boundary.

A—6 to 12 inches; dark gray (10YR 4/1) fine sand; many medium distinct black (10YR 2/1) mottles; single grained; loose; many very fine and fine roots; about 15 percent shell fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

Cg1—12 to 33 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many very fine and fine roots; about 15 percent shell fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cg2—33 to 80 inches; light gray (10YR 7/1) fine sand; single grained; loose; common very fine and fine roots; about 10 percent shell fragments; strongly effervescent; moderately alkaline.

Reaction is neutral to moderately alkaline throughout the profile. The soils are calcareous.

The Oa horizon, if it occurs, is less than 7 inches thick. It has hue of 10YR, value of 2, and chroma of 2 or less.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 2 or less. It is 2 to 6 inches thick. The content of shell fragments ranges from 5 to 15 percent, by volume. The fragments are 2 millimeters to 4 centimeters in diameter.

The Cg horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or less. The content of shell fragments ranges from 5 to 20 percent.

Krome Series

Soils of the Krome series are loamy-skeletal, carbonatic, hyperthermic Lithic Udorthents. They are very shallow, moderately well drained, moderately permeable soils underlain by limestone bedrock. They formed through scarification of oolitic limestone outcrops and the loamy residuum that partially covers the limestone and fills the many cavities or solution holes. These soils are on broad, very low hills on the Miami Ridge. Slopes are dominantly 0 to 2 percent but range to 5 percent.

Krome soils are closely associated with Biscayne, Chekika, Cardsound, Matecumbe, Pennsuco, and Perrine soils. Biscayne, Pennsuco, and Perrine soils consist of limnic material (marl) and are very poorly drained or poorly drained. Biscayne soils have less than 35 percent gravel. Pennsuco and Perrine soils are nongravelly. Pennsuco soils have limestone bedrock at a depth of more than 40 inches. Perrine soils have limestone bedrock at a depth of 20 to 40 inches. Chekika soils are somewhat poorly drained. They have dry value of more than 5.5. Cardsound soils are in unscarified areas of the pine woods. They are mapped in a complex with Rock outcrop. Matecumbe soils are organic and are very shallow over limestone bedrock.

Typical pedon of Krome very gravelly loam, 0.5 mile northeast of Homestead General Airport; 500 feet west and 100 feet south of the northeast corner of sec. 5, T. 57 S., R. 38 E.

Ap—0 to 7 inches; dark brown (10YR 3/3) very gravelly loam, brown (10YR 5/3) dry; weak medium granular structure; very friable; about 40 percent, by volume, hard limestone fragments 3 inches or less in diameter; strongly effervescent; mildly alkaline; abrupt irregular boundary.

R—7 inches; hard, porous, oolitic limestone.

The depth to limestone bedrock is 3 to 9 inches.

The Ap horizon has hue of 10YR, 7.5YR, or 5YR, value of 3, and chroma of 2 or 3 when moist. It has hue of 10YR, value of 3 to 5, and chroma of 2 or 3 when dry. The content of limestone fragments is dominantly 35 to 60 percent, by volume, but ranges to 70 percent. The fragments range from 2 millimeters to 7.5 centimeters in diameter. Reaction is mildly alkaline or moderately alkaline.

The C horizon, if it occurs, has hue of 5YR and has value of 4 or 5 and chroma of 3 to 6 or value of 5 and chroma of 8, or it has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 8. The texture is silt loam, silty clay loam, clay loam, or silty clay. The material in solution holes is noneffervescent. Some of the solution holes have dark gray or very dark gray pockets of silty clay loam or silty clay in root channels.

Lauderhill Series

Soils of the Lauderhill series are euic, hyperthermic Lithic Medisaprists. They are moderately deep, very poorly drained, rapidly permeable, organic soils that formed in moderately thick beds of hydrophytic, nonwoody plant remains. These soils are in large freshwater marshes. Slopes are less than 1 percent.

Lauderhill soils are closely associated with Biscayne, Dania, Pahokee, Pennsuco, Perrine, Plantation, and Tamiami soils. Biscayne, Pennsuco, and Perrine soils consist of limnic material (marl). Biscayne and Dania soils have limestone bedrock within a depth of 20 inches. Pennsuco soils have limestone bedrock at a depth of more than 40 inches. Pahokee soils have limestone bedrock at a depth of 36 to 51 inches. Plantation soils are sandy. Tamiami soils have one or more continuous layers of marl within the control section.

Typical pedon of Lauderhill muck, depressional, approximately 2 miles east of Tallahassee Road and 500 feet north of North Canal; lat. 25 degrees 27 minutes 50 seconds N. and long. 80 degrees 22 minutes 46 seconds W.

Oa1—0 to 7 inches; black (10YR 2/1) muck; about 15 percent fiber unrubbed, less than 5 percent rubbed; massive; slightly sticky and nonplastic; brown (10YR 5/3) sodium pyrophosphate extract; many fine and very fine roots; neutral (pH 7.0 in 0.01 *M* $CaCl_2$); gradual wavy boundary.

Oa2—7 to 30 inches; very dark brown (10YR 2/2) muck; less than 15 percent fiber unrubbed; massive; slightly sticky and nonplastic; brown (10YR 5/3) sodium pyrophosphate extract; common very fine and fine roots; neutral (pH 6.9 in 0.01 *M* $CaCl_2$); abrupt irregular boundary.

2R—30 inches; hard, porous, oolitic limestone.

The organic material ranges from 20 to 36 inches in thickness. Reaction ranges from 6.5 to 7.2 in 0.01 *M* $CaCl_2$.

The Oa horizon has hue of 10YR, value of 2, and chroma of 1 or 2. The content of fiber is 15 to 30 percent before rubbing and less than 10 percent after rubbing. The sodium pyrophosphate extract has hue of 10YR or 5YR. It has value of 2 to 4 and chroma of 4 or less, value of 5 and chroma of 2 to 8, value of 6 and chroma of 3 to 8, or value of 7 and chroma of 4 to 8. In some pedons this horizon has discontinuous lenses or pockets of marl.

Margate Series

Soils of the Margate series are siliceous, hyperthermic Mollic Psammaquents. They are moderately deep, poorly drained, rapidly permeable soils underlain by limestone bedrock. They formed in moderately thick beds of sandy marine sediments. These soils are on low terraces between the Everglades and the low, sandy coastal ridge. Slopes are less than 2 percent.

Margate soils are closely associated with Hallandale and Plantation soils. Hallandale soils have limestone bedrock within a depth of 20 inches. Plantation soils have a histic epipedon.

Typical pedon of Margate fine sand, in an area of pasture approximately 400 feet west of Red Road and 2,200 feet north of the Palmetto Expressway (State Road 826); 400 feet west and 1,200 feet north of the southeast corner of sec. 12, T. 52 S., R. 40 E.

A—0 to 9 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; many fine and very fine roots; moderately acid; abrupt smooth boundary.

E—9 to 18 inches; light brownish gray (10YR 6/2) fine sand; few fine black (10YR 2/1) and very dark gray (10YR 3/1) streaks in root channels; single grained; loose; few fine and very fine roots; moderately acid; gradual wavy boundary.

Bw1—18 to 28 inches; brown (10YR 5/3) fine sand; single grained; loose; few very fine roots; slightly acid; clear wavy boundary.

Bw2—28 to 36 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; neutral; abrupt irregular boundary.

2R—36 inches; soft, porous limestone.

The depth to limestone bedrock ranges from 20 to 40 inches. In some pedons a thin horizon of gravel-sized, hard limestone fragments or soft accumulations of calcium carbonate overlies the limestone.

The A horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1. It is 5 to 10 inches thick. Reaction is moderately acid or slightly acid.

The E horizon has value of 6 or 7 and chroma of 2 or less. It is 8 to 15 inches thick. Reaction is moderately acid or slightly acid.

The Bw1 horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. It is 5 to 10 inches thick. Reaction is slightly acid to mildly alkaline.

The Bw2 horizon, if it occurs, has value of 4 or 5 and chroma of 2 to 4. It is 0 to 10 inches thick. Reaction is neutral or mildly alkaline.

The 2R horizon is soft, porous limestone that has a smooth or irregular surface. In some pedons it has solution holes several inches to several feet wide and as much as 3 feet deep.

Matecumbe Series

Soils of the Matecumbe series are euic, isohyperthermic Lithic Tropofolists. They are very shallow, moderately well drained, rapidly permeable, organic soils underlain by oolitic limestone bedrock. These soils are on small tropical hardwood hammocks on the Miami Ridge and in the Everglades. Slopes are less than 2 percent.

Matecumbe soils are closely associated with Biscayne, Cardsound, and Pennsuco soils. Biscayne soils consist of limnic material (marl) and are very poorly drained or poorly drained. Cardsound soils are in unscarified areas of the pine woods. They are mapped in a complex with Rock outcrop. Pennsuco soils consist of marl and are poorly drained or very poorly drained.

Typical pedon of Matecumbe muck, 2,300 feet west and 1,300 feet north of the southeast corner of sec. 30, T. 56 S., R. 39 E.

Oa—0 to 3; black (10YR 2/1) muck; about 25 percent fiber unrubbed, less than 5 percent rubbed; neutral; abrupt irregular boundary.

2R—3 inches; soft, porous, oolitic limestone.

The depth to bedrock is 2 to 5 inches. The Oa horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is moderately acid to neutral. The 2R horizon consists of soft coral or oolitic limestone. It has solution holes that contain silty clay loam, silty clay, or muck.

Opalocka Series

Soils of the Opalocka series are sandy, siliceous, hyperthermic Lithic Udorthents. They are very shallow, well drained, very rapidly permeable, sandy soils underlain by oolitic limestone bedrock. They formed in sandy marine sediments over oolitic limestone. These soils are dominantly in natural areas on the Atlantic Coastal Ridge and the Pineland Ridge. Slopes are smooth and are 1 to 2 percent.

Opalocka soils are closely associated with Krome soils. Krome soils have been rock-plowed and are used for crops.

Typical pedon of Opalocka sand, in an area of Opalocka-Rock outcrop complex, 450 feet east and 1,300 feet south of the northwest corner of sec. 35, T. 56 S., R. 39 E.

A—0 to 6 inches; brown (10YR 4/3) sand; single grained; loose; about 10 percent, by volume, hard limestone fragments 3 inches or less in diameter; noneffervescent; neutral; many fine and medium roots; abrupt irregular boundary.

Cr—6 inches; hard, porous, oolitic limestone.

The depth to weathered limestone bedrock is 2 to 8 inches, but solution holes are as deep as 20 inches.

The A horizon has value of 4 to 6 and chroma of 1 to 8. It is slightly acid or neutral. The content of weathered limestone fragments less than 3 inches in diameter is less than 15 percent, by volume.

The Cr horizon is light gray to brownish yellow, continuous, oolitic limestone. The surface is extremely pitted with solution holes. These holes range from less than 1 inch to about 10 inches in diameter. They are filled with sand or loamy sand residuum.

Pahokee Series

Soils of the Pahokee series are euic, hyperthermic Lithic Medisaprists. They are moderately deep or deep, very poorly drained, rapidly permeable, organic soils underlain by limestone bedrock. They formed in moderately thick or thick beds of hydrophytic, nonwoody plant remains. These soils are in large freshwater swamps and marshes. Slopes are less than 1 percent.

Pahokee soils are closely associated with Dania, Lauderhill, and Tamiami soils and the tidal Terra Ceia soils. Dania soils are less than 20 inches deep over limestone bedrock. Lauderhill soils are 20 to 36 inches deep over limestone bedrock. Tamiami soils have one or more layers of marl within the control section. The tidal Terra Ceia soils are more than 51 inches deep over limestone bedrock and are saline.

Typical pedon of Pahokee muck, depressional, approximately 2,300 feet north and 200 feet east of the southwest corner of sec. 19, T. 53 S., R. 39 E.

Oa1—0 to 11 inches; black (10YR 2/1) muck; about 15 percent fiber unrubbed, less than 5 percent rubbed; massive; slightly sticky and nonplastic; many very fine and fine roots; yellowish brown (10YR 5/4) sodium pyrophosphate extract; neutral (pH 7.3 in 0.01 *M* $CaCl_2$); gradual wavy boundary.

Oa2—11 to 46 inches; very dark brown (10YR 2/2) muck; massive; slightly sticky and nonplastic; common very fine and fine roots; yellowish brown (10YR 5/4) sodium pyrophosphate extract; neutral (pH 7.3 in 0.01 *M* $CaCl_2$); abrupt irregular boundary.

2R—46 inches; hard, porous, oolitic limestone.

The depth to limestone bedrock ranges from 36 to 51 inches. Reaction is slightly acid or neutral in 0.01 *M* $CaCl_2$.

The Oa horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2. The content of fiber is less than 20 percent before rubbing and less than 5 percent after rubbing. The sodium pyrophosphate extract has hue of 10YR and has value of 2 to 4 and chroma of 4 or less, value of 5 and chroma of 2 to 4, or value of 6 and chroma of 3 or 4. A thin layer of periphyton or marl overlies the Oa horizon in some pedons.

Pennsuco Series

Soils of the Pennsuco series are coarse-silty, carbonatic, hyperthermic Typic Fluvaquents. They are deep or very deep, poorly drained or very poorly drained, moderately slowly permeable soils underlain by oolitic limestone bedrock. They formed in calcareous, silty recent sediments of marine or freshwater origin. These soils are on broad, low coastal flats and in marshes and sloughs. Slopes are less than 1 percent.

Pennsuco soils are closely associated with Biscayne, Chekika, Krome, Lauderhill, Pahokee, Perrine, and Terra Ceia soils. Biscayne soils have limestone bedrock within a depth of 20 inches. Chekika and Krome soils have less than 50 percent silt in the fine-earth fraction, have limestone bedrock within a depth of 10 inches, and have more than 35 percent gravel. Lauderhill, Pahokee, and Terra Ceia soils are dominantly organic. Perrine soils have limestone bedrock at a depth of 20 to 40 inches.

Typical pedon of Pennsuco marl, drained, in an area of cropland approximately 300 feet north of Mowry Drive and 1.5 miles west of Tallahassee Road; 300 feet north and 100 feet east of the center of sec. 16, T. 57 S., R. 39 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) marl that has a texture of silt loam; moderate medium granular structure; slightly sticky and nonplastic; few very fine and fine roots; about 15 percent shell fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Cg1—8 to 27 inches; grayish brown (10YR 5/2) marl that has a texture of silt loam; common fine light gray (10YR 7/2) mottles; moderate medium angular blocky structure; slightly sticky and nonplastic; many fine and medium continuous pores; few very fine and fine roots; about 15 percent shell fragments; strongly effervescent; moderately alkaline; gradual smooth boundary.

Cg2—27 to 36 inches; dark gray (10YR 4/1) marl that has a texture of silt loam; common fine and medium light gray (10YR 7/1) mottles; moderate medium angular blocky structure; slightly sticky and nonplastic; many fine and medium continuous pores; few very fine and fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

Cg3—36 to 44 inches; dark gray (10YR 4/1) marl that has a texture of silt loam; common fine and medium light gray (10YR 7/1) mottles; moderate medium angular blocky structure; slightly sticky and nonplastic; common fine and medium continuous pores; few very fine and fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

2Cr—44 inches; soft, porous, oolitic limestone.

The depth to limestone bedrock ranges from 40 to 80 inches. Many pedons have thin pockets and lenses in which organic matter has accumulated. In many pedons some or all horizons have snail shells and snail shell fragments. The soils are nonsaline to saline. Reaction is mildly alkaline or moderately alkaline in the A and C horizons.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or less and in some pedons has fine faint gray and very pale brown pockets. It is 1 to 12 inches thick. Dry matrix values are 6 or 7. Where matrix values are 3.5 or less, the A horizon is less than 10 inches thick. In some areas as much as 8 inches of local soil material has been added to the original surface as a result of land leveling. The calcium carbonate equivalent ranges from 70 to nearly 100 percent. A thin layer of organic material overlies the A horizon in some pedons.

The Cg horizon generally has hue of 10YR to 5Y, value of 4 to 7, and chroma of 3 or less and in some pedons has pockets and lenses of silt loam, mucky silt loam, or muck with hue of 10YR, value of 2 or 3, and chroma of 3 or less. In some pedons the upper part of this horizon has few or common fine, high-chroma mottles.

The 2Cr horizon is soft, porous limestone that has a smooth or wavy surface. It has few or common solution holes.

Perrine Series

Soils of the Perrine series are coarse-silty, carbonatic, hyperthermic Typic Fluvaquents. They are moderately deep, poorly drained or very poorly drained, moderately slowly permeable soils underlain by limestone bedrock. They formed in calcareous, silty recent sediments of marine or freshwater origin. These soils are on broad, low coastal flats and in marshes and sloughs. Slopes are less than 1 percent.

Perrine soils are closely associated with Biscayne, Chekika, Krome, Lauderhill, Pennsuco, and Tamiami soils. Biscayne soils have limestone bedrock within a depth of 20 inches. Chekika and Krome soils have less than 50 percent silt in the fine-earth fraction, have limestone bedrock within a depth of 10 inches, and have more than 35 percent gravel. Also, Krome soils are in the higher landscape positions. Lauderhill soils are dominantly organic. Pennsuco soils have limestone bedrock at a depth of more than 40 inches. Tamiami soils are organic.

Typical pedon of Perrine marl, drained, in an area of abandoned cropland (University of Florida Research Farm) 200 feet north of Canal Drive and 30 feet west of a field road; lat. 25 degrees 27 minutes 51 seconds N. and long. 80 degrees 22 minutes 23 seconds W.

Ap—0 to 11 inches; grayish brown (10YR 5/2) marl that has a texture of silt loam; moderate medium granular structure; slightly sticky and nonplastic; few very fine and fine continuous pores; many very fine and fine and few medium roots; about 14 percent shell fragments; moderately alkaline; abrupt smooth boundary.

Cg1—11 to 16 inches; light brownish gray (10YR 6/2) marl that has a texture of silt loam; common fine and medium grayish brown (10YR 5/2) vertical streaks; moderate medium angular blocky structure; slightly sticky and nonplastic; many very fine and fine continuous pores; common very fine and fine and few medium roots; about 13 percent shell fragments; moderately alkaline; clear smooth boundary.

Cg2—16 to 26 inches; light gray (10YR 7/2) marl that has a texture of silt loam; many coarse grayish brown (10YR 5/2) horizontal layers; moderate medium angular blocky structure; slightly sticky and nonplastic; common very fine, fine, and medium roots; about 10 percent shell fragments; moderately alkaline; abrupt smooth boundary.

2Cr—26 inches; soft, porous, oolitic limestone.

The depth to limestone bedrock ranges from 20 to 40 inches.

The A or Ap horizon has hue of 10YR, value of 3 to 6, and chroma of 2 or less. It has value of 6 or more when dry. Where matrix values are 3.5 or less, the A horizon is less than 10 inches thick. A thin layer of organic material overlies the A horizon in some pedons.

The Cg horizon generally has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 or less and in some pedons has mottles or stains in shades of gray, brown, or yellow. This horizon is 7 to 15 inches thick. Some pedons have continuous layers of calcareous or noncalcareous silt loam, mucky silt loam, or silty clay loam. Value of 2 or 3 and chroma of 2 or less can occur within the Cg horizon or directly above the limestone. The layers having these colors are 5 inches or less thick.

The 2Cr horizon is soft, porous limestone that has a smooth or irregular surface.

Plantation Series

Soils of the Plantation series are sandy, siliceous, hyperthermic Histic Humaquepts. They are moderately deep, very poorly drained, rapidly permeable soils that formed in thin beds of hydrophytic, nonwoody plant remains and are underlain by sandy marine sediments and limestone bedrock. These soils are in or at the edge of large marshes and swamps. Slopes are less than 1 percent.

Plantation soils are closely associated with Dania, Hallandale, Lauderhill, and Margate soils and with Udorthents and Urban land. Dania and Lauderhill soils are organic. Dania and Hallandale soils have limestone bedrock within a depth of 20 inches. Hallandale and Margate soils do not have an organic surface layer that is 8 or more inches thick. Udorthents consist of extremely gravelly fill material derived from excavated areas. In areas of Urban land, more than 60 percent of the surface is covered by concrete and buildings.

Typical pedon of Plantation muck, about 0.5 mile west of State Road 826 and 2.5 miles south of the Dade-Broward County line; approximately 1,800 feet west and 2,800 feet south of the northeast corner of sec. 15, T. 52 S., R. 40 E.

Oa1—0 to 6 inches; black (10YR 2/1) muck; about 15 percent fiber unrubbed, less than 5 percent rubbed; massive; slightly sticky and nonplastic; many fine roots; very dark brown (10YR 2/2) sodium pyrophosphate extract; moderately acid (pH 6.0 in 0.01 *M* $CaCl_2$); gradual wavy boundary.

Oa2—6 to 14 inches; dark reddish brown (5YR 3/2) muck; about 5 percent fiber unrubbed, less than 5 percent rubbed; massive; slightly sticky and nonplastic; common fine roots; dark brown or brown (10YR 4/3) sodium pyrophosphate extract; neutral (pH 6.8 in 0.01 *M* $CaCl_2$); abrupt smooth boundary.

A—14 to 21 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; few fine roots; slightly acid; clear smooth boundary.

C1—21 to 28 inches; light gray (10YR 7/1) fine sand; single grained; loose; neutral; gradual wavy boundary.

C2—28 to 30 inches; brown (10YR 5/3) very gravelly fine sand; single grained; loose; about 40 percent limestone fragments; moderately alkaline; abrupt irregular boundary.

2R—30 inches; soft, porous limestone.

The depth to limestone bedrock ranges from 20 to 40 inches. The organic material is 8 to 16 inches thick. Reaction ranges from very strongly acid to neutral in the Oa horizon and from strongly acid to moderately alkaline in the A and C horizons.

The Oa1 horizon has hue of 10YR, value of 2, and chroma of 1. The content of fiber is less than 15 percent before rubbing and less than 5 percent after rubbing. The sodium pyrophosphate extract has hue of 10YR and has value of 2 to 4 and chroma of 4 or less, value of 5 and chroma of 2 to 4, or value of 6 and chroma of 3 or 4.

The Oa2 horizon, if it occurs, has hue of 5YR, value of 2 or 3, and chroma of 2. The content of fiber is less than 33 percent before rubbing and less than 5 percent after rubbing. The sodium pyrophosphate extract has the same colors as that in the Oa1 horizon.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. It is 5 to 9 inches thick.

The C1 horizon has hue of 10YR, value of 4 to 7, and chroma of 3 or less. The C2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3. The C1 and C2 horizons are sand or fine sand.

Pomello Series

Soils of the Pomello series are sandy, siliceous, hyperthermic Arenic Haplohumods. They are very deep, moderately well drained, moderately rapidly permeable soils that formed in thick beds of sandy marine sediments. These soils are on moderately high hills on the Miami Ridge. Slopes are smooth and are 0 to 2 percent.

Pomello soils are closely associated with Basinger, Dade, and Margate soils. Basinger and Margate soils are poorly drained. Dade and Margate soils have limestone bedrock at a depth of 20 to 40 inches. Dade soils are well drained.

Typical pedon of Pomello sand, about 0.5 mile north of Miami Gardens Drive and 0.5 mile west of State Road 817; 2,500 feet east and 2,900 feet north of the southwest corner of sec. 4, T. 52 S., R. 41 E., in an abandoned pasture:

Ap—0 to 5 inches; dark gray (10YR 4/1) sand; single grained; loose; common very fine and fine roots; moderately acid; clear smooth boundary.

E1—5 to 15 inches; light gray (10YR 7/2) sand; single grained; loose; common very fine and fine roots; moderately acid; gradual wavy boundary.

E2—15 to 35 inches; gray (10YR 6/1) sand; single grained; loose; common medium dark grayish brown (10YR 4/2) streaks and pockets; common very fine roots; moderately acid; abrupt wavy boundary.

Bh1—35 to 55 inches; very dark grayish brown (10YR 3/2) sand; single grained; loose; common medium dark brown (7.5YR 4/4) streaks and pockets; moderately acid; gradual wavy boundary.

Bh2—55 to 76 inches; very dark grayish brown (10YR 3/2) sand; single grained; loose; common medium brownish yellow (10YR 6/6) streaks and pockets; moderately acid; clear wavy boundary.

BC—76 to 80 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; slightly acid.

The solum ranges from 40 to more than 80 inches in thickness. It is sand or fine sand throughout. It ranges from very strongly acid to slightly acid.

The A horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. It is 2 to 6 inches thick. The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. The combined thickness of the A and E horizons ranges from 40 to 50 inches.

The Bh horizon generally has hue of 10YR to 5YR, value of 2 or 3, and chroma of 1 to 3. In some pedons, however, it has pockets or lenses with hue of 10YR, value of 4 to 6, and chroma of 3 to 6.

The BC horizon has hue of 10YR, value of 4 to 7, and chroma of 2 to 8. The C horizon, if it occurs, has colors similar to those of the BC horizon.

St. Augustine Series

Soils of the St. Augustine series are sandy, siliceous, hyperthermic Alfic Udarents. They are very deep, somewhat poorly drained, moderately rapidly permeable soils that formed in thick beds of sandy dredged material. They consist of sandy material containing loamy fragments and fragments of shells. These soils are along the Atlantic Coast. Slopes are less than 2 percent.

St. Augustine soils are closely associated with Beaches.

Typical pedon of St. Augustine sand, approximately 2,200 feet south and 500 feet east of the northwest corner of sec. 9, T. 55 S., R. 42 E., in Bill Boggs Cape Florida State Recreational Area:

A—0 to 3 inches; dark brown (10YR 3/2) sand; single grained; loose; less than 5 percent, by volume, shell fragments; moderately alkaline; gradual wavy boundary.

C1—3 to 29 inches; light gray (10YR 7/2) sand; single grained; loose; about 10 percent, by volume, shell fragments; moderately alkaline; gradual wavy boundary.

C2—29 to 51 inches; gray (10YR 5/1) sand that has common fine brown (10YR 5/2) lenses of silt loam; moderate medium subangular blocky structure parting to weak fine granular; nonsticky and nonplastic; about 35 percent, by volume, shell fragments; moderately alkaline; clear smooth boundary.

Cg1—51 to 57 inches; light gray (10YR 7/2) and light brownish gray (10YR 6/2) sand that has few fine gray (10YR 5/1) lenses of silt loam; moderate medium subangular blocky structure parting to weak fine granular; nonsticky and nonplastic; moderately alkaline; gradual wavy boundary.

Cg2—57 to 80 inches; gray (5Y 5/1) sand; single grained; loose; mildly alkaline.

The depth to limestone bedrock is more than 80 inches. Shells and shell fragments in all horizons are sand sized to 5 centimeters in diameter.

The A horizon is 2 to 3 inches thick. The content of shell fragments is less than 5 percent, by volume. This horizon is moderately effervescent in 10 percent hydrochloric acid. It is mildly alkaline or moderately alkaline.

The C1 and C2 horizons generally have hue of 10YR, value of 5 to 7, and chroma of 1 to 3 and in some pedons have lenses of marly silt loam in shades of brown or gray. The C1 horizon is 18 to 26 inches thick, and the C2 horizon is 6 to 22 inches thick. The content of shell fragments ranges from 20 to 35 percent, by volume.

The Cg horizon has hue of 10YR, value of 6 or 7, and chroma of 2 or hue of 5YR, value of 5 or 6, and chroma of 1. It is more than 29 inches thick. Reaction is mildly alkaline or moderately alkaline.

Tamiami Series

Soils of the Tamiami series are euic, hyperthermic Lithic Medisaprists. They are moderately deep or deep, very poorly drained soils that formed in moderately thick beds of hydrophytic, nonwoody plant remains and water-deposited, silt-sized carbonates (marl). They are underlain by oolitic limestone bedrock. They are rapidly permeable in the sapric layers and moderately permeable in the layers of marl. These soils are in large freshwater marshes. Slopes are less than 2 percent.

Tamiami soils are closely associated with Biscayne, Dania, Lauderhill, Pahokee, and Perrine soils. Biscayne and Perrine soils are dominantly marl. Biscayne and Dania soils are less than 20 inches deep over limestone bedrock. Lauderhill and Pahokee soils do not have layers of marl within the control section.

Typical pedon of Tamiami muck, depressional, approximately 500 feet west of Krome Avenue and 3,000 feet south of Tamiami Trail (U.S. Highway 41); lat. 25 degrees 45 minutes 9 seconds N. and long. 80 degrees 27 minutes 57 seconds W.

Oa—0 to 4 inches; black (10YR 2/1) muck; less than 5 percent fiber rubbed; massive; slightly sticky and nonplastic; many very fine and fine roots; neutral; abrupt smooth boundary.

Cg—4 to 12 inches; gray (10YR 6/1) marl that has a texture of silt loam; moderate medium subangular blocky structure; slightly sticky and nonplastic; many very fine and fine roots; common fine pores; about 15 percent whole shells and shell fragments as much as 5 centimeters in diameter; strongly effervescent; mildly alkaline; abrupt smooth boundary.

O′a—12 to 31 inches; very dark gray (5YR 3/1) muck; less than 5 percent fiber rubbed; massive; slightly sticky and nonplastic; few fine roots; neutral; abrupt irregular boundary.

R—31 inches; hard, porous, oolitic limestone.

The depth to limestone bedrock ranges from 21 to 51 inches. The soils can have one or more Cg horizons at any depth. The combined thickness of these horizons is less than half of the control section.

The Oa horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The content of fiber is less than 33 percent before rubbing and less than 5 percent after rubbing. A thin layer of periphyton or marl overlies the Oa horizon in some pedons.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 2 or less. It is 6 to 12 inches thick. It may contain as much as 20 percent whole shells or shell fragments. The calcium carbonate equivalent ranges from 80 to nearly 100 percent.

Terra Ceia Series

Soils of the Terra Ceia series are euic, hyperthermic Typic Medisaprists. They are very deep, very poorly drained, rapidly permeable, organic soils that formed in thick beds of hydrophytic, nonwoody plant remains. These soils are in narrow saltwater swamps and marshes along the coast. They typically are flooded twice daily. Slopes are less than 1 percent.

Terra Ceia soils are closely associated with Pahokee soils, the tidal Pennsuco soils, and the tidal Perrine soils. Pahokee soils are 36 to 51 inches deep over limestone bedrock and are in freshwater swamps and marshes. The tidal Pennsuco and Perrine soils formed in mineral material. Also, the tidal Perrine soils are 20 to 40 inches deep over limestone bedrock.

Typical pedon of Terra Ceia muck, tidal, about 5.5 miles east of Card Sound Road and 6.0 miles south of Palm Drive; approximately 700 feet north and 100 feet west of the southeast corner of sec. 28, T. 58 S., R. 40 E.

Oa1—0 to 8 inches; very dark brown (10YR 2/2) muck; about 30 percent fiber unrubbed, less than 10 percent rubbed; massive; nonsticky and nonplastic; many very fine and fine and common medium roots; pale brown (10YR 6/3) sodium pyrophosphate extract; mildly alkaline (pH 8.0 in 0.01 $M\ CaCl_2$); gradual smooth boundary.

Oa2—8 to 24 inches; black (10YR 2/1) muck; about 35 percent fiber unrubbed, less than 10 percent rubbed; massive; nonsticky and nonplastic; many very fine and fine and common medium roots; pale brown (10YR 6/3) sodium pyrophosphate extract; mildly alkaline (pH 7.8 in 0.01 $M\ CaCl_2$); gradual wavy boundary.

Oa3—24 to 80 inches; black (10YR 2/2) muck; about 35 percent fiber unrubbed, less than 10 percent rubbed; massive; nonsticky and nonplastic; few fine roots; pale brown (10YR 6/3) sodium pyrophosphate extract; mildly alkaline.

The organic material ranges from 51 to 80 inches in thickness. Reaction ranges from neutral to moderately alkaline throughout the profile.

The Oa horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2. The content of fiber is less than 33 percent before rubbing and less than 10 percent after rubbing. The sodium pyrophosphate extract has hue of 10YR. It has value of 2 to 4 and chroma of 4 or less, value of 5 and chroma of 2 to 8, value of 6 and chroma of 3 to 8, or value of 7 and chroma of 4 to 8. A thin layer of periphyton or marl overlies the Oa horizon in some pedons.

Vizcaya Series

Soils of the Vizcaya series are clayey, mixed, hyperthermic Lithic Haplaquolls. They are very shallow or shallow, very poorly drained, slowly permeable, mineral soils underlain by oolitic limestone bedrock. They formed in thin beds of loamy and clayey marine sediments. These soils are in broad, low freshwater marshes in the Everglades. Slopes are 0 to 2 percent.

Vizcaya soils are closely associated with Biscayne, Chekika, and Dania soils and with Rock outcrop. Biscayne soils consist of limnic material (marl). Chekika soils are very gravelly. Dania soils are organic.

Typical pedon of Vizcaya mucky silt loam, in an area of Rock outcrop-Vizcaya-Biscayne complex, approximately 7,700 feet west and 2,000 feet north of an entrance road to Chekika Park; lat. 25 degrees 37 minutes 19 seconds N. and long. 80 degrees 35 minutes 56 seconds W.

A—0 to 6 inches; very dark gray (10YR 3/1) mucky silt loam; moderate medium granular structure; slightly sticky and nonplastic; about 20 percent snail shell fragments; neutral; abrupt smooth boundary.

C—6 to 15 inches; black (10YR 2/1) clay; massive; slightly sticky and nonplastic; about 10 percent snail shell fragments; neutral; abrupt irregular boundary.

2R—15 inches; hard, porous, oolitic limestone.

The depth to limestone bedrock ranges from 4 to 20 inches. Reaction is neutral or mildly alkaline in the A and C horizons.

The A horizon has hue of 10YR and value and chroma of 3 or less when moist. It has hue of 10YR, value of 3 to 5, and chroma of 2 or 3 when dry. A thin layer of periphyton or marl overlies the A horizon in some pedons.

The C horizon has hue of 10YR and value and chroma of 3 or less when moist. It has hue of 10YR, value of 3 to 5, and chroma of 2 or 3 when dry. The texture is clay, sandy clay, or sandy clay loam.

In many pedons the 2R horizon has solution holes several inches to several feet wide and as much as 3 feet deep.

Formation of the Soils

Soil forms through processes that act on deposited or accumulated geologic material. The kind of soil that forms depends on five major factors—the type of parent material; the climate under which the soil material has existed since accumulation; the plant and animal life in and on the soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material.

The five soil-forming factors are interdependent. Each modifies the effect of the others. Any one of the five factors can have more influence than the others on the formation of a soil and can account for most of its properties. For example, if the parent material is quartz sand, the soil generally has weakly expressed horizons. The effect of the parent material is significantly modified in some areas by the effects of climate, relief, and plants and animals in and on the soil. As a soil forms, it is influenced by one or more of the five factors. A modification or variation in any of the factors results in a different kind of soil.

Parent Material

The soils in this survey area formed in different kinds of parent material. The soils on the Atlantic Coastal Ridge formed in sandy marine sediments. Examples are Canaveral, Dade, Margate, and Opalocka soils.

Some of the soils formed in varying amounts of recently accumulated organic material. Examples are Dania, Lauderhill, and Pahokee soils, which are in low, wet areas *(6, 16)*.

Some of the soils formed in accumulations of marl (calcium carbonate). The marl formed through precipitation of periphyton from fresh water. Biscayne, Pennsuco, and Perrine soils formed in recent accumulations of marl.

The soils in the survey area are underlain by the Miami Oolite Formation, a hard, porous limestone formed from small spherules of calcium carbonate. This formation crops out in many areas.

Climate

This survey area has a humid, subtropical climate. Extreme temperatures are moderated by the Atlantic Ocean and Biscayne Bay. These bodies of water increase the humidity of the area. The average rainfall is about 58 inches per year. The climate aids in the rapid decomposition of organic matter and hastens chemical reactions in the soils. Few differences among the soils within the survey area are caused by local variations in climate.

Plants and Animals

Plants and animals provide the parent material for the organic soils and organic horizons. Periphyton in the form of blue-green algae precipitates calcium carbonate from fresh water and forms the parent material of the soils that consist of marl.

Human activities have altered the soils in many areas, creating new soils. Rock-plowing or scarifying in preparation for cultivation completely alters the natural soils and changes the soil classification. Krome and Chekika soils formed through human activities.

Relief

Relief has affected the formation of soils in this survey area mainly through its influence on soil-water relationships. Other factors of soil formation generally associated with relief, such as erosion and temperature, are of minor importance.

Some of the differences among the soils in the survey area are directly related to relief. The survey area is a nearly level plain that has an elevation of 0 to 20 feet. The shallow, mineral soils on flatwoods in the Everglades have a water table within the underlying limestone. Unless a drainage system has been installed, the soils in the swamps and marshes in the Everglades are covered with water for long periods. In many areas they have a high content of organic matter.

Time

Time is an important factor of soil formation. The physical and chemical changes brought about by climate, living organisms, and relief occur slowly. The length of time needed to convert raw geological material into a soil varies, depending on the nature of the geological material and the interaction of the other soil-forming factors. Some of the basic minerals in soils weather fairly rapidly. Others are chemically inert and show little evidence of change over long periods. The translocation of fine particles, which results in the formation of various horizons within the soil, always takes a relatively long time. In terms of geological time, relatively little time has elapsed since the material in which the soils in the survey area formed was laid down or emerged from the sea.

In this survey area the dominant kinds of geological material vary considerably in their resistance to weathering. The sandy material is almost pure quartz and is highly resistant to weathering. The limestone and marl are much less resistant. The finer textured silt and clay are products of the earlier weathering of these materials.

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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:

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. Controlling excess water in cropped areas through the use of regularly spaced, shallow ditches and beds.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

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.

Bottom land. The normal flood plain of a stream, subject to flooding.

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.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

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.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

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

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

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.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

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.

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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

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.

Ecological plant communities. The ecological plant communities in this survey area are as follows:

Everglades Flatwoods.—This community is in nearly level areas only in the Everglades region of south Florida. South Florida slash pine is the dominant tree species. Marlberry, saw palmetto, waxmyrtle, chalky bluestem, and creeping bluestem also grow in these areas.

Freshwater Marsh.—This community occurs as an open expanse of grasses, sedges, rushes, and other herbaceous plants. The dominant vegetation is sawgrass, cattail, cordgrass, and buttonbush. The water table is at or above the surface for 2 or more months during the year.

Mangrove Swamp.—This community is on saltwater shorelines south of Pasco County on the gulf coast and south of Volusia County on the Atlantic coast. The Ten Thousand Islands area of Monroe and Collier Counties is the largest area of this community in Florida and perhaps in the world. The community is in areas of very poorly drained, organic and marly, level soils that support a mangrove monoculture. The community is dominated by hydric soils.

Sand Pine Scrub.—This community is throughout Florida. It is most common inland from the coast and in the central part of the State. The largest areas are in the Ocala National Forest, in and around Marion County. The community is in areas of very droughty, rolling soils that support even-height stands of sand pine or dense stands of scrub oak. These areas do not have hydric soils.

Sawgrass Marsh.—This community is in the Everglades. It occurs as an open expanse of sawgrass in areas where the soil is saturated or covered with water during part of the year. Sawgrass, gulf muhly, plumegrass, and pickerelweed are the dominant plants.

Slough.—This community is throughout peninsular Florida. The largest areas are in Charlotte, Lee, and Collier Counties. The community occurs as nearly open areas of grasses, sedges, and rushes and scattered pine. The percentage of woody cover increases from the northern part of Florida to the southern part. This community is in areas of poorly drained, level soils that are covered with a few inches of slowly moving water during wet periods and do not support shrubs. Some areas in the northern part of Florida are dominated by trees. The community is dominated by hydric soils.

South Florida Coastal Strand.—This community is on nearly level to sloping soils adjacent to the Atlantic Ocean. The dominant vegetation is saw palmetto, seagrape, and seaoats.

Tropical Hammocks.—This community is interspersed throughout the Everglades Flatwoods community. Jamaica dogwood, mastic, poisontree, strangler fig, live oak, cabbage-palm, and wild coffee are the most common plants.

Effervescence. As used in this survey, the bubbling of carbon dioxide when dilute hydrochloric acid is applied to calcium carbonates.

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 human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salt (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

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.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

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 of the land to a desired level.

Fine textured soil. Sandy clay, silty clay, or clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flatwoods. Broad, nearly level, low ridges characterized by an open pine forest and an understory of saw palmetto and pineland threeawn and by poorly drained soils that are dominantly sandy.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

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.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

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 the material below the water table.

Hammock. A densely wooded area that is slightly elevated above the adjacent areas and has characteristic natural vegetation of cabbage-palm, oak, and pine and 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.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

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 uppercase letter represents the major horizons. Numbers or lowercase 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.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The bedrock 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 capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

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:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

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.

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 soil 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.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Land leveling. Cutting and filling so that the suitability of a site for an intended use is improved.

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 fresh water and consisting chiefly of silt- and clay-sized 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. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or 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. On sites for septic tank absorption fields, filling 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 three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, 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.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

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

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

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.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

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 outlets (in tables). Refers to areas where 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.

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

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

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

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

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

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.

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

Salty water (in tables). Water is too salty for consumption by livestock.

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.

Saprolite (soil science). Unconsolidated, residual material underlying the soil and grading to hard bedrock below.

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.

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

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

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.

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.

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

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

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, in millimeters, of separates recognized in the United States are as follows:

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.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, thickness of the line can be one fragment or more. It generally overlies material that weathered in place, and it is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

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).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

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

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). An otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors that are assumed to be inherited from the parent material rather than to be the result of poor drainage.

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 coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded at the Miami International Airport. The period of record for normal temperatures and normal precipitation is 1951 to 1980. The length of record for temperature extremes and maximum and minimum precipitation is 41 years, through the year 1983. The length of record for extremes may be for other than complete or consecutive years. If the same extreme occurs more than once, the most recent date is given)

Month	Temperature							Normal degree days (base 65 °F)		Precipitation						
	Normal			Extremes												
	Daily max.	Daily min.	Monthly	Rec. high	Year	Rec. low	Year	Heating	Cooling	Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year
	°F	°F	°F	°F		°F				In	In		In		In	
Jan.	75.0	59.2	67.1	87	1982	31	1977	76	141	2.08	6.66	1969	0.04	1951	2.68	1973
Feb.	75.8	59.7	67.8	89	1982	32	1947	62	140	2.05	8.07	1983	.01	1944	5.73	1966
Mar.	79.3	64.1	71.7	92	1977	32	1980	14	222	1.89	7.22	1949	.02	1956	7.07	1949
Apr.	82.4	68.2	75.3	96	1971	46	1971	0	309	3.07	17.29	1979	.05	1981	16.21	1979
May	85.1	71.9	78.5	94	1956	53	1945	0	419	6.53	18.54	1968	.44	1965	11.59	1977
June	87.3	74.6	81.0	98	1944	65	1951	0	480	9.15	22.36	1968	1.81	1945	8.20	1977
July	88.7	76.2	82.4	98	1983	69	1950	0	539	5.98	13.51	1947	1.77	1963	4.55	1952
Aug.	89.2	76.5	82.8	98	1954	68	1950	0	552	7.02	16.88	1943	1.65	1954	6.92	1964
Sept.	87.8	75.7	81.8	95	1954	68	1983	0	504	8.07	24.40	1960	2.63	1951	7.58	1960
Oct.	84.2	71.6	77.9	95	1980	51	1943	0	400	7.14	21.08	1952	1.25	1977	9.95	1948
Nov.	79.8	65.8	72.8	89	1958	39	1950	5	239	2.71	13.15	1959	.09	1970	7.93	1959
Dec.	76.2	60.8	68.5	87	1978	33	1983	42	150	1.86	6.39	1958	.13	1968	4.38	1964
Year	82.6	68.7	75.6	98	Jul. 1983	31	Jan. 1977	199	4,095	57.55	24.40	Sep. 1960	0.01	Feb. 1944	16.21	Apr. 1979

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
2	Biscayne gravelly marl, drained	6,213	1.0
3	Lauderhill muck, depressional	49,060	7.9
4	Pennsuco marl, drained	2,399	0.4
5	Pennsuco marl	7,995	1.3
6	Perrine marl, drained	11,678	1.9
7	Krome very gravelly loam	59,113	9.5
9	Udorthents-water complex	17,902	2.9
10	Udorthents, limestone substratum-Urban land complex	36,910	5.9
11	Udorthents, marl substratum-Urban land complex	3,375	0.5
12	Perrine marl	35,742	5.7
13	Biscayne marl	17,434	2.8
14	Dania muck, depressional	40,167	6.5
15	Urban land	140,461	22.6
16	Biscayne marl, drained	17,285	2.8
18	Tamiami muck, depressional	3,039	0.5
20	Cardsound-Rock outcrop complex	2,614	0.4
22	Opalocka-Rock outcrop complex	4,179	0.7
23	Chekika very gravelly loam	16,894	2.7
24	Matecumbe muck	665	0.1
25	Biscayne-Rock outcrop complex	37,360	6.0
26	Perrine marl, tidal	8,931	1.4
28	Demory-Rock outcrop complex	2,289	0.4
30	Pahokee muck, depressional	23,773	3.8
31	Pennsuco marl, tidal	3,674	0.6
32	Terra Ceia muck, tidal	7,862	1.3
33	Plantation muck	2,382	0.4
34	Hallandale fine sand	4,376	0.7
35	Margate fine sand	3,694	0.6
37	Basinger fine sand	233	*
38	Rock outcrop-Vizcaya-Biscayne complex	33,565	5.4
39	Beaches	687	0.1
40	Pomello sand	547	0.1
41	Dade fine sand	783	0.1
42	Udorthents, limestone substratum, 0 to 5 percent slopes	5,504	0.9
45	Canaveral sand	332	0.1
47	St. Augustine sand	597	0.1
48	Kesson muck, tidal	402	0.1
	Water	10,964	1.8
	Total	621,080	100.0

* Less than 0.1 percent.

TABLE 3.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2 Biscayne	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: small stones, wetness, depth to rock.	Severe: wetness.	Severe: wetness, depth to rock.
3 Lauderhill	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
4, 5 Pennsuco	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
6 Perrine	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
7 Krome	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones.	Severe: small stones, depth to rock.
9*:					
Udorthents.					
Water.					
10*, 11*:					
Udorthents.					
Urban land.					
12 Perrine	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
13 Biscayne	Severe: wetness, depth to rock, ponding.	Severe: wetness, depth to rock, ponding.	Severe: wetness, depth to rock, ponding.	Severe: wetness, ponding.	Severe: wetness, depth to rock, ponding.
14 Dania	Severe: ponding, excess humus, depth to rock.	Severe: ponding, excess humus, depth to rock.	Severe: excess humus, ponding, depth to rock.	Severe: ponding, excess humus.	Severe: ponding, depth to rock, excess humus.
15*. Urban land					
16 Biscayne	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness, depth to rock.
18 Tamiami	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
20*:					
Cardsound	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Severe: depth to rock.
Rock outcrop.					
22*:					
Opalocka	Severe: too sandy, depth to rock.	Severe: too sandy, depth to rock.	Severe: too sandy, depth to rock.	Severe: too sandy.	Severe: droughty, depth to rock.
Rock outcrop.					
23 Chekika	Severe: small stones, wetness, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, wetness, depth to rock.	Moderate: wetness.	Severe: small stones, depth to rock.
24 Matecumbe	Severe: flooding, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: wetness.	Severe: depth to rock, excess humus.
25*:					
Biscayne	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness, depth to rock.
Rock outcrop.					
26 Perrine	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: excess salt, wetness, flooding.
28*:					
Demory	Severe: flooding, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness, depth to rock.
Rock outcrop.					
30 Pahokee	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
31 Pennsuco	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
32 Terra Ceia	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: wetness, flooding, excess humus.
33 Plantation	Severe: excess humus.	Severe: excess humus.	Severe: excess humus.	Severe: excess humus.	Severe: excess humus.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
34----------Hallandale	Severe: wetness, too sandy.	Severe: wetness, too sandy, depth to rock.	Severe: too sandy, wetness, depth to rock.	Severe: wetness, too sandy.	Severe: wetness, droughty, depth to rock.
35----------Margate	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
37----------Basinger	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
38*: Rock outcrop.					
Vizcaya----------	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding.	Severe: ponding, depth to rock.
Biscayne----------	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness, depth to rock.
39*. Beaches					
40----------Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
41----------Dade	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
42. Udorthents					
45----------Canaveral	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
47----------St. Augustine	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
48----------Kesson	Severe: flooding, wetness, excess humus.	Severe: wetness, excess salt.	Severe: wetness, flooding.	Severe: wetness.	Severe: excess salt, wetness, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 4.--WILDLIFE HABITAT

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

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
2----------------- Biscayne	Fair	Fair	Fair	Fair	Very poor.	Good	Fair	Fair	Fair	Fair.
3----------------- Lauderhill	Very poor.	Very poor.	Poor	Poor	Very poor.	Good	Good	Very poor.	Poor	Good.
4, 5--------------- Pennsuco	Poor	Fair	Fair	Very poor.	Very poor.	Fair	Good	Poor	Very poor.	Fair.
6----------------- Perrine	Very poor.	Poor	Fair	Very poor.	Very poor.	Fair	Good	Poor	Very poor.	Fair.
7----------------- Krome	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
9*:										
Udorthents.										
Water.										
10*, 11*:										
Udorthents.										
Urban land.										
12----------------- Perrine	Very poor.	Poor	Fair	Very poor.	Very poor.	Fair	Good	Poor	Very poor.	Fair.
13----------------- Biscayne	Fair	Fair	Fair	Fair	Very poor.	Good	Fair	Fair	Fair	Fair.
14----------------- Dania	Very poor.	Poor	Poor	Very poor.	Very poor.	Good	Good	Poor	Very poor.	Good.
15*. Urban land										
16----------------- Biscayne	Fair	Fair	Fair	Fair	Very poor.	Good	Fair	Fair	Fair	Fair.
18----------------- Tamiami	Very poor.	Poor	Poor	Very poor.	Very poor.	Good	Good	Poor	Very poor.	Good.
20*:										
Cardsound---------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Very poor.
Rock outcrop.										
22*:										
Opalocka----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.										

See footnote at end of table.

TABLE 4.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
23 Chekika	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
24 Matecumbe	Very poor.	Very poor.	Poor	Fair	Very poor.	Poor	Very poor.	Very poor.	Fair	Very poor.
25*:										
Biscayne	Fair	Fair	Fair	Fair	Very poor.	Good	Fair	Fair	Fair	Fair.
Rock outcrop.										
26 Perrine	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.
28*:										
Demory	Very poor.	Very poor.	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor.
Rock outcrop.										
30 Pahokee	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	---	Good.
31 Pennsuco	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.
32 Terra Ceia	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.
33 Plantation	Fair	Fair	---	---	---	Good	Good	Fair	---	Good.
34 Hallandale	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
35 Margate	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
37 Basinger	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
38*:										
Rock outcrop.										
Vizcaya	Poor	Poor	Fair	Very poor.	Very poor.	Good	Fair	Poor	Poor	Fair.
Biscayne	Fair	Fair	Fair	Fair	Very poor.	Good	Fair	Fair	Fair	Fair.
39*. Beaches										
40 Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

See footnote at end of table.

TABLE 4.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
41----------------- Dade	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
42. Udorthents										
45----------------- Canaveral	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
47----------------- St. Augustine	Very poor.	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor.
48----------------- Kesson	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2----------------- Biscayne	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.
3----------------- Lauderhill	Severe: depth to rock, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
4, 5-------------- Pennsuco	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
6----------------- Perrine	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
7----------------- Krome	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.
9*:					
Udorthents.					
Water.					
10*, 11*:					
Udorthents.					
Urban land.					
12---------------- Perrine	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
13---------------- Biscayne	Severe: depth to rock, wetness, ponding.	Severe: wetness, depth to rock, ponding.	Severe: wetness, depth to rock, ponding.	Severe: depth to rock, wetness, ponding.	Severe: wetness, depth to rock, ponding.
14---------------- Dania	Severe: depth to rock, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, depth to rock, excess humus.
15*. Urban land					
16---------------- Biscayne	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.
18---------------- Tamiami	Severe: depth to rock, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
20*:					
Cardsound--------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.					
22*:					
Opalocka---------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: droughty, depth to rock.
Rock outcrop.					
23---------------- Chekika	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.
24---------------- Matecumbe	Severe: depth to rock, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: depth to rock, excess humus.
25*:					
Biscayne---------	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.
Rock outcrop.					
26---------------- Perrine	Severe: depth to rock, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
28*:					
Demory-----------	Severe: depth to rock, wetness.	Severe: flooding, wetness, depth to rock.	Severe: flooding, wetness, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.
Rock outcrop.					
30---------------- Pahokee	Severe: depth to rock, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: ponding, excess humus.
31---------------- Pennsuco	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
32---------------- Terra Ceia	Severe: excess humus, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, flooding, wetness.	Severe: subsides, wetness, flooding.	Severe: wetness, flooding, excess humus.
33---------------- Plantation	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness, excess humus.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
34---------------- Hallandale	Severe: depth to rock, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty, depth to rock.
35---------------- Margate	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
37---------------- Basinger	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
38*: Rock outcrop.					
Vizcaya----------	Severe: depth to rock, ponding.	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: depth to rock, ponding.	Severe: ponding, depth to rock.
Biscayne---------	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.
39*. Beaches					
40---------------- Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
41---------------- Dade	Severe: cutbanks cave.	Slight-----------	Slight-----------	Slight-----------	Severe: droughty.
42. Udorthents					
45---------------- Canaveral	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
47---------------- St. Augustine	Severe: cutbanks cave, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
48---------------- Kesson	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--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 but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2------------------- Biscayne	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness.	Poor: depth to rock, small stones, wetness.
3------------------- Lauderhill	Severe: depth to rock, ponding, poor filter.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding, excess humus.
4, 5---------------- Pennsuco	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.
6------------------- Perrine	Severe: depth to rock, ponding.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding.
7------------------- Krome	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock.
9*:					
Udorthents.					
Water.					
10*, 11*:					
Udorthents.					
Urban land.					
12------------------ Perrine	Severe: depth to rock, ponding.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding.
13------------------ Biscayne	Severe: depth to rock, wetness, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, wetness, ponding.	Poor: depth to rock, small stones, ponding.
14------------------ Dania	Severe: depth to rock, ponding.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, ponding.	Poor: depth to rock, ponding, excess humus.
15*. Urban land					

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
16------------------ Biscayne	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness.	Poor: depth to rock, small stones, wetness.
18------------------ Tamiami	Severe: depth to rock, ponding, poor filter.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding, excess humus.
20*:					
Cardsound----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock.
Rock outcrop.					
22*:					
Opalocka-----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock.	Poor: depth to rock.
Rock outcrop.					
23------------------ Chekika	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
24------------------ Matecumbe	Severe: flooding, depth to rock, wetness.	Severe: depth to rock, flooding, wetness.	Severe: flooding, depth to rock, seepage.	Severe: flooding, depth to rock, wetness.	Poor: depth to rock.
25*:					
Biscayne-----------	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness.	Poor: depth to rock, small stones, wetness.
Rock outcrop.					
26------------------ Perrine	Severe: flooding, depth to rock, wetness.	Severe: depth to rock, flooding, wetness.	Severe: flooding, depth to rock, wetness.	Severe: flooding, depth to rock, wetness.	Poor: depth to rock, wetness.
28*:					
Demory-------------	Severe: depth to rock, wetness.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
Rock outcrop.					
30------------------ Pahokee	Severe: subsides, depth to rock, ponding.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding, excess humus.

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
31------------------ Pennsuco	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, depth to rock, seepage.	Severe: flooding, seepage, wetness.	Poor: wetness, thin layer.
32------------------ Terra Ceia	Severe: subsides, flooding, wetness.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
33------------------ Plantation	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, seepage, too sandy.
34------------------ Hallandale	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, seepage, too sandy.
35------------------ Margate	Severe: depth to rock, ponding, poor filter.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, seepage, too sandy.
37------------------ Basinger	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
38*: Rock outcrop.					
Vizcaya------------	Severe: depth to rock, ponding.	Severe: depth to rock, ponding.	Severe: depth to rock, ponding, too clayey.	Severe: depth to rock, ponding.	Poor: depth to rock, too clayey, ponding.
Biscayne-----------	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness, seepage.	Severe: depth to rock, wetness.	Poor: depth to rock, small stones, wetness.
39*. Beaches					
40------------------ Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
41------------------ Dade	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage.	Poor: depth to rock, seepage, too sandy.
42. Udorthents					

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
45------------------ Canaveral	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
47------------------ St. Augustine	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
48------------------ Kesson	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "poor," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
2 Biscayne	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
3 Lauderhill	Poor: depth to rock, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
4, 5 Pennsuco	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
6 Perrine	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
7 Krome	Poor: depth to rock.	Improbable: thin layer, excess fines.	Improbable: thin layer, excess fines.	Poor: depth to rock, small stones.
9*:				
Udorthents.				
Water.				
10*, 11*:				
Udorthents.				
Urban land.				
12 Perrine	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
13 Biscayne	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, thin layer, wetness.
14 Dania	Poor: depth to rock, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: depth to rock, excess humus, wetness.
15*. Urban land				
16 Biscayne	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, thin layer, wetness.

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
18-------------------- Tamiami	Poor: depth to rock, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
20*:				
Cardsound------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Rock outcrop.				
22*:				
Opalocka-------------	Poor: depth to rock.	Improbable: thin layer, excess fines.	Improbable: thin layer, excess fines.	Poor: depth to rock, too sandy.
Rock outcrop.				
23-------------------- Chekika	Poor: depth to rock.	Improbable: thin layer, excess fines.	Improbable: thin layer, excess fines.	Poor: depth to rock, small stones.
24-------------------- Matecumbe	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, excess humus.
25*:				
Biscayne-------------	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, thin layer, wetness.
Rock outcrop.				
26-------------------- Perrine	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
28*:				
Demory---------------	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, wetness.
Rock outcrop.				
30-------------------- Pahokee	Poor: depth to rock, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
31-------------------- Pennsuco	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
32-------------------- Terra Ceia	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: excess humus, wetness.
33-------------------- Plantation	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
34: Hallandale	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: depth to rock, too sandy, wetness.
35: Margate	Poor: depth to rock, wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
37: Basinger	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
38*: Rock outcrop.				
Vizcaya	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, wetness.
Biscayne	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, thin layer, wetness.
39*. Beaches				
40: Pomello	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
41: Dade	Poor: depth to rock.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
42. Udorthents				
45: Canaveral	Fair: wetness.	Probable	Probable	Poor: too sandy.
47: St. Augustine	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
48: Kesson	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, excess salt, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
2----------------- Biscayne	Severe: depth to rock, seepage.	Severe: thin layer, piping, wetness.	Severe: depth to rock.	Depth to rock	Wetness, depth to rock.	Depth to rock, wetness.	Wetness, depth to rock.
3----------------- Lauderhill	Severe: seepage.	Severe: excess humus, ponding.	Severe: depth to rock.	Ponding, depth to rock, subsides.	Ponding, soil blowing, depth to rock.	Depth to rock, ponding, soil blowing.	Wetness, depth to rock.
4, 5-------------- Pennsuco	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Favorable------	Wetness--------	Wetness--------	Wetness.
6----------------- Perrine	Severe: seepage.	Severe: piping, ponding.	Severe: depth to rock.	Ponding, depth to rock.	Ponding, depth to rock.	Depth to rock, ponding.	Wetness, depth to rock.
7----------------- Krome	Severe: depth to rock.	Severe: thin layer.	Severe: depth to rock.	Deep to water	Soil blowing, depth to rock.	Depth to rock	Depth to rock.
9*:							
Udorthents.							
Water.							
10*, 11*:							
Udorthents.							
Urban land.							
12---------------- Perrine	Severe: seepage.	Severe: piping, ponding.	Severe: depth to rock.	Ponding, depth to rock.	Ponding, depth to rock.	Depth to rock, ponding.	Wetness, depth to rock.
13---------------- Biscayne	Severe: depth to rock, seepage, ponding.	Severe: thin layer, piping, wetness, ponding.	Severe: depth to rock, ponding.	Depth to rock, ponding.	Wetness, depth to rock, ponding.	Depth to rock, wetness, ponding.	Wetness, depth to rock, ponding.
14---------------- Dania	Severe: depth to rock.	Severe: excess humus, ponding.	Severe: depth to rock, cutbanks cave.	Ponding, depth to rock, subsides.	Ponding, soil blowing, depth to rock.	Depth to rock, ponding, soil blowing.	Wetness, depth to rock.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
15*. Urban land							
16----------------- Biscayne	Severe: depth to rock, seepage.	Severe: thin layer, piping, wetness.	Severe: depth to rock.	Depth to rock	Wetness, depth to rock.	Depth to rock, wetness.	Wetness, depth to rock.
18----------------- Tamiami	Severe: seepage.	Severe: excess humus, ponding.	Severe: depth to rock.	Ponding, depth to rock, subsides.	Ponding, soil blowing, depth to rock.	Depth to rock, ponding, soil blowing.	Wetness, depth to rock.
20*: Cardsound--------	Severe: depth to rock.	Severe: thin layer.	Severe: depth to rock.	Deep to water	Depth to rock	Depth to rock	Depth to rock.
Rock outcrop.							
22*: Opalocka---------	Severe: depth to rock.	Severe: thin layer.	Severe: depth to rock.	Deep to water	Droughty, fast intake, depth to rock.	Depth to rock	Droughty, depth to rock.
Rock outcrop.							
23----------------- Chekika	Severe: depth to rock.	Severe: thin layer, wetness.	Severe: depth to rock.	Depth to rock	Depth to rock	Depth to rock, wetness.	Wetness, depth to rock.
24----------------- Matecumbe	Severe: depth to rock.	Severe: thin layer, wetness.	Severe: depth to rock.	Depth to rock, flooding, subsides.	Wetness, depth to rock, flooding.	Depth to rock, wetness.	Excess salt, depth to rock.
25*: Biscayne---------	Severe: depth to rock, seepage.	Severe: thin layer, piping, wetness.	Severe: depth to rock.	Depth to rock	Wetness, depth to rock.	Depth to rock, wetness.	Wetness, depth to rock.
Rock outcrop.							
26----------------- Perrine	Severe: seepage.	Severe: thin layer, piping, wetness.	Severe: slow refill, salty water, depth to rock.	Severe: depth to rock, flooding, excess salt.	Severe: wetness, depth to rock, flooding.	Severe: depth to rock, wetness, poor outlets.	Severe: wetness, excess salt, depth to rock.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
28*:							
Demory	Severe: depth to rock.	Severe: thin layer, wetness.	Severe: depth to rock.	Depth to rock	Wetness, droughty, depth to rock.	Depth to rock, wetness.	Wetness, droughty, depth to rock.
Rock outcrop.							
30 Pahokee	Severe: seepage.	Severe: excess humus, ponding.	Severe: depth to rock.	Ponding, depth to rock, subsides.	Ponding, soil blowing, depth to rock.	Depth to rock, ponding, soil blowing.	Wetness, depth to rock.
31 Pennsuco	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding	Wetness, flooding, excess salt.	Wetness	Wetness, excess salt.
32 Terra Ceia	Severe: seepage.	Severe: excess humus, wetness.	Severe: cutbanks cave.	Flooding, subsides.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness, excess salt.
33 Plantation	Severe: seepage.	Severe: seepage, piping.	Severe: depth to rock, cutbanks cave.	Ponding, depth to rock, subsides.	Ponding, soil blowing.	Depth to rock, ponding, too sandy.	Wetness, droughty, depth to rock.
34 Hallandale	Severe: depth to rock.	Severe: seepage, piping, wetness.	Severe: depth to rock, cutbanks cave.	Depth to rock, cutbanks cave.	Wetness, droughty, fast intake.	Depth to rock, wetness, too sandy.	Wetness, droughty, depth to rock.
35 Margate	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: depth to rock, cutbanks cave.	Ponding, depth to rock, cutbanks cave.	Ponding, droughty, fast intake.	Depth to rock, ponding, too sandy.	Wetness, droughty, depth to rock.
37 Basinger	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
38*:							
Rock outcrop.							
Vizcaya	Severe: depth to rock.	Severe: thin layer, ponding.	Severe: depth to rock.	Depth to rock, ponding.	Ponding, depth to rock.	Depth to rock, ponding.	Wetness, depth to rock.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
38*:							
Biscayne	Severe: depth to rock, seepage.	Severe: thin layer, piping, wetness.	Severe: depth to rock.	Depth to rock	Wetness, depth to rock.	Depth to rock, wetness.	Wetness, depth to rock.
39*. Beaches							
40 Pomello	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
41 Dade	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Depth to rock, too sandy, soil blowing.	Droughty, depth to rock.
42. Udorthents							
45 Canaveral	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
47 St. Augustine	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
48 Kesson	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: salty water, cutbanks cave.	Flooding, cutbanks cave, excess salt.	Wetness, excess salt.	Wetness, too sandy, soil blowing.	Wetness, excess salt, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
2----------------- Biscayne	0-7	Gravelly marl----	ML, CL-ML	A-4	0-5	60-85	50-75	35-70	35-70	23-28	NP
	7	Weathered bedrock	---	---	---	---	---	---	---	---	---
3----------------- Lauderhill	0-30	Muck--------------	PT	---	0	---	---	---	---	---	---
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
4----------------- Pennsuco	0-8	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	98-100	85-95	<40	NP-19
	8-44	Silt, silt loam	ML	A-4	0	100	100	98-100	85-95	---	NP
	44-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
5----------------- Pennsuco	0-4	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	98-100	85-95	<40	NP-19
	4-46	Silt, silt loam	ML	A-4	0	100	100	98-100	85-95	---	NP
	46-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
6----------------- Perrine	0-10	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	98-100	95-100	95-100	85-95	<30	NP-19
	10-26	Silt, silt loam	ML	A-4	0	98-100	95-100	95-100	85-95	---	NP
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
7----------------- Krome	0-7	Very gravelly loam.	GM, GC	A-1-b, A-2-4	0-5	40-80	30-45	25-40	5-30	---	NP
	7-11	Weathered bedrock	---	---	---	---	---	---	---	---	---
9*. Udorthents.											
Water.											
10*, 11*: Udorthents.											
Urban land.											
12---------------- Perrine	0-4	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	98-100	95-100	95-100	85-95	<30	NP-19
	4-29	Silt, silt loam	ML	A-4	0	98-100	95-100	95-100	85-95	---	NP
	29-33	Weathered bedrock	---	---	---	---	---	---	---	---	---
13---------------- Biscayne	0-15	Marl--------------	ML	A-4	0	100	100	80-100	80-100	---	NP-4
	15-19	Weathered bedrock	---	---	---	---	---	---	---	---	---
14---------------- Dania	0-15	Muck--------------	PT	---	0	---	---	---	---	---	---
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15*. Urban land											
16---------------- Biscayne	0-15	Marl--------------	ML	A-4	0	100	100	80-100	80-100	---	NP-4
	15-19	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
18--------------- Tamiami	0-4	Muck-------------	PT	A-8	0	---	---	---	---	---	---
	4-12	Marl, silt, silt loam.	ML	A-4	0	100	100	80-100	80-100	---	NP-4
	12-31	Muck-------------	PT	A-8	0	---	---	---	---	---	---
	31-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
20*: Cardsound-------	0-4	Silty clay loam	ML	A-4	0-5	100	90-100	70-90	70-90	---	NP
	4-8	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
22*: Opalocka--------	0-6	Sand-------------	SP, SP-SM	A-3	0	100	100	90-100	1-6	---	NP
	6-10	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
23--------------- Chekika	0-5	Very gravelly loam.	GM, GC	A-2, A-1-b, A-4	0-5	40-80	35-45	20-45	20-45	---	NP
	5-9	Weathered bedrock	---	---	---	---	---	---	---	---	---
24--------------- Matecumbe	0-3	Muck-------------	OL, OH	A-8	0	---	---	---	---	---	---
	3-7	Weathered bedrock	---	---	---	---	---	---	---	---	---
25*: Biscayne--------	0-4	Marl-------------	ML	A-4	0	100	100	80-100	80-100	---	NP-4
	4-8	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
26--------------- Perrine	0-12	Marl-------------	ML	A-4	0	100	100	50-100	50-100	16-21	NP-4
	12-26	Marl, silt, silt loam.	ML	A-4	0	100	100	80-100	80-100	---	NP-4
	26-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
28*: Demory----------	0-4	Sandy clay loam	SC, SC-SM, SM	A-2-4, A-2-6	0-5	98-100	98-100	95-100	13-35	<40	NP-24
	4-7	Fine sandy loam, sandy clay loam.	SC, SC-SM, SM	A-4, A-6, A-2-4, A-2-6	0-5	98-100	98-100	95-100	25-50	<40	NP-24
	7-10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
30--------------- Pahokee	0-46	Muck-------------	PT	---	---	---	---	---	---	---	---
	46-50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
31--------------- Pennsuco	0-51	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	98-100	85-95	<40	NP-19
	51-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
32--------------- Terra Ceia	0-80	Muck-------------	PT	---	0	---	---	---	---	---	---

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
33---------------Plantation	0-14	Muck-------------	PT	---	0	---	---	---	---	---	---
	14-28	Sand, fine sand	SP	A-3	0	100	100	90-100	1-4	---	NP
	28-30	Gravelly sand, gravelly fine sand.	SP	A-3	0-5	70-90	65-85	60-80	1-4	---	NP
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
34---------------Hallandale	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	90-100	2-6	---	NP
	4-16	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	90-100	2-12	---	NP
	16-20	Weathered bedrock	---	---	---	---	---	---	---	---	---
35---------------Margate	0-9	Fine sand--------	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
	9-18	Fine sand, sand	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
	18-28	Fine sand, sand	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
	28-36	Gravelly variable	GM, GC, SM, SC	A-1-b, A-2-4, A-2-6	35-85	60-80	45-60	40-55	5-35	<40	NP-15
	36-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
37---------------Basinger	0-6	Fine sand--------	SP	A-3	0	100	100	85-100	1-4	---	NP
	6-30	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	30-50	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	50-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
38*: Rock outcrop.											
Vizcaya---------	0-6	Mucky silt loam	ML, OL	A-2-4	0	100	100	90-100	85-99	---	NP
	6-15	Clay, sandy clay	CL	A-6	0	100	100	85-100	65-95	---	NP
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
Biscayne--------	0-15	Marl-------------	ML	A-4	0	100	100	80-100	80-100	---	NP-4
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
39*. Beaches											
40---------------Pomello	0-35	Sand-------------	SP, SP-SM	A-3	0	100	100	60-100	1-8	---	NP
	35-76	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	60-100	6-15	---	NP
	76-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	0	100	100	60-100	4-10	---	NP
41---------------Dade	0-24	Fine sand--------	SP, SP-SM	A-3	0	100	100	90-100	1-6	---	NP
	24-27	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-8	---	NP
	27-31	Weathered bedrock	---	---	---	---	---	---	---	---	---
47. Udorthents											

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments >3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
45---------------Canaveral	0-4	Sand-------------	SP	A-3	0	100	100	90-100	1-4	---	NP
	4-80	Fine sand, sand, coarse sand.	SP	A-3	0	70-100	70-95	65-90	1-3	---	NP
47---------------St. Augustine	0-3	Sand-------------	SP, SP-SM	A-3	0	85-95	80-95	80-90	2-5	---	NP
	3-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	85-95	80-95	80-90	5-15	---	NP
48---------------Kesson	0-6	Muck-------------	PT	---	0	---	---	---	---	---	NP
	6-33	Sand, fine sand	SP, SP-SM	A-3	0	90-100	90-100	90-100	2-10	---	NP
	33-80	Sand, fine sand	SP, SP-SM	A-3	0	70-100	65-95	60-95	2-10	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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)

Soil name and map symbol	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
2---------------- Biscayne	0-7	10-20	1.00-1.20	0.6-6.0	0.10-0.20	7.4-8.4	<4	Low--------	0.32	1	8	3-6
	7	---	---	2.0-20	---	---	---	-----------	----			
3---------------- Lauderhill	0-30	---	0.15-0.35	6.0-20	0.30-0.50	5.6-7.8	<2	Low--------	----	---	2	60-90
	30-34	---	---	2.0-20	---	---	---	-----------	----			
4---------------- Pennsuco	0-8	15-30	1.00-1.20	0.2-2.0	0.15-0.20	7.9-8.4	<4	Low--------	0.32	3	4L	3-6
	8-44	2-18	0.95-1.05	0.6-6.0	0.20-0.45	7.9-8.4	<4	Low--------	0.32			
	44-48	---	---	2.0-20	---	---	---	-----------	----			
5---------------- Pennsuco	0-4	15-30	1.00-1.20	0.2-2.0	0.15-0.20	7.9-8.4	<4	Low--------	0.32	3	4L	3-6
	4-46	2-18	0.95-1.05	0.6-6.0	0.20-0.45	7.9-8.4	<4	Low--------	0.32			
	46-50	---	---	2.0-20	---	---	---	-----------	----			
6---------------- Perrine	0-10	15-32	1.00-1.20	0.2-2.0	0.15-0.20	7.9-8.4	<4	Low--------	0.32	2	4L	2-6
	10-26	2-18	0.95-1.05	0.6-6.0	0.20-0.45	7.9-8.4	<4	Low--------	0.32			
	26	---	---	2.0-20	---	---	---	-----------	----			
7---------------- Krome	0-7	15-20	1.20-1.40	0.6-2.0	0.08-0.12	7.4-8.4	<2	Low--------	0.08	1	8	3-10
	7-11	---	---	2.0-20	---	---	---	-----------	----			
9*: Udorthents.												
Water.												
10*, 11*: Udorthents.												
Urban land.												
12--------------- Perrine	0-4	15-32	1.00-1.20	0.2-2.0	0.15-0.20	7.9-8.4	<4	Low--------	0.32	2	4L	2-6
	4-29	2-18	0.95-1.05	0.6-6.0	0.20-0.45	7.9-8.4	<4	Low--------	0.32			
	29-33	---	---	2.0-20	---	---	---	-----------	----			
13--------------- Biscayne	0-15	5-12	1.00-1.20	0.6-6.0	0.15-0.20	7.4-8.4	<4	Low--------	0.32	1	4L	1-2
	15-19	---	---	2.0-20	---	---	---	-----------	----			
14--------------- Dania	0-15	---	0.15-0.35	6.0-20	0.20-0.30	5.6-7.3	<2	Low--------	----	---	2	60-90
	15-19	---	---	2.0-20	---	---	---	-----------	----			
15*. Urban land												
16--------------- Biscayne	0-15	5-12	1.00-1.20	0.6-6.0	0.15-0.20	7.4-8.4	<4	Low--------	0.32	1	4L	1-2
	15-19	---	---	2.0-20	---	---	---	-----------	----			
18--------------- Tamiami	0-4	2-5	0.15-0.35	6.0-20	0.20-0.25	6.6-7.8	<2	Low--------	----	---	2	60-80
	4-12	5-15	1.00-1.20	0.6-6.0	0.15-0.20	7.4-7.8	<2	Low--------	0.32			
	12-31	2-5	0.15-0.35	6.0-20	0.20-0.25	6.6-7.8	<2	Low--------	----			
	31-35	---	---	2.0-20	---	---	---	-----------	----			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	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
20*:												
Cardsound	0-4	27-35	1.40-1.60	0.2-0.6	0.18-0.23	6.1-7.3	<2	Low	0.32	1	4L	3-10
	4-8	---	---	2.0-20	---	---	---	---	---			
Rock outcrop.												
22*:												
Opalocka	0-6	0-2	1.45-1.60	>20	0.02-0.05	6.1-7.3	<2	Low	0.10	1	1	3-6
	6-10	---	---	2.0-20	---	---	---	---	---			
Rock outcrop.												
23 Chekika	0-5	15-20	1.40-1.60	0.6-2.0	0.08-0.12	7.4-8.4	<2	Low	0.10	1	4L	3-10
	5-9	---	---	2.0-20	---	---	---	---	---			
24 Matecumbe	0-3	1-5	0.20-0.40	6.0-20	0.20-0.24	5.6-7.3	4-8	Low	---	---	7	80-90
	3-7	---	---	2.0-20	---	---	---	---	---			
25*:												
Biscayne	0-4	5-12	1.00-1.20	0.6-6.0	0.15-0.20	7.4-8.4	<4	Low	0.32	1	4L	1-2
	4-8	---	---	2.0-20	---	---	---	---	---			
Rock outcrop.												
26 Perrine	0-12	10-17	1.00-1.20	0.2-0.6	0.15-0.20	7.4-7.8	8-16	Low	0.32	2	4L	4-6
	12-26	10-17	1.00-1.20	0.2-0.6	0.15-0.20	7.4-7.8	8-16	Low	0.32			
	26-30	---	---	2.0-20	---	---	---	---	---			
28*:												
Demory	0-4	8-25	1.05-1.45	0.2-2.0	0.08-0.15	6.1-7.3	<2	Low	0.10	1	8	6-18
	4-7	12-35	1.20-1.45	0.2-0.6	0.10-0.15	6.1-7.3	<2	Low	0.15			
	7-10	---	---	2.0-20	---	---	---	---	---			
Rock outcrop.												
30 Pahokee	0-46	---	0.20-1.00	6.0-20	0.20-0.25	5.6-7.3	<2	Low	---	---	2	75-90
	46-50	---	---	2.0-20	---	---	---	---	---			
31 Pennsuco	0-51	15-30	1.00-1.20	0.2-2.0	0.15-0.20	7.9-8.4	4-8	Low	0.32	3	4L	3-6
	51-55	---	---	2.0-20	---	---	---	---	---			
32 Terra Ceia	0-80	---	0.20-0.35	6.0-20	0.20-0.50	4.5-8.4	4-8	Low	---	---	2	60-85
33 Plantation	0-14	---	0.15-0.35	6.0-20	0.20-0.30	4.5-7.3	<2	Low	---	2	2	20-50
	14-28	1-3	1.50-1.60	6.0-20	0.02-0.05	5.1-8.4	<2	Low	0.10			
	28-30	1-3	1.50-1.60	6.0-20	0.01-0.03	5.1-8.4	<2	Low	0.10			
	30-34	---	---	2.0-20	---	---	---	---	---			
34 Hallandale	0-4	0-3	1.20-1.45	6.0-20	0.05-0.10	5.1-6.5	<2	Low	0.10	1	2	1-2
	4-16	0-5	1.45-1.65	6.0-20	0.03-0.10	5.6-8.4	<2	Low	0.10			
	16-20	---	---	2.0-20	---	---	---	---	---			
35 Margate	0-9	1-4	1.25-1.45	6.0-20	0.05-0.10	4.5-6.0	<2	Low	0.10	2	2	1-4
	9-18	0-4	1.55-1.65	6.0-20	0.03-0.06	5.1-6.5	<2	Low	0.10			
	18-36	1-4	1.55-1.65	6.0-20	0.03-0.06	6.1-7.8	<2	Low	0.10			
	36-40	---	---	2.0-20	---	---	---	---	---			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	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
37---------------Basinger	0-6	0-4	1.40-1.55	6.0-20	0.03-0.07	3.6-8.4	<2	Low--------	0.10	5	2	.5-2
	6-30	0-4	1.40-1.55	6.0-20	0.05-0.10	3.6-7.3	<2	Low--------	0.10			
	30-50	1-6	1.40-1.65	6.0-20	0.10-0.15	3.6-7.3	<2	Low--------	0.10			
	50-80	1-3	1.50-1.70	6.0-20	0.05-0.10	3.6-7.3	<2	Low--------	0.10			
38*: Rock outcrop.												
Vizcaya----------	0-6	15-25	0.15-0.35	2.0-6.0	0.30-0.50	6.6-7.8	<2	Low--------	0.10	1	2	15-35
	6-15	35-45	1.20-1.35	0.06-0.2	0.30-0.40	6.6-7.8	<2	Low--------	0.10			
	15	---	---	2.0-20	---	---	---	-----------	----			
Biscayne---------	0-15	5-12	1.00-1.20	0.6-6.0	0.15-0.20	7.4-8.4	<4	Low--------	0.32	1	4L	1-2
	15	---	---	2.0-20	---	---	---	-----------	----			
39*. Beaches												
40---------------Pomello	0-35	<2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	Low--------	0.10	5	1	<1
	35-76	<2	1.45-1.60	2.0-6.0	0.10-0.30	4.5-6.0	<2	Low--------	0.15			
	76-80	<2	1.35-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	Low--------	0.10			
41---------------Dade	0-24	0-2	1.45-1.60	>20	0.02-0.05	6.1-8.4	<2	Low--------	0.10	2	2	0-5
	24-27	1-5	1.45-1.60	>20	0.02-0.05	6.6-8.4	<2	Low--------	0.10			
	27-31	---	---	2.0-20	---	---	---	-----------	----			
42. Udorthents												
45---------------Canaveral	0-4	0-2	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Low--------	0.10	5	1	0-2
	4-80	0-2	1.25-1.50	>20	0.02-0.05	6.6-8.4	<2	Low--------	0.10			
47---------------St. Augustine	0-3	0-2	1.30-1.40	6.0-20	0.02-0.05	6.1-8.4	<2	Low--------	0.10	5	2	1-3
	3-80	4-12	1.40-1.55	2.0-20	0.05-0.10	6.1-8.4	<2	Low--------	0.15			
48---------------Kesson	0-6	---	0.15-0.35	6.0-20	0.30-0.50	7.4-9.0	>16	Low--------	0.10	5	2	25-35
	6-33	1-4	1.50-1.65	2.0-20	0.05-0.10	7.4-9.0	>16	Low--------	0.10			
	33-80	1-4	1.55-1.70	2.0-20	0.05-0.15	7.4-9.0	>16	Low--------	0.10			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Subsidence: Initial	Subsidence: Total	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In		In	In		
2: Biscayne	B/D	None	---	---	0-1.0	Apparent	Jun-Sep	1-20	Hard	---	---	High	Low.
3: Lauderhill	B/D	None	---	---	+2-0	Apparent	Jun-Apr	20-40	Hard	12-16	16-24	High	Moderate.
4, 5: Pennsuco	D	None	---	---	0-1.0	Apparent	Jun-Nov	40-72	Soft	---	---	High	Low.
6: Perrine	D	None	---	---	+1-1.0	Apparent	Jun-Nov	20-40	Soft	---	---	High	Low.
7: Krome	A	None	---	---	4.0-5.0	Apparent	Jun-Nov	2-10	Hard	---	---	Low	Low.
9*:													
Udorthents.													
Water.													
10*, 11*:													
Udorthents.													
Urban land.													
12: Perrine	D	None	---	---	+1-1.0	Apparent	Jun-Nov	20-40	Soft	---	---	High	Low.
13: Biscayne	B/D	None	---	---	0-1.0	Apparent	Jun-Sep	1-20	Hard	---	---	High	Low.
14: Dania	B/D	None	---	---	+2-0	Apparent	Jun-Apr	8-20	Soft	4-8	8-14	High	Moderate.
15*. Urban land													
16: Biscayne	B/D	None	---	---	0-1.0	Apparent	Jun-Sep	1-20	Hard	---	---	High	Low.

See footnote at end of table.

TABLE 11.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Ini-tial	Total	Uncoated steel	Concrete
					Ft			In		In	In		
18----------------- Tamiami	D	None---------	---	---	+1-1.0	Apparent	Jan-Dec	20-51	Hard	8-12	16-47	High-----	Moderate.
20*: Cardsound----------	D	None---------	---	---	5.0-6.0	Apparent	Jan-Dec	2-9	Hard	---	---	Low------	Low.
Rock outcrop.													
22*: Opalocka-----------	D	None---------	---	---	5.0-6.0	Apparent	Jan-Dec	2-9	Hard	---	---	Low------	Moderate.
Rock outcrop.													
23----------------- Chekika	D	None---------	---	---	1.0-3.0	Apparent	Jun-Nov	2-10	Hard	---	---	High-----	Low.
24----------------- Matecumbe	D	Occasional	Brief-----	Jul-Dec	1.5-3.0	Apparent	Jul-Dec	2-9	Soft	1-3	5-9	Moderate	Low.
25*: Biscayne----------	B/D	None---------	---	---	0-1.0	Apparent	Jun-Sep	1-20	Hard	---	---	High-----	Low.
Rock outcrop.													
26----------------- Perrine	D	Frequent----	Long------	Jan-Dec	0-1.0	Apparent	Jan-Dec	20-40	Hard	---	---	High-----	Low.
28*: Demory------------	D	Rare---------	---	---	0-1.0	Apparent	Apr-Sep	4-19	Hard	---	---	High-----	Low.
Rock outcrop.													
30----------------- Pahokee	B/D	None---------	---	---	+1-0	Apparent	Jun-Feb	36-51	Hard	4-8	36-50	High-----	Moderate.
31----------------- Pennsuco	D	Frequent----	Long------	Jan-Dec	0-0.5	Apparent	Jan-Dec	40-72	Soft	---	---	High-----	Low.
32----------------- Terra Ceia	D	Frequent----	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	>60	---	16-20	>50	High-----	High.
33----------------- Plantation	B/D	None---------	---	---	0-1.0	Apparent	Jun-Apr	20-40	Soft	4-8	4-16	High-----	Moderate.

See footnote at end of table.

TABLE 11.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Ini-tial	Total	Uncoated steel	Concrete
					Ft			In		In	In		
34----------------- Hallandale	B/D	None---------	---	---	0.5-1.5	Apparent	Jun-Sep	7-20	Soft	---	---	High------	Low.
35----------------- Margate	B/D	None---------	---	---	+1-1.0	Apparent	Jun-Feb	20-40	Soft	---	---	High------	Moderate.
37----------------- Basinger	B/D	None---------	---	---	0-1.0	Apparent	Jun-Feb	>60	---	---	---	High------	Moderate.
38*: Rock outcrop.													
Vizcaya-----------	D	None---------	---	---	+1-1.0	Apparent	Jan-Dec	3-20	Hard	2	4	High------	Low.
Biscayne----------	B/D	None---------	---	---	0-1.0	Apparent	Jun-Sep	1-20	Hard	---	---	High------	Low.
39*. Beaches			to long.										
40----------------- Pomello	C	None---------	---	---	2.0-3.5	Apparent	Jul-Nov	>60	---	---	---	Low-------	High.
41----------------- Dade	A	None---------	---	---	5.0-6.0	Apparent	Jun-Sep	20-40	Soft	---	---	Low-------	Moderate.
42. Udorthents													
45----------------- Canaveral	C	None---------	---	---	1.0-3.0	Apparent	Jun-Nov	>60	---	---	---	Moderate	Low.
47----------------- St. Augustine	C	None---------	---	---	1.5-3.0	Apparent	Jul-Oct	>60	---	---	---	High------	High.
48----------------- Kesson	D	Frequent-----	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	>60	---	---	---	High------	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Basinger	Siliceous, hyperthermic Spodic Psammaquents
Biscayne	Loamy, carbonatic, hyperthermic, shallow Typic Fluvaquents
Canaveral	Hyperthermic, uncoated Aquic Quartzipsamments
Cardsound	Loamy, mixed (calcareous), hyperthermic Lithic Udorthents
Chekika	Loamy-skeletal, carbonatic, hyperthermic Lithic Udorthents
Dade	Hyperthermic, uncoated Spodic Quartzipsamments
Dania	Euic, hyperthermic, shallow Lithic Medisaprists
Demory	Loamy, siliceous, hyperthermic Lithic Haplaquolls
Hallandale	Siliceous, hyperthermic Lithic Psammaquents
Kesson	Siliceous, hyperthermic Typic Psammaquents
Krome	Loamy-skeletal, carbonatic, hyperthermic Lithic Udorthents
Lauderhill	Euic, hyperthermic Lithic Medisaprists
Margate	Siliceous, hyperthermic Mollic Psammaquents
Matecumbe	Euic, isohyperthermic Lithic Tropofolists
Opalocka	Sandy, siliceous, hyperthermic Lithic Udorthents
Pahokee	Euic, hyperthermic Lithic Medisaprists
Pennsuco	Coarse-silty, carbonatic, hyperthermic Typic Fluvaquents
Perrine	Coarse-silty, carbonatic, hyperthermic Typic Fluvaquents
Plantation	Sandy, siliceous, hyperthermic Histic Humaquepts
Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods
St. Augustine	Sandy, siliceous, hyperthermic Alfic Udarents
Tamiami	Euic, hyperthermic Lithic Medisaprists
Terra Ceia	Euic, hyperthermic Typic Medisaprists
Udorthents	Udorthents
Vizcaya	Clayey, mixed, hyperthermic Lithic Haplaquolls

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