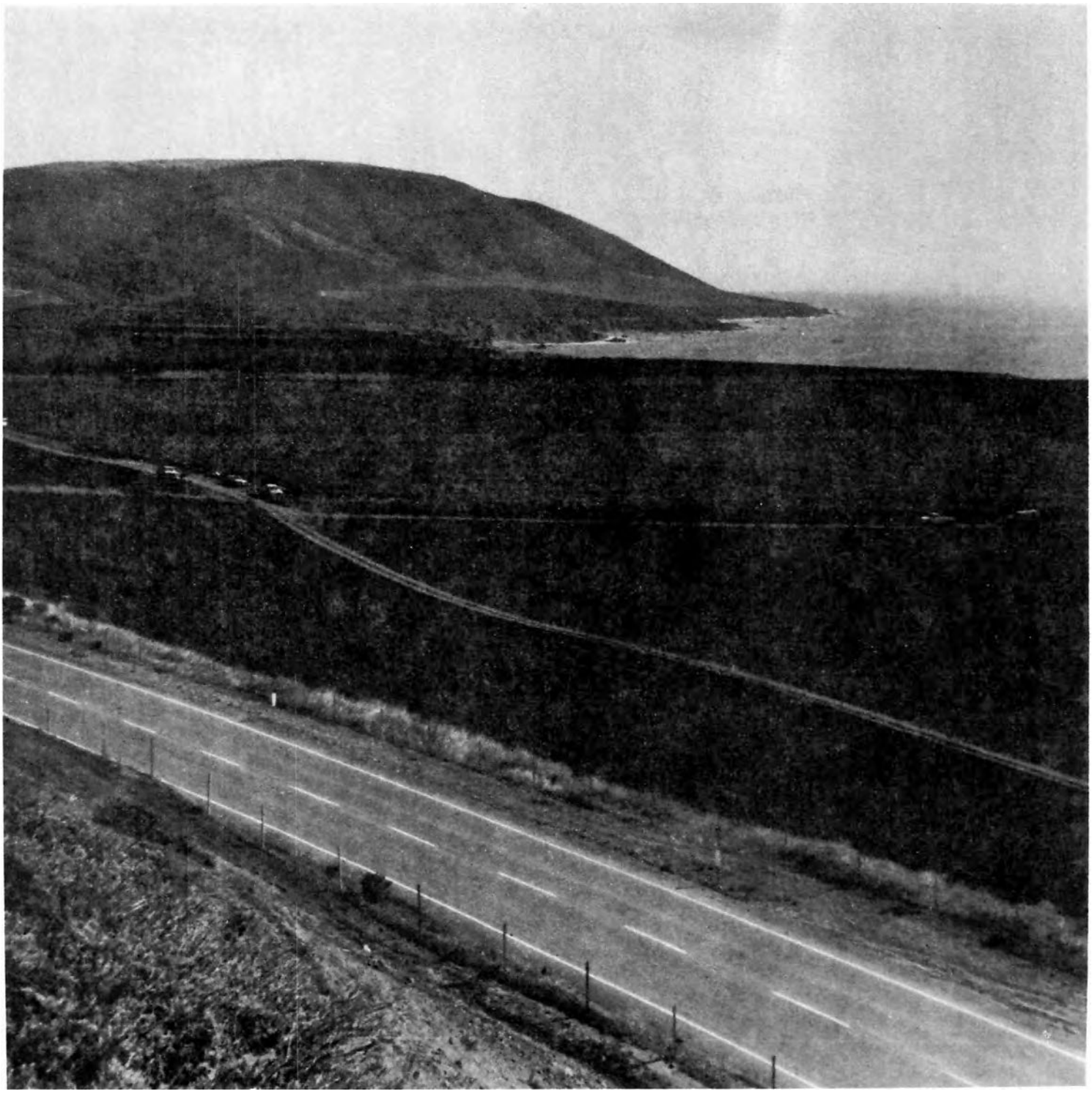
United States Department of Agriculture

Soil Conservation Service

In cooperation with University of California Agricultural Experiment Station

Soil Survey of San Luis Obispo County, California

Coastal Part



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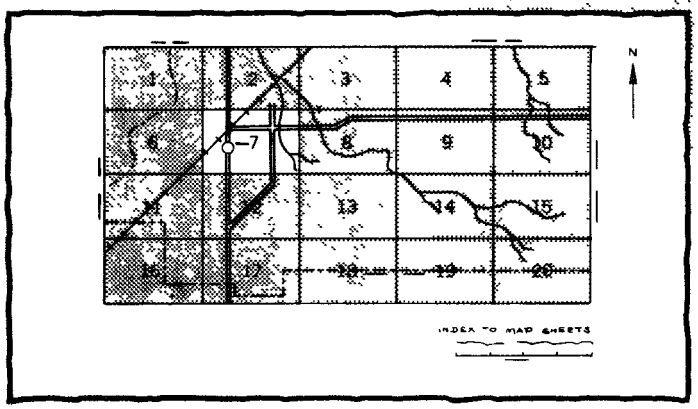

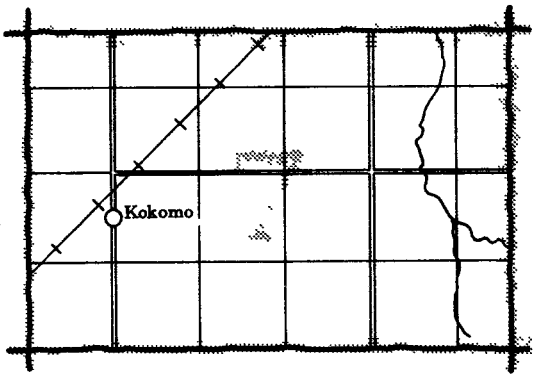

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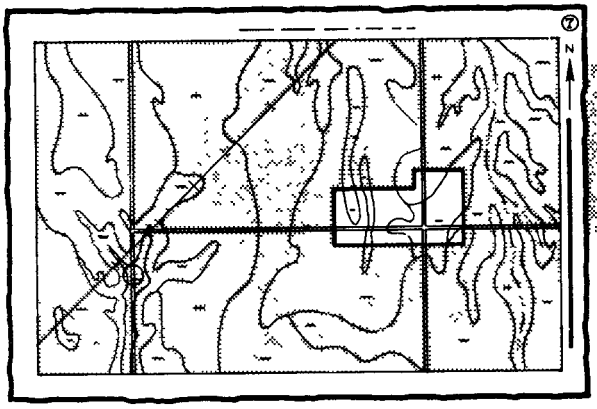

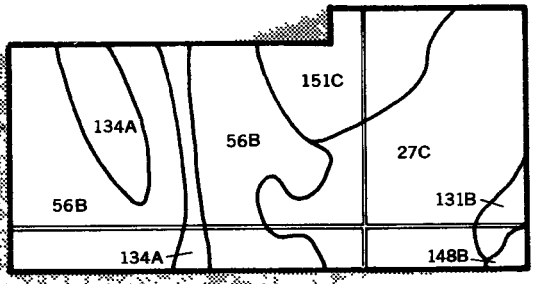

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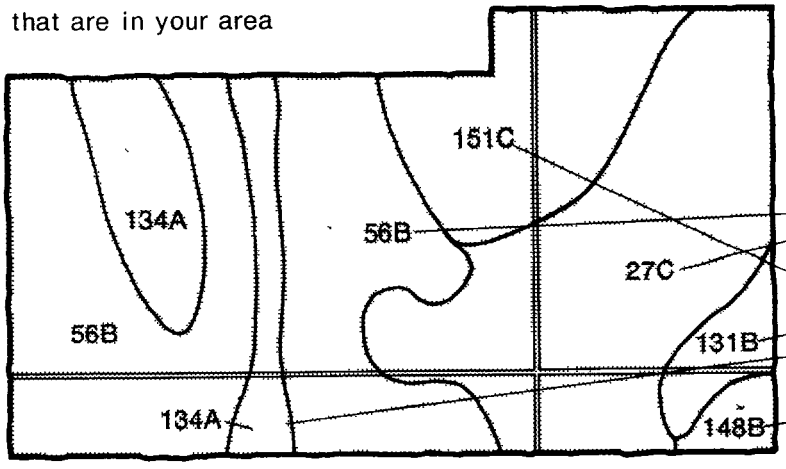

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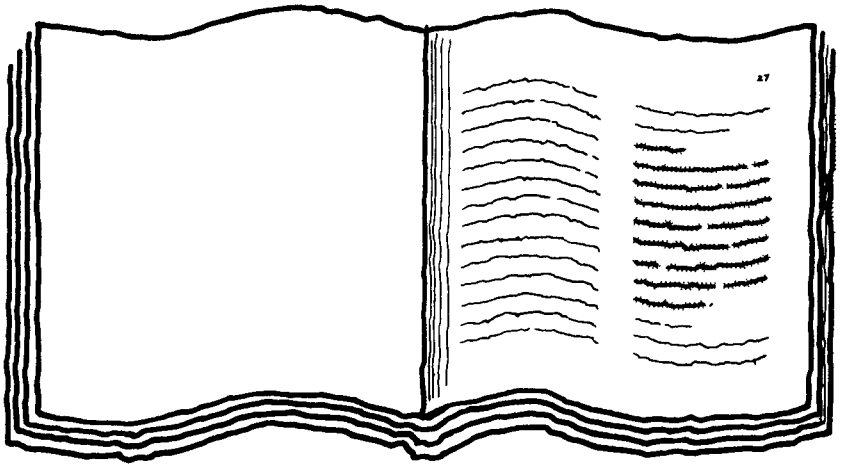
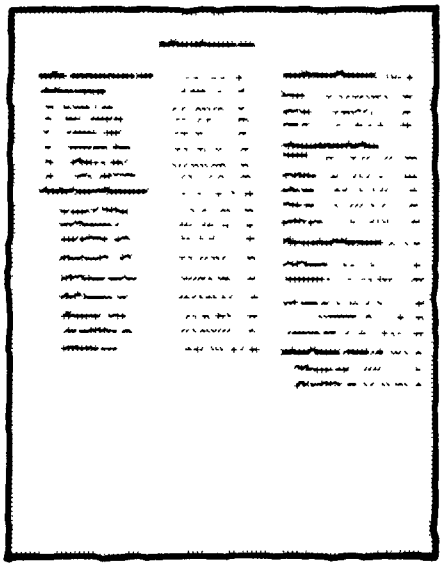
THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.





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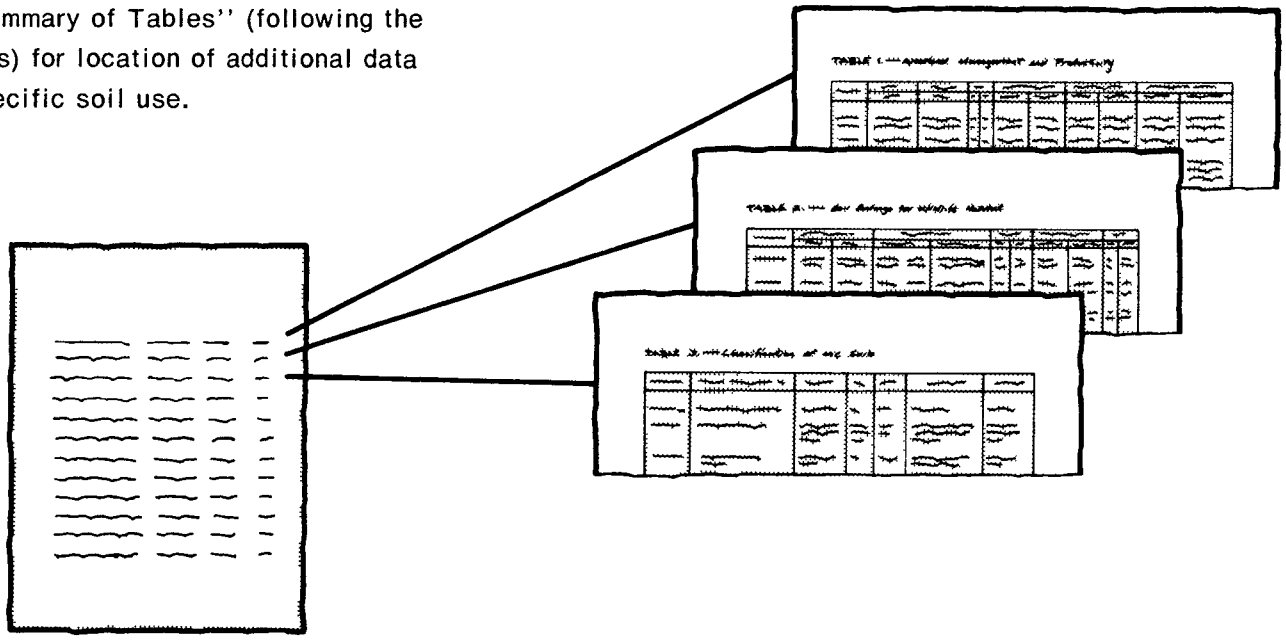

7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1969-1976. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service and the University of California Agricultural Experiment Station. It is part of the technical assistance furnished to the Santa Maria and Arroyo Grande Resource Conservation District.

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

Cover: A typical landscape along the coast. Still gravelly sandy clay loam is on the ocean terrace in the foreground. Lodo clay loam and Rock outcrop are on the steep uplands in the background.

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preface

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

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

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

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

Location of San Luis Obispo County, Coastal Part, in California.

soil survey of
San Luis Obispo County, California, Coastal Part

by Daniel J. Ernstrom, Soil Conservation Service

fieldwork by Daniel J. Ernstrom, Ronald D. Edwards, Christopher W. Smith, Larry A. Day, C. Douglas Pumphrey, and Gordon E. Shipman, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with University of California Agricultural Experiment Station

The SAN LUIS OBISPO COUNTY, COASTAL PART soil survey area is in the west-central part of California. The area includes the entire coastal side of San Luis Obispo County. The total extent of the survey area is about 562,152 acres, or 878 square miles. The northern boundary of the survey area is the Monterey County line. The southern boundary is the Santa Maria River, which is also the Santa Barbara County line. The northeastern boundary is the coastal ridge of the Santa Lucia mountains, and the southeastern boundary is the Los Padres National Forest boundary. The Pacific Ocean is along the entire western edge of the survey area.

general nature of the survey area

This section provides general information about the coastal part of San Luis Obispo County. It discusses history and agricultural development, population trends, topography, and climate.

history and agricultural development

This section was prepared by Clark L. Moore, district conservationist, retired, Soil Conservation Service

The first known inhabitants of the San Luis Obispo County area were the Chumash Indians, who lived in the area about 15,000 years ago. They lived by hunting, fishing, and foraging.

Many European explorers are associated with the area. Among the first were Juan Rodrigues and Sir Francis Drake. Both sailed past the area in the mid or late 16th century. However, neither set foot in the county.

In 1587, Pedro de Unamuno entered Morro Bay and traveled inland to the present site of the city of San Luis Obispo. He took possession of the area in the name of King Philip of Spain. In 1602, Sebastian Vizcaino visited San Luis Obispo Bay. He named the Santa Lucia Mountains in the eastern part of the survey area (*6*).

In 1772, Fr. Junipero Serra established Mission San Luis Obispo de Tolosa (*7*). The mission included a rancho at Santa Margarita, which was used to produce cattle and grain. By 1821, the mission had 78,000 cattle and 37,000 sheep. The alluvial soils of Arroyo Grande were used for vegetable gardens. Corn, wheat, peas, beans, and olives were plentiful.

On April 6, 1837, three rancho land grants, totaling 105,000 acres, were made by Mexican governor Alvarado. These were the Rancho Nipomo, 38,000 acres; Rancho Santa Manuela, 18,000 acres; and Rancho Suey, 49,000 acres. Between 1837 and 1844, the Mexican government made 25 land grants in the coastal part of San Luis Obispo County (*11*).

The major interest of the rancho period was cattle. The main source of income was the sale of cattle hides. The growth of land used by the ranchos contributed to the decline of the missions. The rancho period lasted until 1864. A severe drought from 1862 through 1864 killed most of the cattle and caused the breakup of the ranchos.

John C. Fremont claimed San Luis Obispo County for the United States in 1846. California was ceded to the United States of America under the treaty of Guadalupe Hidalgo in 1848, and it became a state in 1850. San Luis Obispo was one of the state's original 27 counties.

In 1866, Edgar Steele bought Corral de Piedra, El Pismo, Bolsa de Chamisal, and Arroyo Grande ranchos. He and his brothers stocked the ranchos with 600 dairy cows. This was the beginning of the dairy business in San Luis Obispo County. Ira Van Gordon started a large dairy at San Simeon in 1868, and emigrants from Switzerland began dairying in the Cayucos region during the 1880's. Dairies in the coastal part of San Luis Obispo County continued to thrive until the 1940's, when a shortage of labor and marketing caused a sharp decline. By 1976, only one large dairy was operating in the area.

As the dairy industry declined, the beef cattle industry increased. The number of beef cattle increased steadily until 1970, but then began to decline because of low beef prices and a severe drought in 1975-76.

Until 1973, the animal industry, mainly beef cattle, had a higher income than any other agricultural enterprise (fig. 1). From 1974 to 1976, however, vegetable crops had the highest income in the area (fig. 2). A wide variety of vegetables are grown in the area. Lettuce accounts for about 30 to 50 percent of the total vegetable income. Premium quality celery has about 1/3 the value of the lettuce crop. In 1976, field crops accounted for about 20 percent of the agricultural income, with alfalfa hay making up 1/3 of the field crop value.

Irrigation in the coastal part of the county was started by diverting small amounts of water from coastal streams. Early irrigation systems, such as Branch Mill started in 1904, used a diversion dam. Centrifugal pumps were used to lift water from streams and shallow wells until 1930. From 1930 to 1976, the turbine pump for deep wells was the main irrigation source.

In the 1970's, the acreage of such crops as lemons, avocados, and wine grapes increased rapidly. In 1976, there were about 2,000 acres of grapes, at Edna, Nipomo, and Suey Ranch; 1,200 acres of avocados, mainly at Edna and Nipomo; and 700 acres of lemons, at Nipomo and Suey. Nearly all of these crops are irrigated by deep wells.

population trends

County population growth was relatively slow until 1950, when the population was about 33,000 (*5*). About 15,000 persons lived in the coastal part of the county. In 1977, the population of the county was 135,456, with

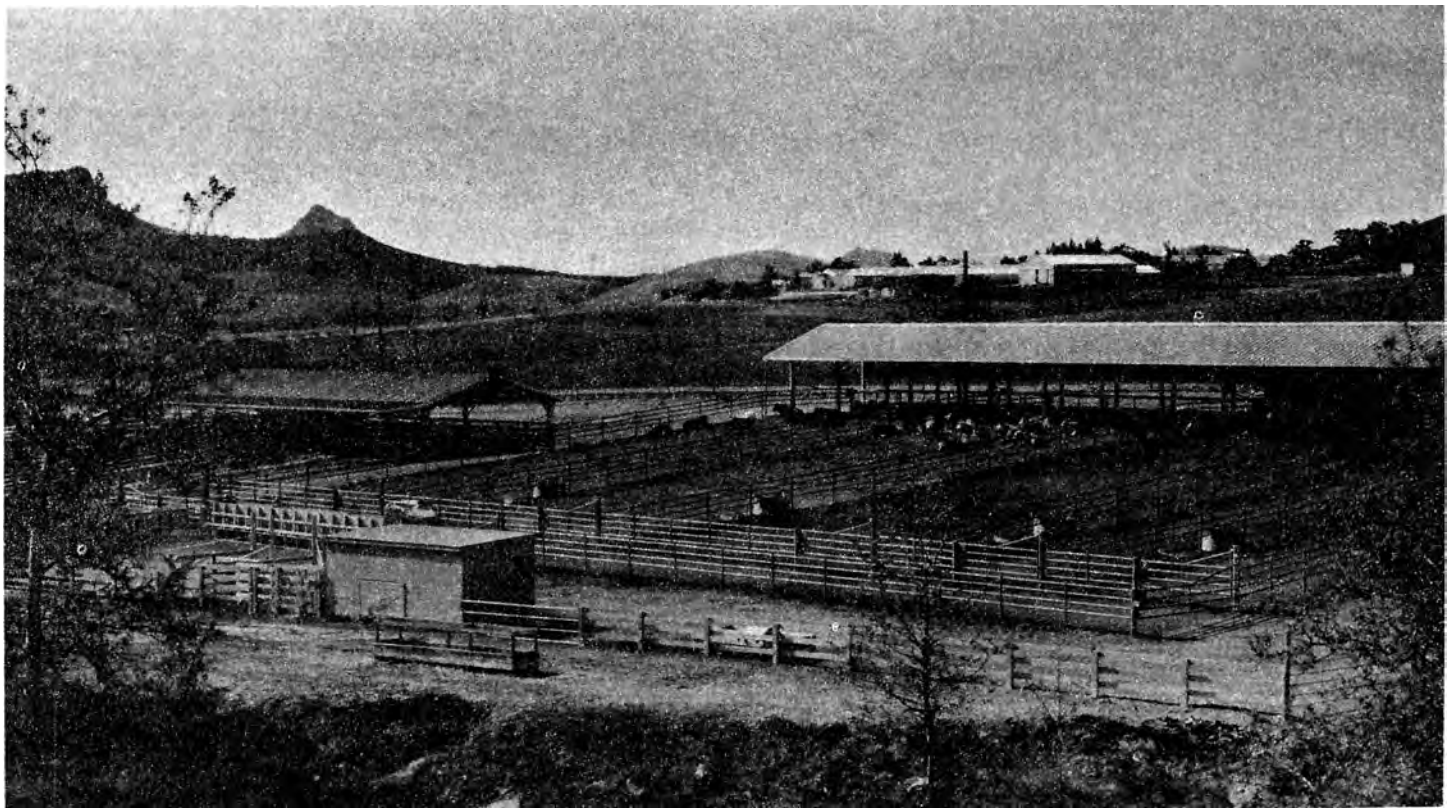

Figure 1.—Cattle pens on the California Polytechnic State University campus. Cattle raising is the dominant land use in the survey area.

Figure 2.—About 20 percent of the land in the survey area is used for intensive row cropping

over 95,000 living in the coastal area. The population was expected to reach 143,000 for the county by 1980.

San Luis Obispo is the major city in the survey area. The cities of Arroyo Grande, Nipomo, Oceano, Grover City, Pismo Beach, Morro Bay, Cayucos, and Cambria account for most of the rest of the population.

California Polytechnic State University was founded in 1901. It currently has an enrollment of about 15,000 students, and makes up a large part of the city of San Luis Obispo.

topography

The topography of the survey area varies greatly. Elevation ranges from sea level along the coast to more than 3,400 feet on the coastal ridge of the Santa Lucia mountains.

The western portion of the survey area is characterized by the coastal terraces that extend from the extreme northern boundary to as far south as Pismo Beach (fig. 3). From Pismo Beach south to the Santa Maria River, which is the southern boundary of the survey area, the dominant landforms are coastal beaches and recent to old sand dune deposits (fig. 4).

The eastern boundary of the survey area is the coastal ridge of the Santa Lucia Mountains. This runs in a southeasterly direction from the Monterey County line to the Santa Barbara County line.

From Morro Bay north to the Monterey County line are a series of narrow valleys that dissect the western slopes of the Santa Lucia Mountains. These valleys run roughly east and west with the drainage all running toward the Pacific Ocean. From Morro Bay south to about midway between the cities of San Luis Obispo and Arroyo Grande are three valleys that run southeasterly, roughly parallel to the mountain range. Two of these valleys are between San Luis Obispo and Morro Bay. They are the Los Osos and Chorro valleys, which are separated by a series of steep volcanic peaks extending from Morro Rock on the west to Islay Hill on the southeast (fig. 5). The third of the three valleys is Edna valley, which lies between the coastal mountains to the east and the Pismo hills to the west.

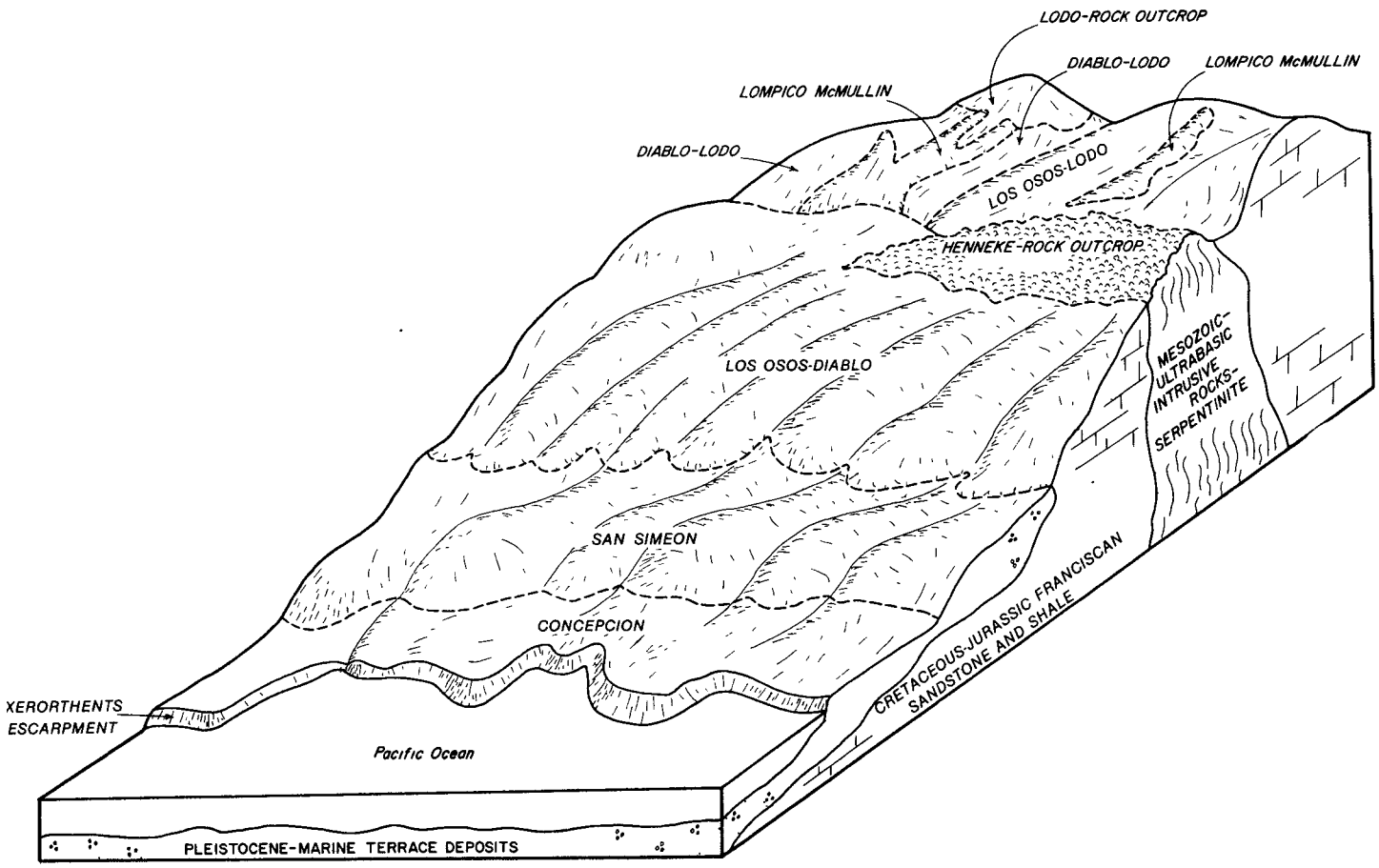

Figure 3.—A typical cross-section of the soils and the geology in the northern part of the survey area.

The extreme southwestern portion of the area consists of the northern tip of the Santa Maria valley and all of the Arroyo Grande valley.

climate

Jerry L. Hatfield, biometeorologist, University of California, Davis, helped to prepare this section

The climate of the coastal part of San Luis Obispo County is moderate and relatively uniform throughout because of the marine influence of the Pacific Ocean. This influence provides a typical Mediterranean climate with cool, moist winters and warm, dry summers. There are differences, however, as one goes from the areas adjacent to the ocean to areas in the foothills and mountains of the Santa Lucia Range and to the few inland valleys. One such valley is the Huasna area, where plant communities begin to show signs of having less of a coastal influence and more of a continental inland type climatic influence.

The northwest-southeast orientation of the Santa Lucia Range governs, to a large extent, the direction of major wind patterns. Winds are either from the northwest or, to a minor extent, the southeast. The relatively rough topography of this range and other mountainous areas, however, can result in sharp differences from the normal pattern within short distances.

During the summer months, the abundant amount of sunshine in the inland portions of the survey area causes a rapid warming. This creates a sharp pressure and temperature gradient between the coastal area and inland areas, which in turn causes a strong inflow of cool marine air to replace the rising warm air. This marine air is much higher in moisture content. The result is often fog or low overcast directly adjacent to the coast, particularly in the early morning or late afternoon (fig. 6). This serves to lower the mean summer temperature, which decreases the difference between the mean summer and winter temperatures. This reduction in summer temperatures reduces the annual amount of evapotranspiration, thereby increasing the total moisture available for plant growth.

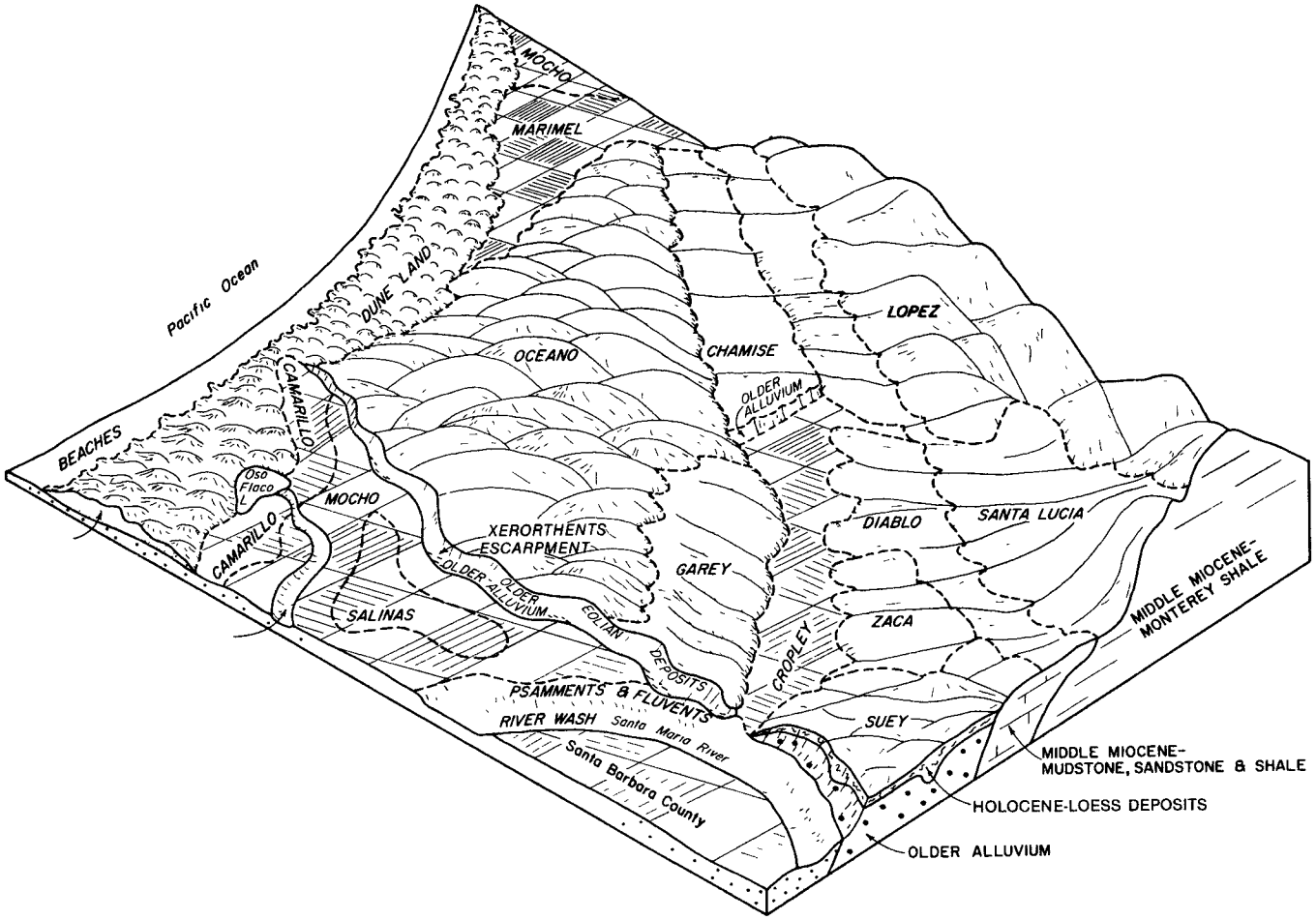

Figure 4.—A cross-section of the soils and the geology in the Santa Maria Valley area.

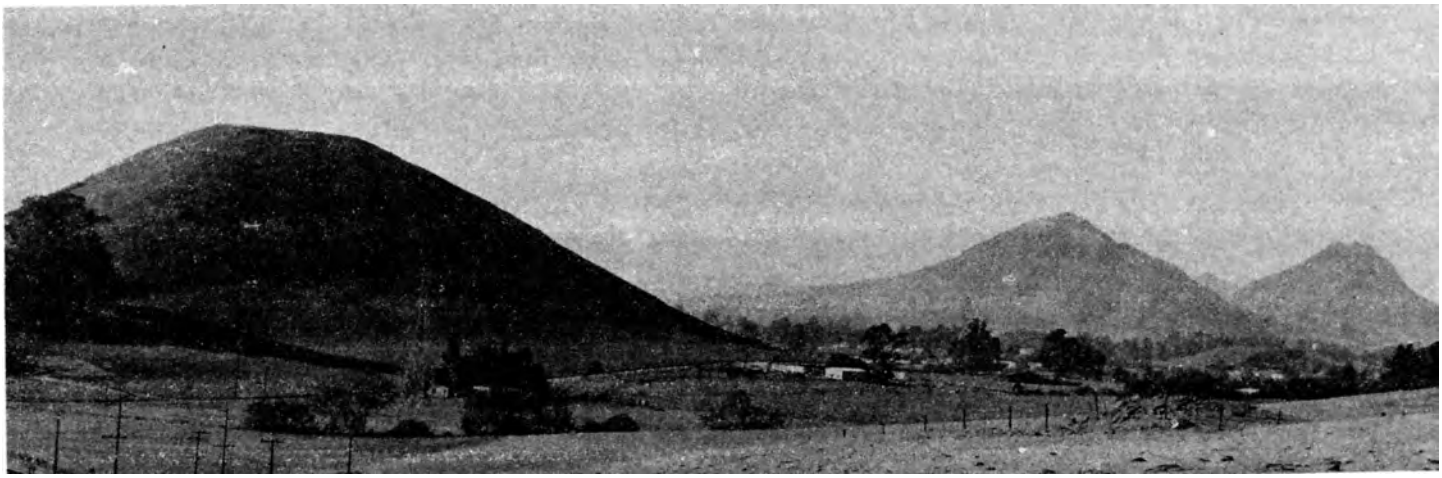

Figure 5.—Volcanic peaks extend from Morro Rock in the west to Islay Hill southeast of San Luis Obispo

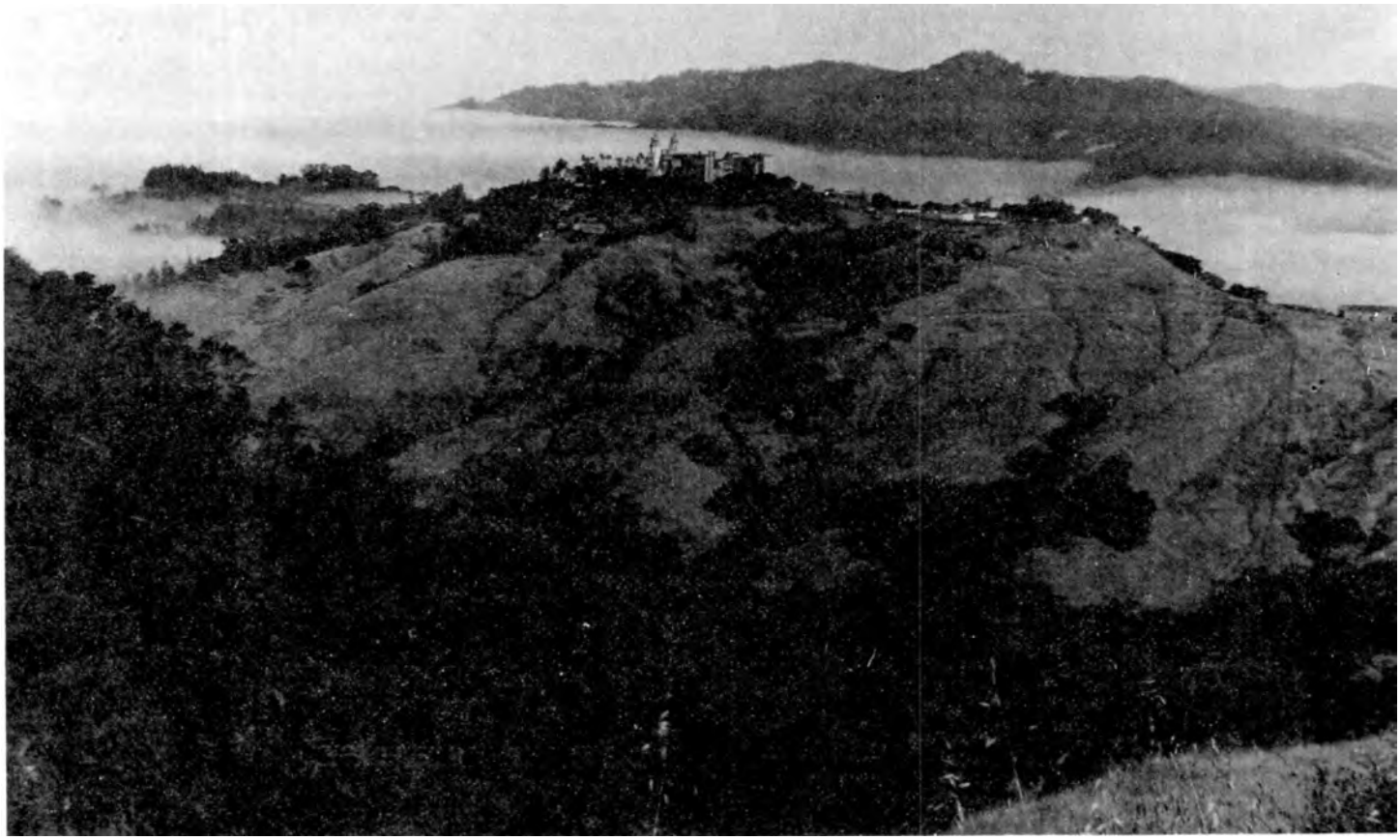

Figure 6 —Coastal fog surrounding Hearst Castle in a typical area of Diablo-Lodo complex

Precipitation, in the form of rain, occurs mainly between November and March. It is least along the coast (averaging about 16 inches) but increases as the clouds move inland and rise over the mountains. The highest rainfall (from about 30 to 45 inches) is normally recorded along the ridgetops, such as just northeast and west-by-southwest of the city of San Luis Obispo and northeast of the town of Cambria (fig. 7). Although precipitation occurs for an extended time during the winter, the stored available soil moisture is depleted by June.

The mean annual temperature in the survey area ranges from about 54 degrees to 60 degrees F. The cooler temperatures are along the coast. The coolest readings along the coast are in the northernmost part of the survey area. Typical of this area is Point Piedras Blancas, with a mean annual temperature of 54.0 degrees. The mean temperature is 51.6 degrees in January and 55.7 degrees in July. Soil temperature data show, however, that even the coolest soils under grassland vegetation in that area average above 59 degrees F. The only soils that have average yearly soil temperatures less than 59 degrees F are those in the northern part of the survey area under a dense tree canopy.

Throughout the survey area the climate is very mild. The growing season length is 338 days at San Luis Obispo. The length of the 32 degrees F growing season decreases rapidly as one moves inland (fig. 8). However, the length of the growing season varies widely, depending on microrelief and aspect. At San Luis Obispo, temperatures below 32 degrees F are rarely recorded. Point Piedras Blancas along the north coast occasionally has a temperature below 32 degrees F. Santa Maria, which typifies the southern part of the survey area, also exhibits a very long growing season and a low probability of freezing temperatures (fig. 8).

Open pan evaporation exceeds precipitation for most of the survey area (fig. 9). This deficit is overcome by irrigation of primary agricultural crops. Without irrigation, the available soil moisture near the coast would be depleted by June 15.

Growing degree days are shown in Table 1 for San Luis Obispo. Beginning in the spring, growing degree days accumulate by the amount the average temperature exceeds a base temperature of 40 degrees F. The

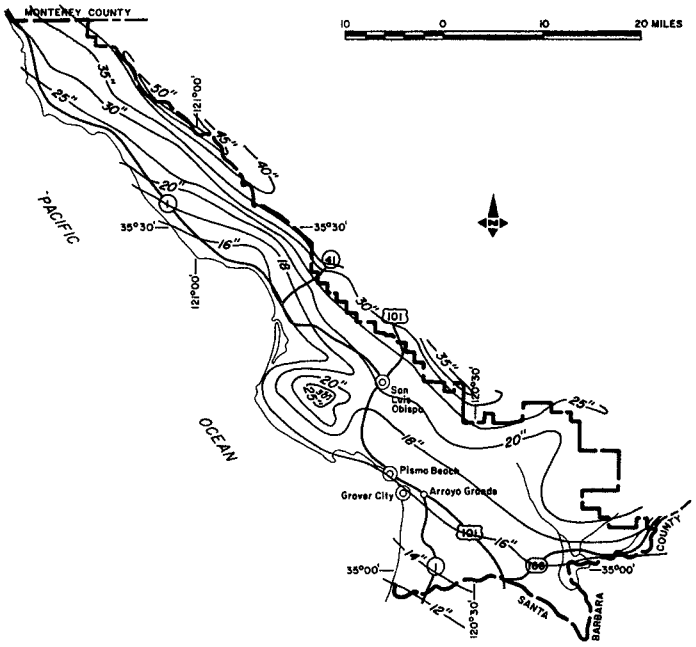

Figure 7.—Precipitation isohyets for the coastal part of San Luis Obispo County. The average annual rainfall is based on data collected in the period 1931 to 1960.

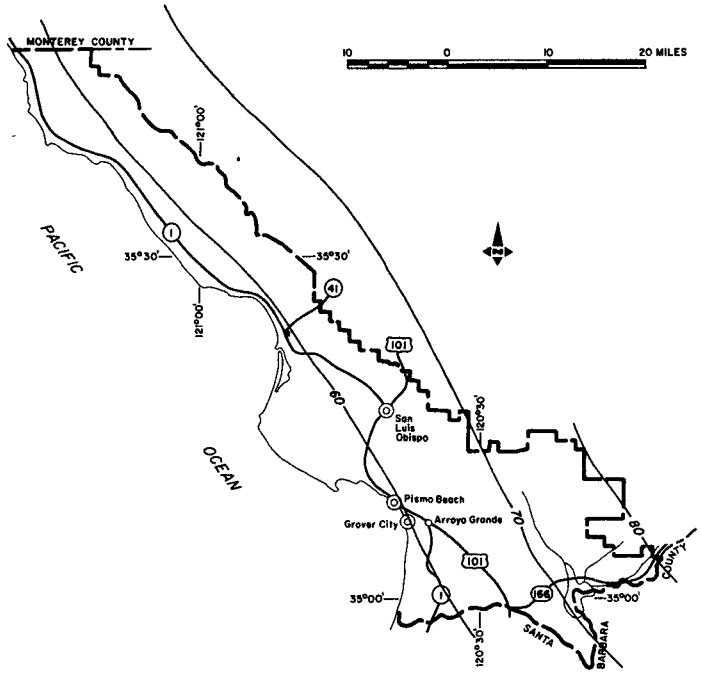

Figure 9.—The average annual open pan evaporation from Weather Bureau Class A pan.

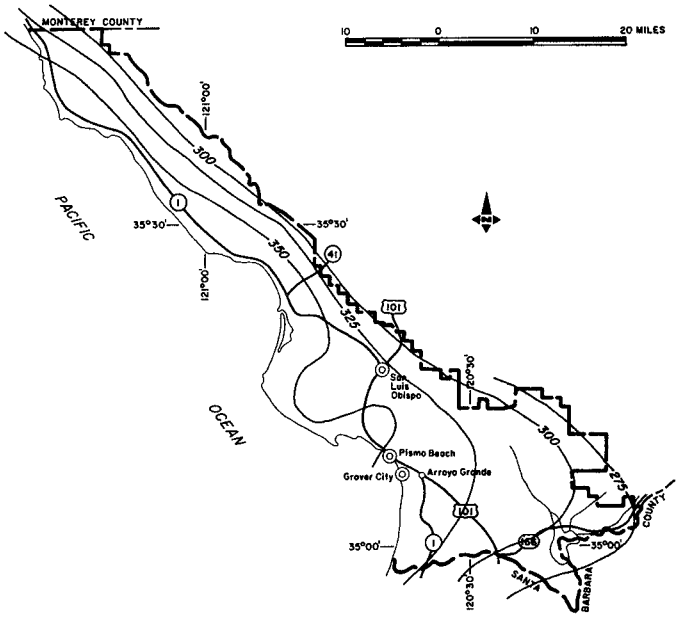

Figure 8.—The average length of the 32 degree Fahrenheit growing season (the number of days between the last freeze in spring and the first freeze in fall) for the survey area. The average length of the growing season is based on data collected in the period 1931 to 1960.

normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall. San Luis Obispo is an excellent location for growing plants, with an accumulation of 4,000 growing degree days from May through October. With this large value, it is possible to have successive plantings and be assured of proper growth and development.

Along with the long growing season, there is an ample supply of solar radiation for plant growth. Solar radiation records for long periods are not available for San Luis Obispo, although some sketchy data exists. Typical solar radiation receipts would be 200 langleys per day in January and 700 langleys per day in June. Within the survey area the sun shines about 70 percent of the time, or it is completely cloudy 30 percent of the time. The sun shines about 60 percent of the time during the winter and 80 percent of the time in the summer and fall.

how this survey was made

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; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in

a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform 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 "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. All soils are field tested to determine their characteristics. 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.

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

general soil map units

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

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

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

The soils in the survey area vary widely in their potential and suitability for major land uses. The potential and suitability of each, in relation to that of the other map units, for major land uses and soil properties that limit use are discussed in each map unit description. Soil potential ratings are based on the practices commonly used in the survey area to overcome soil limitations. These ratings reflect the ease of overcoming the limitations. They also reflect the problems that will persist even if such practices are used. Each map unit is rated for *cultivated crops, rangeland, urban development,* and *wildlife habitat development.*

The units on the general soil map of this survey do not always match with units on the general soil maps of adjacent counties. The differences in these maps are the result of different soil patterns and recent changes in the concept of classification.

The 14 general soil map units in this survey are grouped into 4 general kinds of landscapes for broad interpretive purposes. These groups, and the map units in each group, are described in the following pages.

soils on alluvial fans and plains

The soils in this group are dominantly on the lower positions of the landscape. The soils are dominantly nearly level, but they range to moderately steep in areas that are adjacent to the steeper residual soils. Elevation ranges from 0 to 1,000 feet. The average annual precipitation ranges from 12 to 22 inches, and the average annual air temperature ranges from 57 degrees to 60 degrees F. The average frost-free season ranges from 275 to 300 days in the lower inland areas and from 300 to 365 days in the higher inland areas and along the coast.

These soils are very deep and range from well drained to poorly drained. The surface layer ranges from sandy loam to clay.

Areas of these soils are used mainly for irrigated row crops and dryland farming. A few areas are used for irrigated pasture. Some areas are being subdivided for urban development.

The four map units in this group make up about 11 percent of the survey area.

1. Mocho-Camarillo-Salinas

Very deep, nearly level to moderately sloping, somewhat poorly drained and well drained loam and silty clay loam soils; on alluvial plains

This map unit is mainly in the Santa Maria Valley and the Huasna area (see fig. 4). The soils formed in mixed alluvium from sedimentary rock sources.

This map unit makes up about 2 percent of the survey area. It is about 22 percent Mocho soils, 20 percent Camarillo soils, 15 percent Salinas soils, and 43 percent soils of minor extent.

Mocho soils are well drained. Slope ranges from 0 to 2 percent. The soil profile is calcareous silty clay loam that has strata of fine sandy loam. Sand is at a depth of about 45 inches.

Camarillo soils are somewhat poorly drained. Slope ranges from 0 to 2 percent. The soil profile is loam underlain by strata of silty clay loam, fine sandy loam, and loamy fine sand.

Salinas soils are well drained. Slope ranges from 0 to 9 percent. The soil profile is silty clay loam that has strata of very fine sandy loam or silty clay.

Soils of minor extent in this map unit are moderately well drained Cropley clay, well drained Elder sandy loam, and somewhat excessively drained Corralitos sand and Tujunga loamy sand. Also included are areas of Psamments, Fluvents, and Riverwash.

Most areas of this map unit are used for irrigated row crops and pasture. A few areas are used for dryland farming.

The Mocho and Salinas soils in this map unit are well suited to most climatically adapted crops. The Camarillo

soils are well suited only if they have been artificially drained. Undrained areas have fair or poor potential for deep-rooted irrigated crops.

The Mocho and Salinas soils of this map unit are suited to urban development, such as building sites, roads and streets, and sewage disposal systems. These soils are well suited to range because of their nearly level to moderate slopes and high forage production.

Salinas and Mocho soils have good potential for openland wildlife habitat development. Camarillo soils have fair potential for openland wildlife habitat development. On intensively cropped areas, wildlife benefits from cover plantings of shrubs or trees.

2. Cropley-Salinas

Very deep, nearly level to moderately sloping, moderately well drained and well drained clay and silty clay loam soils; on alluvial plains

This map unit is in the Chorro, Los Osos, and Edna Valleys and in narrow valleys north of Morro Bay. The soils formed in mixed alluvium from sedimentary rock sources.

This map unit makes up about 4 percent of the survey area. It is about 41 percent Cropley soils, 19 percent Salinas soils, and 40 percent soils of minor extent.

Cropley soils are moderately well drained. Slope ranges from 0 to 9 percent. The soil profile is clay and silty clay loam throughout. The soil shrinks and swells with changes in moisture content.

Salinas soils are well drained. Slope ranges from 0 to 9 percent. The soil profile is silty clay loam that has strata of very fine sandy loam or silty clay.

Soils of minor extent in this map unit are well drained Diablo clay and Elder sandy loam and somewhat poorly drained Marimel sandy clay loam. Also included are Psamments, Fluvents, and Riverwash.

Most areas of this map unit are used for dryland farming. Some areas are used for irrigated pasture. There are also minor areas of Urban land.

The Cropley and Salinas soils in this map unit are well suited to most climatically adapted crops. The high available water capacity increases their suitability for dryland farming of small grains and beans. The Cropley soil can be worked only in a narrow range of moisture content.

The potential for urban development on Cropley soils is limited because of the high shrink-swell potential and slow permeability. These soils are well suited to range because of their nearly level to moderate slopes and high forage production.

The Salinas soils have good potential for openland wildlife habitat development. The potential for openland wildlife habitat development on Cropley soils is limited because of the high shrink-swell potential.

3. Salinas-Marimel

Very deep, nearly level to moderately sloping, somewhat poorly drained and well drained silty clay loam and sandy clay loam soils; on alluvial plains

This map unit is adjacent to San Luis Obispo Creek, Perry Creek, and the west end of Los Osos Valley; near Warden Lake; and just south of Oceano. The soils formed in mixed alluvium from sedimentary rock sources.

This map unit makes up about 3 percent of the survey area. It is about 27 percent Salinas soils, 24 percent Marimel soils, and 49 percent soils of minor extent.

Salinas soils are well drained. Slope ranges from 0 to 9 percent. The soil profile is silty clay loam that has strata of very fine sandy loam or silty clay.

Marimel soils are somewhat poorly drained. Slope ranges from 0 to 2 percent. The soil profile is stratified sandy clay loam or clay loam.

Soils of minor extent in this map unit are well drained Cropley clay, Diablo clay, Los Osos loam, and Mocho silty clay loam. Also included are areas of Riverwash. The Cropley and Diablo soils are clay throughout. The Los Osos soils have a clay subsoil. The Mocho soils are stratified loam, fine sandy loam, and silty clay loam.

Most areas of this map unit are used for cultivated row crops.

The Salinas soils in this map unit, and the Marimel soils if artificially drained, are suited to most climatically adapted crops. The somewhat poorly drained areas of the Marimel soils are limited to shallow-rooted crops, except late in summer or early in fall when the water table drops. The well drained areas of soils in this map unit are suited to urban development, including roads and streets, building sites, and sewage disposal systems. The somewhat poorly drained areas of soils are poorly suited to urban development. These soils are well suited to range or, where adequately drained, to irrigated pasture because of their nearly level to moderate slopes and high forage production.

The Salinas and Marimel soils have good potential for openland wildlife habitat development. On intensively cropped areas, wildlife benefits from cover plantings of shrubs or trees.

4. Still-Elder

Very deep, nearly level to moderately steep, well drained sandy loam and gravelly sandy clay loam soils; on alluvial fans

This map unit is on alluvial fans on marine terrace deposits along the coast between Pismo Beach and Morro Bay; just south of Cambria; and along Tar Spring, Arroyo Grande, and Los Berros Creeks. The soils formed in alluvium from sedimentary rock sources.

This map unit makes up about 2 percent of the survey area. It is about 31 percent Still soils, 21 percent Elder soils, and 48 percent soils of minor extent.

Still soils are well drained. Slope ranges from 0 to 25 percent. The soil profile is gravelly sandy clay loam underlain by gravelly sand.

Elder soils are well drained. Slope ranges from 2 to 15 percent. The profile is sandy loam throughout.

Soils of minor extent in this map unit are well drained Santa Lucia and Lopez shaly clay loam soils that have steeper slopes and Concepcion loam on marine terraces north of Cayucos. Concepcion soils have a clay subsoil. Along the coast near Cayucos are areas of Cropley clay. Also included are Psamments, Fluvents, Riverwash, and Xerorthents, escarpment.

Most areas of this map unit are used for cultivated crops, both irrigated and dryfarmed; range; or urban developments.

The Still and Elder soils of this map unit are well suited to most climatically adapted crops. They are suited to dryland grains and beans. The less sloping areas are suited to irrigated pasture; the more sloping areas are potentially excellent rangeland. Most engineering interpretations associated with urban development are also favorable.

Elder and Still soils have good potential for openland and rangeland wildlife habitat development.

soils on wind-blown deposits

The soils in this group are mainly on old, stabilized sand dune deposits, except along the coastline where the dunes are still active. The soils are nearly level to moderately steep. Elevation ranges from 0 to 800 feet. The average annual precipitation ranges from 13 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 325 to 365 days for most of the soils in this group.

These soils are very deep and excessively drained or somewhat excessively drained. The surface layer is sand, loamy sand, sandy loam, or silt loam.

Areas of these soils are used mainly for urban development, recreation, and some irrigated orchards or specialty crops.

One map unit is in this group. It makes up about 9 percent of the survey area.

5. Oceano-Dune land-Baywood

Very deep, nearly level to moderately steep, excessively drained and somewhat excessively drained fine sand and sand soils; on wind-blown deposits

This map unit is in the areas of Nipomo Mesa, Oceano, Grover City, Morro Bay, Los Osos, and Baywood. It is also on the northern coast near Piedras Blancas. The soils formed in deposits of wind-blown sand.

This map unit makes up about 9 percent of the survey area. It is about 37 percent Oceano soils, 25 percent Dune land, 11 percent Baywood soils, and 27 percent soils of minor extent. Some of the delineations of this unit on the general soil map do not contain all of the major soils.

Oceano soils are excessively drained. Slope ranges from 0 to 30 percent. The soil profile is sand that has strata of loamy sand in the subsoil.

Dune land is excessively drained. Slopes are variable and change because of the movement of sand. The profile is sand throughout.

Baywood soils are somewhat excessively drained. Slope ranges from 2 to 30 percent. The soil profile is fine sand throughout.

Soils of minor extent in this map unit are well drained Garey sandy loam, Capistrano sandy loam, and Suey silt loam and somewhat excessively drained Corralitos sand. Also included are areas of Beaches; Aquolls, saline; water; and Xerorthents, escarpment.

Most areas of this map unit are used for urban development or recreation. Some areas are used for orchards or cultivated crops.

The major soils of this map unit are suited to recreation, some urban development, and irrigated orchards or pasture. The soils are droughty because of their coarse texture, and they are subject to blowing. Seepage is a limitation for sewage disposal systems.

The potential for openland and rangeland wildlife habitat development on Baywood and Oceano soils and Dune land is limited because of droughtiness.

soils on foothills and terraces

The soils in this group are dominantly formed in old alluvial deposits on dissected marine terraces. The soils are gently sloping to steep. Elevation ranges from 25 to 2,000 feet. The average annual precipitation ranges from 15 to 25 inches, and the average annual air temperature ranges from 55 degrees to 60 degrees F. The average frost-free season ranges from 275 to 365 days.

These soils are shallow to very deep and somewhat excessively drained to moderately well drained. The surface layer ranges from loamy sand to sandy loam or loam.

Areas of these soils are used mainly for range or dryland farming. Some areas are used for urban development.

Four map units are in this group. They make up about 11 percent of the survey area.

6. Tierra-Briones

Moderately deep and very deep, gently sloping to steep, moderately well drained and somewhat excessively drained soils; on foothills and terraces

This map unit is mainly in the Tar Spring and Huasna areas. The soils formed on old alluvial terraces from sedimentary rock sources.

This map unit makes up about 3 percent of the survey area. It is about 34 percent Tierra soils, 23 percent Briones soils, and 43 percent soils of minor extent.

Tierra soils are very deep and moderately well drained. Slope ranges from 2 to 30 percent. The soil profile is sandy loam underlain by sandy clay and sandy clay loam to a depth of more than 60 inches.

Briones soils are moderately deep and somewhat excessively drained. Slope ranges from 15 to 50 percent. The soil profile is loamy sand underlain by soft sandstone at a depth of about 32 inches.

Soils of minor extent in this map unit are somewhat excessively drained Arnold loamy sand, Pismo loamy sand, Gaviota sandy loam, and Lopez shaly clay loam and well drained Santa Lucia shaly clay loam. Pismo, Gaviota, and Lopez soils are shallow. Arnold soils are similar to Briones soils, but they are deeper. Santa Lucia soils are moderately deep.

Most areas of this map unit are used for range, dryland grains and beans, and limited urban development.

The Tierra soil is well suited to dryland farming and range. It is also well suited to rangeland and wildlife habitat.

Briones soils are coarse textured and droughty. This limits their suitability for most uses. They are moderately suited to range and wildlife habitat. Because of the droughtiness, Briones soils produce quality forage for a relatively short period of time. Maintaining a good vegetative cover on both soils helps to prevent water erosion in wet years.

7. Arnold-Pismo-Briones

Shallow to deep, moderately sloping to very steep, somewhat excessively drained soils; on foothills

This map unit is mainly in the area just east of Pismo Beach. These soils formed in material weathered from soft sandstone.

This map unit makes up about 3 percent of the survey area. It is about 33 percent Arnold soils, 31 percent Pismo soils, 15 percent Briones soils, and 21 percent soils of minor extent.

Arnold soils are deep and somewhat excessively drained. Slope ranges from 5 to 50 percent. The soil profile is loamy sand underlain by soft sandstone at a depth of about 59 inches.

Pismo soils are shallow and somewhat excessively drained. Slope ranges from 9 to 75 percent. The soil profile is loamy sand underlain by soft sandstone at a depth of about 19 inches.

Briones soils are moderately deep and somewhat excessively drained. Slope ranges from 15 to 50 percent. The soil profile is loamy sand underlain by soft sandstone at a depth of about 32 inches.

Soils of minor extent in this map unit are well drained Chamise shaly sandy clay loam, Elder sandy loam, and Gaviota fine sandy loam and moderately well drained Tierra sandy loam. Also included are areas of Corralitos sand in swales. Chamise and Tierra soils are on terraces and have a clay subsoil. Gaviota soils are similar to Pismo soils but are fine sandy loam or sandy loam throughout. Elder soils are on flood plains and terraces. Corralitos soils are sand throughout.

Most areas of this map unit are used for range. Some areas are used for limited urban development.

The major soils of this map unit are droughty. This limits their suitability for most uses. They are moderately suited or poorly suited to range and wildlife habitat. Because of the droughtiness of these soils, quality forage is produced for a relatively short period. Coarse texture and steepness of slope make it necessary to maintain a good cover of protective vegetation in order to reduce water erosion during wet years. Development and maintenance of wildlife habitat is especially difficult on steep, south-facing slopes.

8. San Simeon-Concepcion

Moderately deep and very deep, gently sloping to steep, moderately well drained soils; on old marine terraces

This map unit is on old marine terraces from Cayucos to just north of Piedras Blancas Lighthouse, and within one to two miles of the coast. These soils formed in mixed alluvium and soft sandstone.

This map unit makes up about 4 percent of the survey area. It is about 44 percent San Simeon soils, 39 percent Concepcion soils, and 17 percent soils of minor extent.

San Simeon soils are moderately deep and moderately well drained. Slope ranges from 2 to 50 percent. The soil profile is sandy loam about 24 inches thick underlain by clay about 10 inches thick. Sandstone is at a depth of about 34 inches.

Concepcion soils are very deep and moderately well drained. Slope ranges from 2 to 30 percent. The soil profile is loam and sandy loam about 19 inches thick underlain by clay and sandy clay to a depth of more than 60 inches.

Soils of minor extent in this map unit are well drained Los Osos loam, Lodo clay loam, Gazos clay loam, Diablo clay, and Cropley clay. Lodo soils are shallow. Los Osos soils are on foothills and mountains. Gazos soils are clay loam throughout. Diablo and Cropley soils are clay throughout.

Most areas of this map unit are used for range. Some areas are used for dryfarmed hay or small grains. Some urban development has taken place in the Cambria and San Simeon areas.

The major soils in this map unit are moderately suited to rangeland. The commonly dense woody vegetation on the San Simeon soils limits rangeland production.

These soils have severe limitations for most urban development because of the heavy clay subsoil.

Concepcion and San Simeon soils have fair potential for rangeland wildlife habitat development. The heavy clay subsoil limits the kinds of plants that can be grown for wildlife food and cover.

9. Chamise

Very deep, moderately sloping to moderately steep, well drained soils; on foothills and dissected terraces

This map unit is mainly in the area of Piccacho Peak and Highway 101 extending south to Los Berros Road and north to Arroyo Grande. These soils formed on old alluvial terraces in mixed alluvium from sedimentary rock sources.

This map unit makes up about 1 percent of the survey area. It is about 82 percent Chamise soils and 18 percent soils of minor extent.

Chamise soils are well drained. Slope ranges from 5 to 30 percent. The surface layer is shaly sandy clay loam about 12 inches thick. The subsoil is weakly cemented very shaly clay 10 inches thick. The underlying material is shaly sandy clay loam to a depth of more than 60 inches.

Soils of minor extent in this map unit are somewhat excessively drained Arnold loamy sand; well drained Diablo clay, Zaca clay, and Nacimiento silty clay loam; and somewhat excessively drained Lopez very shaly clay loam. Arnold soils are loamy sand throughout. Diablo and Zaca soils are mostly clay throughout. Nacimiento soils are calcareous. Lopez soils are shallow.

Most areas of this map unit are used for range. A few areas are used for small grains, hay, or garbanzo beans.

The weakly cemented, fine textured subsoil and the shale content make Chamise soils poorly suited to most crops. They are moderately suited to shallow-rooted small grains, hay crops, and range. The large amount of shale and the heavy clay subsoil lower the available water capacity and limit range forage productivity. The heavy clay layer limits suitability for most urban development.

Chamise soils have fair potential for rangeland wildlife habitat development. The clay subsoil limits the kinds of plants that can be grown for wildlife food and cover.

soils on hills and mountains

The soils in this group are dominantly on the higher parts of the landscape. The soils are moderately sloping to extremely steep. Elevation ranges from 50 to 3,000 feet. The average annual precipitation ranges from about 14 to 35 inches, but a few areas in the northeastern part of the survey area receive 45 or more inches. The average annual air temperature ranges from 54 degrees to 60 degrees F; it is generally about 58 degrees F. The average frost-free season ranges from about 250 to 365 days.

These soils are shallow to deep and well drained or somewhat excessively drained. The surface layer ranges from loam to clay.

Areas of these soils are used mainly for range. There is some dryland farming and urban development.

Five map units are in this group. They make up about 69 percent of the survey area.

10. Los Osos-Lodo-Diablo

Shallow to deep, moderately sloping to very steep, well drained and somewhat excessively drained soils; on hills and mountains

This map unit occurs throughout the survey area. The soils formed in residual material weathered from sedimentary rocks.

This map unit makes up about 32 percent of the survey area. It is about 25 percent Los Osos soils, 23 percent Lodo soils, 20 percent Diablo soils, and 32 percent soils of minor extent.

Los Osos soils are moderately deep and well drained. Slope ranges from 5 to 75 percent. The soil profile is loam about 14 inches thick underlain by clay and clay loam to a depth of 32 inches. The underlying material is sandy loam about 7 inches thick. Sandstone is at a depth of about 39 inches.

Lodo soils are shallow and somewhat excessively drained. Slope ranges from 5 to 75 percent. The soil profile is clay loam about 12 inches thick underlain by sandstone or red rock.

Diablo soils are deep and well drained. Slope ranges from 5 to 50 percent. The soil profile is clay about 58 inches thick over soft mudstone or shale.

Soils of minor extent in this map unit are well drained Cibo, Obispo, and Zaca clays, Nacimiento silty clay loam, Gazos clay loam, and Lompico loam; and somewhat excessively drained McMullin and Cieneba loams and Gaviota sandy loam. Also included are small areas of water. Cibo and Zaca soils are mostly clay throughout; Obispo soils are shallow and clayey. Nacimiento soils are calcareous. Gazos soils are moderately deep and clay loam throughout. Lompico soils are moderately deep and cool, and McMullin soils are shallow and cool. Cieneba and Gaviota soils are shallow.

Most areas of this map unit are used for range. Some areas are used for dryfarmed crops or urban development.

Los Osos and Diablo soils are well suited to rangeland. The shallowness and low available water capacity of the Lodo soils limit range forage production. Management is critical to keep Lodo soils free of brush.

The clay subsoil of the Los Osos soils and the clayey texture of the Diablo soils limit their suitability for urban development. These soils also are susceptible to slippage when saturated. This limits their usefulness for many engineering purposes.

Los Osos and Diablo soils have fair or good potential for rangeland wildlife habitat development. The heavy soil texture limits the kinds of shrubs and trees that can be established for wildlife cover. Lodo soils have poor potential for wildlife habitat development because the soil is shallow.

11. Santa Lucia-Lopez-Rock outcrop

Shallow and moderately deep, moderately sloping to extremely steep, well drained and somewhat excessively drained soils, and Rock outcrop; on hills and mountains

This map unit is mainly on the mountains between Morro Bay and Pismo Beach and on the mountains on the eastern side of the survey area from San Luis Obispo to the southern part of the county. The soils formed in material weathered from shale.

This map unit makes up about 22 percent of the survey area. It is about 31 percent Santa Lucia soils, 25 percent Lopez soils, 11 percent Rock outcrop, and 33 percent soils of minor extent.

Santa Lucia soils are moderately deep and well drained. Slope ranges from 5 to 75 percent. The soil profile is shaly clay loam underlain by shale at a depth of about 36 inches.

Lopez soils are shallow and somewhat excessively drained. Slope ranges from 9 to 100 percent. The profile is very shaly clay loam underlain by shale at a depth of about 18 inches.

Rock outcrop consists of areas that have shale or sandstone at or near the surface of the soil.

Soils of minor extent in this map unit are well drained Diablo clay, Zaca clay, Nacimiento silty clay loam, Calodo loam, Still gravelly sandy clay loam, Gazos clay loam, and Gaviota sandy loam and somewhat excessively drained Lodo clay loam. Also included are small areas of Riverwash and water. Diablo and Zaca soils are mostly clay throughout. Nacimiento and Calodo soils are calcareous. Still soils are on marine terraces or in alluvial valleys. Gazos soils are clay loam throughout. Lodo and Gaviota soils are shallow.

Most areas of this map unit are used for range, watershed, or wildlife habitat. A few areas are used for urban development.

The Santa Lucia soils are moderately suited to range. The major limitation is the woody plants on much of the map unit. The Lopez soils are poorly suited to most uses because they are shallow and droughty. Where slope is less than 15 percent, the Santa Lucia soils are moderately suited to building sites and roads and streets.

The existing woody vegetation on Santa Lucia soils provides wildlife cover. This is especially valuable where it is next to open areas. Lopez soils are poorly suited to wildlife habitat development because of shallowness. Rock outcrops can provide den and cover sites for beneficial predators and other small mammals.

12. Nacimiento-Calodo

Shallow and moderately deep, moderately steep to very steep, well drained soils; on hills and mountains

This map unit is on hills and mountains at the extreme southern end of the survey area and on mountains between San Luis Obispo and Lopez Lake. These soils formed in material weathered from calcareous sandstone or shale.

This map unit makes up about 3 percent of the survey area. It is about 41 percent Nacimiento soils, 17 percent Calodo soils, and 42 percent soils of minor extent.

Nacimiento soils are moderately deep and well drained. Slope ranges from 15 to 75 percent. The soil profile is silty clay loam underlain by calcareous shale at a depth of about 39 inches.

Calodo soils are shallow and well drained. Slope ranges from 15 to 75 percent. The soil profile is loam underlain by calcareous shale or limestone at a depth of about 16 inches.

Soils of minor extent in this map unit are well drained Diablo clay, Zaca clay, Gazos clay loam, Los Osos loam, and Santa Lucia very cobbly clay loam and somewhat excessively drained Lodo clay loam and Lopez very shaly clay loam. Diablo and Zaca soils are clay throughout. Gazos soils are clay loam throughout. Los Osos soils have a clay subsoil. Santa Lucia soils are very cobbly clay loam. Lodo and Lopez soils are shallow.

Areas of this map unit are used mainly for range.

Nacimiento soils are well suited to range, and Calodo soils are moderately suited to range. The shallowness and low available water capacity of Calodo soils limit forage productivity. Because of slope and depth to rock, most engineering uses of these soils are limited.

Nacimiento soils have good potential for rangeland wildlife habitat development. Calodo soils have poor potential for rangeland wildlife habitat development because of shallowness. Development and management of wildlife habitat is limited by steep slopes.

13. Rock outcrop-Obispo-Henneke

Rock outcrop and shallow, strongly sloping to very steep, somewhat excessively drained and well drained soils; on hills and mountains

This map unit is on mountains both east and west of San Luis Obispo and in the northwestern part of the survey area from Pine Mountain to Monterey County. The soils formed in material weathered from serpentine rock.

This map unit makes up about 5 percent of the survey area. It is about 24 percent Rock outcrop, 18 percent Obispo soils, 17 percent Henneke soils, and 41 percent soils of minor extent.

Rock outcrop is mainly serpentine rock at or near the soil surface.

Obispo soils are well drained. Slope ranges from 15 to 75 percent. The profile is clay underlain by serpentine at a depth of about 11 inches.

Henneke soils are somewhat excessively drained. Slope ranges from 15 to 75 percent. The profile is very cobbly clay loam and very cobbly clay underlain by serpentine at a depth of about 19 inches.

Soils of minor extent in this map unit are well drained Lompico loam, Kinkel Variant loam, Los Osos loam,

Millsap loam, Gazos clay loam, and Diablo clay and somewhat excessively drained McMullin loam and Cieneba loam. Lompico soils are loam throughout. Kinkel Variant soils are loam with cobbles throughout the profile. Los Osos and Millsap soils have a clay subsoil. Gazos soils are clay loam throughout. Diablo soils are clay throughout. McMullin and Cieneba soils are shallow.

Areas of this map unit are used for wildlife habitat, watershed, and very limited grazing.

The Obispo and Henneke soils are shallow and have a very low available water capacity. They are poorly suited to most uses. The best management practice is to maintain good vegetative cover.

Obispo and Henneke soils are poorly suited to wildlife habitat development because of shallowness. Rock outcrop can provide cover for wildlife. The value of the Rock outcrop depends on the proximity of areas that satisfy wildlife needs, such as food and water.

14. Millsap-Rock outcrop

Moderately deep, moderately steep to very steep, well drained soils, and Rock outcrop; on mountains

This map unit is on mountains in the extreme southeastern corner of the survey area. The soils formed in material weathered from sandstone or shale.

This map unit makes up about 7 percent of the survey area. It is about 28 percent Millsap soils, 25 percent Rock outcrop, and 47 percent soils of minor extent.

Millsap soils are well drained. Slope ranges from 15 to 75 percent. The soil profile is loam underlain by clay and very gravelly clay. Hard sandstone is at a depth of about 27 inches.

Rock outcrop is sandstone or shale at or near the soil surface.

Soils of minor extent in this map unit are well drained Diablo clay, Elder sandy loam, Gaviota sandy loam, Perkins fine sandy loam, and Los Osos Variant clay loam; and somewhat excessively drained Cieneba loam, Lodo clay loam, and Lopez very shaly clay loam. Also included are minor areas of Lithic Haploxerolls. Diablo soils are clay throughout. Elder soils are alluvial and sandy loam throughout. Cieneba, Gaviota, Lodo, and Lopez soils are shallow. Perkins and Los Osos Variant soils are deep.

Areas of this map unit are used mainly for range, watershed, and wildlife habitat.

The high shrink-swell potential of the clay in the Millsap soils and the Rock outcrop make this map unit poorly suited to most uses other than range, watershed, or wildlife habitat. The Millsap soils are moderately suited to range because of the steep slopes and the difficulty in obtaining uniform forage utilization.

Millsap soils have limited potential for wildlife habitat development. The clay subsoil makes establishment of shrubs and trees difficult. Rock outcrops can provide den and cover sites for wildlife. The value of the Rock outcrop depends on the proximity of areas that satisfy other wildlife needs, such as food and water.

detailed soil map units

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

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

Soils rarely occur as pure units. They typically blend from one to another on the landscape. Small bodies of dissimilar soils are often mixed in. Because of the practical limitations of field mapping and cartographic detail, inclusions of other soils occur within delineated areas of a named soil. The soil boundaries delineated on the map, and the soil interpretations listed in the tables, are not absolute. They are meant to be used as a guide. The interpretations given in the tables are for the central concept of the named soil.

The soil maps at the back of this survey were designed to give the land user enough information to reach a logical decision about each area delineated. The smallest area delineated on the soil maps is about 5 acres in highly contrasting areas and about 15 acres in places where soils are more similar.

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Tierra sandy loam, 2 to 9 percent slopes, is one of several phases in the Tierra series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Los Osos-Diablo complex, 15 to 30 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Diablo and Cibo clays, 9 to 15 percent slopes, is an undifferentiated group in this survey area. An undifferentiated group is distinguished from a complex by the use of the word *and* between the names of the component soils.

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. Beaches 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.

101—Aquolls, saline. This very deep, poorly drained, nearly level soil is on the tidal marsh in Morro Bay. It formed in alluvium, which was weathered from sedimentary rocks and was deposited primarily by the

overflow of Chorro and Los Osos Creeks into Morro Bay. The largest mapped area is somewhat triangular and about 450 acres. Other areas are much smaller and range from 5 to 50 acres. The vegetation is mainly salt-tolerant plants, such as pickleweed, saltgrass, sea-lavender, seablite, alkali heath, atriplex, and jaumea. A few small areas have been intruded by dodder. On slightly higher ground along the fringes of the marsh are such plants as anise, waterhemlock, and willows.

Elevation is only a few feet above sea level; the entire area is submerged by the highest tides. The average annual precipitation is about 15 inches, but seasonal overflow furnishes additional fresh water to areas near the mouths of the two creeks. The average annual air temperature is about 58 degrees F. The average frost-free season ranges from about 350 days in areas adjacent to the creeks or on higher ground to 365 days in the more open areas that are influenced by the temperature of the ocean.

Typically, the soil is grayish brown, gray, or dark gray silty clay loam, clay loam, or clay that is high in organic matter content. Color becomes grayer and darker as depth increases. The odor of hydrogen sulfide is apparent at a depth of about 12 to 20 inches and becomes stronger as depth increases. This indicates a reducing, or anaerobic, condition caused by water standing in soil that has been depleted of free oxygen. Some areas have a yellowish brown sand or loamy sand overwash up to 18 inches thick.

Permeability of this soil is slow or very slow. Surface runoff is slow; water is removed via well established waterways or channels. The water table fluctuates with the rise and fall of the tide, but it is usually at or near the surface. The effective rooting depth for some plants is restricted to the upper 12 to 20 inches of the soil because of the saturated condition and lack of oxygen at greater depths. Roots are commonly found, however, to a depth of 40 inches or more.

Most areas of Aquolls, saline, are within Morro Bay State Park. These are important estuary areas that support many kinds of wildlife. These areas are unique and have esthetic value, which helps to make adjacent areas very popular for recreational use.

Aquolls, saline, is in capability subclass VIIIw (14), nonirrigated.

102—Arnold loamy sand, 5 to 15 percent slopes. This deep, somewhat excessively drained, moderately sloping and strongly sloping soil is on foothills. It formed in residual material weathered from soft sandstone. Areas are irregular in shape and range from 10 to 400 acres. The natural vegetation is mainly annual grasses, brush, and hardwoods. Elevation ranges from 100 to 2,000 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 350 days, depending on location.

Typically, the surface layer is light brownish gray and pale brown loamy sand about 33 inches thick. The underlying material is light brownish gray, light gray, and white loamy sand to a depth of about 59 inches; the upper 9 inches of the underlying material contains strata that have a slightly higher clay content. Light gray, soft sandstone is at a depth of about 59 inches. The profile is slightly acid through strongly acid throughout. In places, the surface layer is sand or loamy coarse sand. In other places, it is sandy loam and is slightly darker.

Included in this map unit are a few areas that have a clay layer, 8 to 16 inches thick, directly above the sandstone. Also included are small areas of Briones loamy sand, Pismo loamy sand, and Tierra sandy loam.

Permeability of this Arnold soil is rapid, and the available water capacity is low or moderate. Surface runoff is medium, and the hazards of water erosion and soil blowing are high. The effective rooting depth ranges from 40 to 60 inches.

Most areas of this soil are used as rangeland. Some small areas are used for urban development and for the production of lemons or Christmas trees.

This soil is moderately suited to rangeland. The loamy sand surface layer makes this soil droughty. The soil produces quality forage for a short period. Soil blowing and water erosion can be controlled by maintaining adequate plant residue on the soil surface. This soil typically is an annual grassland with occasional live oak. The annual forage is supplemented by needlegrass in many areas. Common deerweed and chamise, although indicators of soil disturbance or fire, are important livestock and wildlife browse. Dense stands of live oak are in some areas. A net volume of 3,880 cubic feet per acre has been measured on this soil.

Where this soil is used for lemons or Christmas trees, it must be irrigated because of the soil droughtiness. Sprinkler or drip irrigation systems are preferred because of the high erosion hazard. Irrigation water should be applied at a rate and amount that gives maximum production and avoids excess runoff or losses through deep percolation. Crops other than lemons and Christmas trees can be cultivated using similar conservation practices as part of the management system. A cover crop and proper tillage are essential to maintain and improve tilth and fertility and to increase the water holding capacity. Erosion control structures, such as diversions and terraces, are sometimes necessary on newly cleared areas.

Areas of this soil are increasingly used as rural homesites. The main limitations for urban development are slope and depth to rock. Removal of soil in areas that are to be landscaped should be limited because of the depth to rock. Maintaining a good plant cover at all times reduces the hazards of soil blowing and water erosion. Increasing the size of septic tank absorption fields can compensate for the depth to rock. If located on the steeper slopes, absorption fields may need to be

placed on the contour. Community sewage systems are an alternative in areas that have medium to high population density. Sprinkler and drip methods of irrigation are best suited to this soil because of the slope and fast intake rate.

This Arnold soil is in capability unit IVe-4 (15), irrigated and nonirrigated.

103—Arnold loamy sand, 15 to 50 percent slopes. This deep, somewhat excessively drained, moderately steep and steep soil is on foothills and mountains. It formed in residual material weathered from soft sandstone. Areas are irregular in shape and range from 10 to 300 acres. The natural vegetation is mainly annual grasses, brush, and hardwoods. Elevation ranges from 100 to 2,000 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 350 days, depending on location.

Typically, the surface layer is light brownish gray loamy sand about 33 inches thick. The underlying material is light gray loamy sand to a depth of 59 inches; the upper 9 inches of the underlying material contains strata that have a slightly higher clay content. Soft sandstone is at a depth of about 59 inches. The profile is slightly acid through strongly acid throughout. In places, the surface layer is sand or loamy coarse sand. In other places, it is sandy loam and is slightly darker.

Included in this map unit are a few areas of a soil that has a clay layer, 8 to 10 inches thick, directly above the sandstone. Also included are small areas of Briones loamy sand and Pismo loamy sand. Other minor areas are calcareous, and some contain marine fossils. A few small areas have exposed sandstone.

Permeability of this Arnold soil is rapid, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high or very high. The hazard of soil blowing is high. The effective rooting depth ranges from 40 to 60 inches.

Most areas of this soil are used as rangeland. A few small areas are used for urban development.

This soil is poorly suited to rangeland. The loamy sand surface layer makes this soil droughty. Quality forage can be produced for a short period. Animal or vehicular traffic can cause downhill movement of the dry surface soil. Gully erosion is a hazard during wet years because of the channeling of runoff. Soil blowing, water erosion, and downhill movement of the dry surface soil can be controlled by proper grazing and by maintaining adequate plant cover on the soil surface. This soil typically is an annual grassland with occasional live oak. The annual forage is supplemented by needlegrass in many areas. Some drainageways have a canopy of live oak and an understory of such shrubs as California coffeeberry and blue elderberry. Common deerweed and chamise, although indicators of soil disturbance or fire, are important livestock and wildlife browse. Dense stands of live oak are in some areas. A net volume of 3,880 cubic feet per acre has been measured on this soil.

Most engineering and recreational uses of this soil require special design because of the hazards of soil blowing and water erosion, the moderately steep or steep slopes, depth to bedrock, or sandy texture. Soil blowing and water erosion can be controlled by minimum grading, runoff and sediment control structures, and the establishment of permanent plant cover on side slopes. Septic tank absorption fields should be placed on the contour.

This Arnold soil is in capability subclass VIIe (15), nonirrigated.

104—Baywood fine sand, 2 to 9 percent slopes. This very deep, somewhat excessively drained, undulating and gently rolling soil is on stabilized sand dunes near the coast. It formed in deposits of windblown sand. Areas are irregular in shape and range from 10 to 3,000 acres. The natural vegetation is mainly brush with small areas of conifers or hardwoods. Elevation ranges from 0 to 500 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 325 to 350 days, depending on location.

Typically, the surface layer is very dark grayish brown and dark brown fine sand about 36 inches thick. The underlying material is dark grayish brown and brown fine sand that extends to a depth of 60 inches or more. The surface layer is slightly acid. The soil becomes medium acid or strongly acid as depth increases. In places, the soil is loamy sand.

Included in this map unit are a few areas of Oceano sand containing thin bands in the profile that have a slightly higher clay content. Also included are areas that have been disturbed by man or soil blowing, that are lighter in color, and that contain less organic matter than Baywood soils. Near Piedras Blancas are minor areas of Capistrano sandy loam. Also included, just west of Los Osos Creek, is a small area of Concepcion loam buried by 40 inches of Baywood soil.

Permeability of this Baywood soil is rapid, and the available water capacity is low. Surface runoff is slow or medium. The hazard of soil blowing is high, and the hazard of water erosion medium. The effective rooting depth is 60 inches or more. This soil repels water when dry but has a rapid intake rate once it is moist.

Most areas of this soil are used for urban development. Other areas are used mainly as watershed.

Areas of this map unit generally have a contrasting vegetative cover. The cooler temperatures adjacent to the coast influence a closed canopy of live oak with increases in poison-oak, California coffeeberry, and woodfern. Stands of eucalyptus trees are common. Most

areas, however, support dense brush fields with such shrubs as common deerweed, chamise, California sagebrush, ceanothus, manzanita, and mockheather. Annual grasses are supplemented by melic grass in some areas.

Many areas of this soil are used for urban development. If septic tanks are used, care should be taken to avoid placing absorption fields in areas of eucalyptus trees. The root system of eucalyptus trees extends horizontally for many feet and can clog the leach lines. There is also a hazard of contaminating the ground water. If this soil is used as a site for embankments, dikes, or levees, the soil's rapid permeability and susceptibility to piping must be considered in the design. Piping and permeability can be reduced by mixing the soil with more desirable material and by maintaining a high degree of compaction control. Because of the fast intake rate and slope, sprinkler or drip methods of irrigation are best suited to this soil. The hazards of soil blowing and water erosion are increased if the soil is left exposed. Maintaining a good vegetative cover at all times helps to protect the soil from erosion.

This Baywood soil is in capability unit IVs-1 (14), irrigated and capability subclass VIe (14), nonirrigated.

105—Baywood fine sand, 9 to 15 percent slopes. This very deep, somewhat excessively drained, rolling soil is on stabilized sand dunes near the coast. It formed in deposits of windblown sand. Areas are irregular in shape and range from 5 to 250 acres. The natural vegetation is mainly brush with small areas of conifers or hardwoods. Elevation ranges from 0 to 500 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 325 to 350 days, depending on location.

Typically, the surface layer is very dark grayish brown and dark brown fine sand about 36 inches thick. The underlying material is dark grayish brown and brown fine sand that extends to a depth of 60 inches or more. The surface layer is slightly acid. The soil becomes medium acid or strongly acid as depth increases. In places, the soil is loamy sand.

Included in this map unit are a few areas of Oceano sand containing thin strata that have a slightly higher clay content. Also included are areas that have been disturbed by man or soil blowing, that are lighter in color, and that contain less organic matter. Near Piedras Blancas are minor areas of Capistrano sandy loam. Also included, just west of Los Osos Creek, is a small area of Concepcion loam buried by 40 inches of Baywood fine sand.

Permeability of this Baywood soil is rapid, and the available water capacity is low. Surface runoff is medium. The hazard of soil blowing is high, and the hazard of water erosion medium. The effective rooting depth is 60 inches or more. This soil repels water when dry but has a rapid intake rate once it becomes moist.

Most areas of this soil are used as watershed. Some areas are used for urban development and recreation.

Areas of this map unit generally have a contrasting vegetative cover. The cooler temperatures adjacent to the coast influence a closed canopy of live oak with increases in poison-oak, California coffeeberry, and woodfern. Stands of eucalyptus trees are common. Most areas, however, support dense brush fields with such shrubs as common deerweed, chamise, California sagebrush, ceanothus, manzanita, and mockheather. Annual grasses are supplemented by melic grass in some areas.

Areas of this soil are increasingly used for urban development. If septic tanks are used, care should be taken to avoid placing absorption fields in areas of eucalyptus trees. The root system of eucalyptus trees extends horizontally for many feet and can clog the leach lines. There is also a hazard of contaminating the ground water. If this soil is used for embankments, dikes, or levees, the soil's rapid permeability and susceptibility to piping should be considered in the design. Piping and permeability can be reduced by mixing the soil with more desirable material and by maintaining a high degree of compaction control. Because of the fast intake rate and slope, sprinkler or drip methods of irrigation are best suited to this soil. Maintaining a good vegetative cover at all times helps to protect the soil from erosion.

This Baywood soil is in capability unit IVs-1 (14), irrigated and capability subclass VIe (14), nonirrigated.

106—Baywood fine sand, 15 to 30 percent slopes. This very deep, somewhat excessively drained, moderately steep soil is on stabilized sand dunes near the coast. It formed in deposits of windblown sand. Areas are irregular or elongated in shape and range from 10 to 150 acres. The natural vegetation is mainly brush with small areas of conifers or hardwoods. Elevation ranges from 0 to 500 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 325 to 350 days, depending on location.

Typically, the surface layer is very dark grayish brown and dark brown fine sand about 36 inches thick. The underlying material is dark grayish brown and brown fine sand to a depth of 60 inches or more. The surface layer is slightly acid. The soil becomes medium acid or strongly acid as depth increases. In places, the soil is loamy sand.

Included in this map unit are a few areas of Oceano sand containing thin strata that have slightly higher clay content. Also included are disturbed areas that are lighter in color and contain less organic matter. Near Piedras Blancas are minor areas of Capistrano sandy loam. Also included, just south of Cabrillo Estates in Los

Osos, is an area of a soil similar to Garey soil that has slopes of 30 to 50 percent.

Permeability of this Baywood soil is rapid, and the available water capacity is low. Surface runoff is rapid, and the hazards of soil blowing and water erosion are high. The effective rooting depth is 60 inches or more. This soil repels water when dry but has a rapid intake rate once it becomes moist.

Most areas of this soil are used as watershed. A few areas are used for limited urban development or recreation.

Areas of this map unit generally have a contrasting vegetative cover. The cooler temperature adjacent to the coast influences a closed canopy of live oak with increases in poison-oak, California coffeeberry, and woodfern. Stands of eucalyptus trees are common. Most areas, however, support dense brush fields with such shrubs as deerweed, chamise, California sagebrush, ceanothus, manzanita, and mockheather. Annual grasses are supplemented by melic grass in some areas.

Some areas of this soil are used for urban development. Slope is the main limitation for homesite development. Because of the moderately steep slope, septic tank absorption fields should be installed on the contour. The less sloping areas should be used. Avoid areas of eucalyptus trees when selecting an absorption field site; the root system of eucalyptus trees extends horizontally for many feet and can clog the leach lines. Soil erosion caused by the placement of local roads and streets can be reduced by using runoff and sediment control structures, minimum grading, and establishing a permanent plant cover on side slopes. The droughtiness of this soil makes grassed waterways and areas of permanent plant cover adjacent to roads difficult to maintain. This can be overcome by establishing a permanent, low-rate-of-application irrigation system or by mixing the soil with a more desirable material. Maintaining a good plant cover at all times helps to protect the soil from erosion.

This Baywood soil is in capability subclass VIe (14), nonirrigated.

107—Beaches. This map unit consists of narrow, sandy beaches along the ocean. The beaches are partly covered by waves during high tide and are exposed during low tide. This map unit is essentially barren. The average annual precipitation ranges from about 15 to 20 inches, and the average annual air temperature is about 57 degrees F. The average frost-free season ranges from 350 to 365 days.

Typically, this map unit is stratified with layers of sand or gravel. Some areas are covered by cobbles.

Included in this map unit are a few areas of Dune land and some rock outcroppings.

Permeability of this map unit is very rapid, and the available water capacity is low or very low. Surface runoff is slow. The erosion hazard is high or very high because of wind and wave action.

This map unit has limited value for farming, rangeland, or urban development. It is used almost exclusively for recreation.

This map unit is in capability subclass VIIIw.

108—Briones loamy sand, 15 to 50 percent slopes. This moderately deep, somewhat excessively drained, moderately steep and steep soil is on foothills and mountains. It formed in residual material weathered from soft sandstone. Areas are irregular in shape and range from 35 to 700 acres. Many areas have numerous rills and gullies. The natural vegetation is mainly brush with annual grasses in some areas. Elevation ranges from 100 to 2,000 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 300 to 350 days, depending on location.

Typically, the surface layer is gray loamy sand about 26 inches thick. The underlying material is very pale brown loamy sand to a depth of 32 inches. Soft, fractured sandstone is at a depth of about 32 inches. The profile is slightly acid or medium acid throughout. Some places have a surface layer of sand.

Included in this map unit are a few areas of a soil that has an 8- to 16-inch clay layer above the sandstone, a few small areas of Arnold and Pismo loamy sands, a soil similar to Briones soil that has a darker sandy loam surface layer, and a few areas that have slopes of less than 15 percent.

Permeability of this Briones soil is rapid, and the available water capacity is very low or low. Surface runoff is rapid. The hazards of water erosion and soil blowing are high. The effective rooting depth ranges from 20 to 40 inches.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. The soil is droughty. It produces quality forage for a short period. Animal and vehicular traffic cause downhill movement of the surface layer when the soil is dry. The hazard of gully erosion is high during wet years. Erosion and downhill movement of the surface layer can be controlled by proper grazing management and maintaining adequate plant cover on the surface soil. This soil sometimes has an open canopy of live oak. Cooler temperatures adjacent to the ocean influence a closed canopy of live oak with increases in poison-oak, California coffeeberry, and woodfern. Some areas have been cleared and are managed for annual forage. Other areas now support dense brush fields with such shrubs as California sagebrush and coyotebush. Dense stands of live oak are in some areas. A net volume of 1,560 cubic feet per acre has been measured on these areas.

Most engineering practices and recreational uses require special design because of the slope, depth to

rock, high sand content, and erosion hazard. Soil blowing and water erosion can be controlled by minimum grading, runoff and sediment control structures, and establishment of permanent plant cover on side slopes. Septic tank absorption fields do not function properly because of the slope and unfavorable depth to rock. If septic tanks are to be used, place them on less sloping soils and place trench lines on the contour.

This Briones soil is in capability subclass VIIe (15), nonirrigated.

109—Briones-Pismo loamy sands, 9 to 30 percent slopes. These strongly sloping to moderately steep soils are on foothills and mountains. Areas are irregular in shape and range from 10 to 200 acres. The natural vegetation is mainly annual grasses and forbs, hardwoods, or brush. Elevation ranges from 300 to 2,000 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 40 percent Briones loamy sand and about 30 percent Pismo loamy sand.

Included in this complex are areas of a soil that is similar to Briones and Pismo soils but has a darker, sandy loam surface layer. Also included are a few small areas of Arnold loamy sand. Included areas make up about 30 percent of the total acreage.

The Briones soil is moderately deep and somewhat excessively drained. It formed in residual material weathered from soft sandstone. Typically, the surface layer is gray loamy sand about 26 inches thick. The underlying material is very pale brown loamy sand 6 inches thick. Soft, fractured sandstone is at a depth of about 32 inches. The profile is slightly acid or medium acid throughout. Some areas of this soil have a surface layer of sand.

Permeability of the Briones soil is rapid, and the available water capacity is very low or low. Surface runoff is medium or rapid. The hazard of water erosion is moderate or high, and the hazard of soil blowing is high. The effective rooting depth ranges from 20 to 40 inches.

The Pismo soil is shallow and somewhat excessively drained. It formed in residual material weathered from soft sandstone. Typically, the surface layer is medium acid, light brownish gray loamy sand about 19 inches thick. Soft, fractured sandstone is at a depth of about 19 inches. Some areas of this soil have a surface layer of sand.

Permeability of the Pismo soil is rapid, and the available water capacity is very low. Surface runoff is medium or rapid. The hazard of water erosion is moderate or high, depending on slope, and the hazard of soil blowing is high. The effective rooting depth ranges from 8 to 20 inches.

Most areas of this complex are used as rangeland. These soils are moderately suited or poorly suited to rangeland. The loamy sand texture of both soils and the shallow depth of the Pismo soil make the soils very droughty. The soils produce quality forage for a short period. On the steeper hillsides, animal and vehicular traffic cause downhill movement of the dry surface layer. Gully erosion is a hazard in wet years. Soil blowing, water erosion, and downhill movement of the dry surface layer can be controlled by proper grazing use and by maintaining adequate plant residue on the soil surface in areas where grazing has disturbed or removed the plant cover. Some drainageways have a canopy of live oak with such shrubs as California coffeeberry and blue elderberry. On the Briones soil, dense stands of live oak are in some areas. A net volume of 1,560 cubic feet per acre has been measured on this soil.

These soils are increasingly used for urban development. The main limitations are slope, depth to rock, sandy texture, and the hazard of erosion. Soil blowing and water erosion can be controlled by minimum grading, runoff and sediment control structures, and the establishment of a permanent plant cover on side slopes. The plant cover selected must be able to withstand the droughty soil conditions. Unnecessary removal of soil in areas that are to be landscaped should be avoided because of the shallow depth to rock. Because these soils are highly erodible, a permanent plant cover should be maintained at all times. In places, this requires a permanent, low-rate-of-application irrigation system. Septic tank absorption fields do not function properly on these soils because of the depth to rock and the slope. If septic tanks are to be used, place them on inclusions of deeper, less sloping soils, increase the size of the absorption field, and place trench lines on the contour.

The Briones and Pismo soils in this complex are in capability subclass VIe (15), nonirrigated.

110—Briones-Tierra complex, 15 to 50 percent slopes. These moderately steep and steep soils are on foothills, mountains, and dissected terraces. Areas are irregular in shape and range from 15 to 400 acres. The natural vegetation is mainly annual grasses and forbs, hardwoods, or brush. Elevation ranges from 300 to 2,000 feet. The average annual precipitation ranges from 16 to 20 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 300 to 350 days, depending on location.

This complex is about 50 percent Briones soil and 25 percent Tierra soil.

Included in this complex are a few small areas of a soil that is similar to Briones soil but has a darker, sandy loam surface layer. Also included are areas of Arnold loamy sand, Pismo loamy sand, and a soil that is similar to Tierra soil but is underlain at a depth of about 40 inches by soft sandstone. Included areas make up about 25 percent of the total acreage.

The Briones soil is moderately deep and somewhat excessively drained. It formed in residual material weathered from sandstone. Typically, the surface layer is gray loamy sand about 26 inches thick. The underlying material is very pale brown loamy sand about 6 inches thick. Soft, fractured sandstone is at a depth of about 32 inches. The profile is slightly acid or medium acid throughout. In places, this soil has a surface layer of sand.

Permeability of the Briones soil is rapid, and the available water capacity is very low or low. Surface runoff is rapid. The hazards of water erosion and soil blowing are high. The effective rooting depth ranges from 30 to 40 inches.

The Tierra soil is very deep and moderately well drained. It formed in old alluvium weathered from sedimentary rocks. Typically, the surface layer is gray sandy loam about 9 inches thick. The subsurface layer is light gray sandy loam about 2 inches thick. The subsoil is gray and pale brown sandy clay to a depth of about 42 inches. The underlying material to a depth of 60 inches is pale brown sandy clay loam. The profile is slightly acid at the surface and becomes more alkaline as depth increases.

Permeability of the Tierra soil is very slow, and the available water capacity is low or moderate. Surface runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more, but roots in the subsoil are limited to cracks. This soil has high shrink-swell potential in the subsoil.

Most areas of these soils are used as rangeland or for growing dryfarmed beans or small grains.

Although some areas are dryfarmed to produce beans or small grains, the soils are poorly suited to cropland. The main limitations are a high soil blowing hazard, high water erosion hazard, and low water holding capacity. When dryfarmed, a cropping system that includes crop rotation, cover crops, crop residue utilization, and proper tillage helps to improve soil tilth, fertility, and water holding capacity. Water erosion control systems, such as diversions, should be installed in all farmed areas. Maintaining crop residue on the soil surface helps to control soil blowing.

These soils are moderately suited to rangeland. Because of the loamy sand texture, the Briones soil is droughty. It produces quality forage for a short period. The Tierra soil has a clay subsoil that restricts water movement and plant root penetration. However, well established forage plants that have roots extending to the claypan produce quality forage in spring. Animal and vehicular traffic cause downhill movement of the dry surface layer of both soils. Gully erosion is a hazard in wet years where the plant cover has been disturbed or removed. Soil blowing, water erosion, and downhill movement of the dry surface layer can be controlled by proper grazing use and by maintaining adequate plant residue on the surface. Undesirable plants include plantains, fiddleneck, and poison-hemlock. Scattered California white oak are common on these soils. On the Briones soil, dense stands of live oak are in some areas. A net volume of 1,560 cubic feet per acre has been measured on this soil.

Some areas of this soil are used for rural homesites. The main limitations are the erosion hazard and steep slopes for both soils, sandy texture and depth to rock of the Briones soil, and the high shrink-swell potential in the subsoil of the Tierra soil. Minimum grading, sediment control structures, and permanent plant cover can be used to control erosion. The type of plant cover selected must be able to withstand the droughty soil conditions. Foundations and footings on the Tierra soil can require special design to help overcome the high shrink-swell potential of the clay subsoil. Subgrade or base material needs to be replaced or covered with a suitable soil. It would be better to select an alternate site that does not have a clay subsoil.

The Briones and Tierra soils in this complex are in capability subclass VIIe (15), nonirrigated.

111—Camarillo sandy loam. This very deep, somewhat poorly drained, nearly level soil is on alluvial plains near existing drainageways. It formed in alluvium weathered from sedimentary rocks. Areas are typically long and narrow and range from 20 to 100 acres. The natural vegetation is presumed to have been annual grasses and forbs with scattered hardwoods. Most areas are presently cultivated. Elevation ranges from 10 to 200 feet. The average annual precipitation ranges from 16 to 20 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is pale brown sandy loam 12 inches thick. The underlying material is stratified pale brown, yellowish brown, and light yellowish brown silty clay loam, light yellowish brown fine sandy loam, and pale brown loamy fine sand to a depth of 60 inches or more. Reddish brown mottles are present around a depth of 24 inches. The profile is moderately alkaline and calcareous throughout.

Included in this map unit are a few small areas of Psamments and Fluvents, occasionally flooded, and Corralitos Variant loamy sand.

Permeability of this Camarillo soil is moderate, and the available water capacity is high. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. The effective rooting depth is limited by a seasonal high water table at a depth of 2 to 3.5 feet from January to May. It increases to 60 inches or more during drier times of the year. This soil is subject to brief periods of flooding.

Most areas of this soil are used for cultivated crops. Some areas are used as rangeland.

A cropping system that includes crop rotation or cover crops, crop residue utilization, fertilization, and proper tillage helps to maintain soil tilth, structure, and fertility and to reduce erosion. Since this soil is subject to flooding and has a fluctuating water table, selection of a proper irrigation system and irrigation water management are critical. Surface or underground tile drainage systems, or both, help to lower the water table. Those areas that can not be economically drained can be planted to shallow-rooted vegetable crops, such as broccoli, cabbage, lettuce, or cauliflower or to irrigated pasture. If planted to pasture, shallow-rooted plants should be used.

This soil is moderately suited to rangeland. Soil deposition is a problem, especially during years of high rainfall, because of the sediment load from upslope runoff. This soil should not be grazed during the flooding and deposition period. Erosion can be controlled by maintaining adequate plant residue on the soil surface. Rapid depletion of surface moisture makes the germination of annuals difficult. The soil produces quality forage for a short period. Most areas of this soil have been cultivated and do not have a perennial cover. Water-loving plants, such as willows and coyotebush, are in lower areas, such as swales and drainageways. These wetland areas are important plant and wildlife areas. The major forage is annuals, including burclover and other annual legumes. Perennial forage, such as purple needlegrass and saltgrass, is abundant. Undesirable plants include cocklebur, California saltbush, coyotebush, and California sagebrush. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Most urban development and engineering uses of this soil require special design because of the hazard of flooding and the fluctuating high water table, which can cause abnormal settling of structures. Several different methods of drainage can be used on this soil. Septic tank absorption fields do not function properly because of the water table; their use can contaminate the ground water. An alternative is to connect with a community sewage disposal system. If this soil is used for pond reservoir areas, the main limitation is seepage. This can be corrected by sealing. If this soil is used for embankments, dikes, or levees, the design of the structure must overcome the limitations of piping. To accomplish this, a high degree of compaction and moisture control, careful placement of material, or a special design is needed. Excessive irrigation can raise the water table and decrease the effective rooting depth.

This Camarillo soil is in capability units IIw-2 (14), irrigated and IIIw-2 (14), nonirrigated.

112—Camarillo loam, drained. This very deep, somewhat poorly drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. The water table has been lowered by the use of tile drains. Areas are irregular in shape and range from 20 to 400 acres. The natural vegetation is presumed to have been annual grasses and forbs with scattered hardwoods. Most areas are presently cultivated. Elevation ranges from 10 to 200 feet. The average annual precipitation ranges from 16 to 20 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is pale brown loam 12 inches thick. The underlying material is stratified pale brown, yellowish brown, and light yellowish brown silty clay loam, light yellowish brown fine sandy loam, and pale brown loamy fine sand to a depth of 60 inches or more. Reddish brown mottles are present around a depth of 24 inches. The profile is moderately alkaline and calcareous throughout. This soil is artificially drained; the water table is maintained at a depth of 60 inches or more.

Included in this map unit are a few small areas of Camarillo sandy loam, Corralitos Variant loamy sand, and Tujunga loamy sand.

Permeability of this Camarillo soil is moderate, and the available water capacity is high. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more, but it may be shallower during exceptionally wet periods.

Most areas of this soil are used for cultivated crops and pasture.

This soil has few limitations for agriculture when irrigated. However, a cropping system, proper tillage, and irrigation water management are necessary to maintain optimum production levels. The cropping system should include crop rotation or cover crops. Crop residue maintained on the soil surface helps to control soil blowing. Tillage operations are best restricted to the minimum necessary for crop production. Irrigation water management is important since the water table is artificially maintained; excessive applications of water can cause overloading in the tile drainage lines and raise the water table into plant root zones. Broccoli, lettuce, cauliflower, and cabbage are some of the crops well suited to this soil.

If this soil is used for pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Periodic mowing and clipping helps to maintain uniform growth, discourages selective grazing, and reduces clumpy growth. Weed control and fertilization are needed for production of maximum quality forage.

A few rural homesites are on this soil. Building site development has few limitations. However, septic tank absorption fields are not well suited because of the presence of a water table below the leach lines. The use of septic systems can cause pollution of the ground water. Pond reservoir areas need to be sealed to reduce

seepage. Embankments, dikes, and levees are subject to piping. This can be corrected by a high degree of compaction and moisture control or careful placement of material. Excessive irrigation can raise the water table and decrease the effective rooting depth.

This Camarillo soil is in capability class I (14), irrigated and capability subclass IIIc (14), nonirrigated.

113—Capistrano sandy loam, undulating. This very deep, well drained soil is on old stabilized sand dunes near the coast. It formed in windblown material from coastal beaches. Areas are irregular in shape and range from 10 to 100 acres. Slopes are 2 to 5 percent. The natural vegetation is mainly annual and perennial grasses with a few forbs and some areas of scattered brush. Elevation ranges from 0 to 100 feet but is dominantly less than 50 feet. The average annual precipitation ranges from 20 to 24 inches, and the average annual air temperature is about 56 degrees F. The average frost-free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is dark grayish brown sandy loam about 37 inches thick. The underlying material is brown sandy loam that extends to a depth of 60 inches or more. The profile is medium acid through neutral throughout.

Included in this map unit are a few small areas of Baywood fine sand and Concepcion loam.

Permeability of this Capistrano soil is moderately rapid, and the available water capacity is moderate. Surface runoff is slow. The hazard of soil blowing is moderate, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. Both annual and perennial plants are productive most of the year. This soil typically supports an annual forage with occasional areas of California brome and California fescue. Some bush lupine grows on this soil and is browsed heavily by livestock and wildlife. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants, which increase with heavy grazing, include plantain and coyotebush.

This soil has few limitations for most urban and engineering practices. However, if this soil is used for sewage lagoons or pond reservoir areas, seepage is the main limitation. This can be corrected by sealing. This soil is moderately suited to recreational development because of the soil blowing hazard. Maintaining a good vegetative cover at all times helps to protect the soil. Because of the moderately rapid intake rate and the hazard of soil blowing, sprinkler or drip methods of irrigation are best suited.

This Capistrano soil is in capability units IIe-1 (14), irrigated and IIIe-1 (14), nonirrigated.

114—Capistrano sandy loam, rolling. This very deep, well drained soil is on old stabilized sand dunes near the coast. It formed in windblown material from coastal beaches. Areas are irregular in shape and range from 20 to 150 acres. Slopes are 5 to 9 percent. The natural vegetation is mainly brush with a few small areas of annual and perennial grasses. Elevation ranges from 0 to 200 feet but is dominantly less than 100 feet. The average annual precipitation ranges from 20 to 24 inches, and the average annual air temperature is about 56 degrees F. The average frost-free season ranges from 330 to 365 days, depending on the location.

Typically, the surface layer is dark grayish brown sandy loam about 37 inches thick. The underlying material is brown sandy loam extending to a depth of 60 inches or more. The profile is medium acid through neutral throughout.

Included in this map unit are a few small areas of Baywood fine sand and Concepcion loam. Also included are minor areas of a soil that is similar to Capistrano but is underlain at a depth of about 40 inches by soft sandstone.

Permeability of this Capistrano soil is moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The hazards of soil blowing and water erosion are moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. Both annual and perennial plants are productive most of the year. This soil typically supports an annual forage with occasional areas of California brome and California fescue. Some bush lupine grows on this soil and is browsed heavily by livestock and wildlife. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants, which increase with heavy grazing, include plantain and coyotebush.

This soil has few limitations for most urban and engineering practices. However, if this soil is used for sewage lagoons or pond reservoir areas, seepage is a severe limitation. This can be corrected by sealing. This soil is moderately suited to recreational development; soil blowing is hazard. Maintaining a good vegetative cover at all times helps to protect the soil. Because of the moderately rapid intake rate and the hazard of soil blowing, sprinkler or drip methods of irrigation are best suited.

This Capistrano soil is in capability units IIe-1 (14), irrigated and IIIe-1 (14), nonirrigated.

115—Chamise shaly loam, 9 to 15 percent slopes. This very deep, well drained, rolling soil is on dissected terraces and foothills. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular or elongated in shape and range from 10 to 350 acres. The natural vegetation is mainly annual grasses and forbs with a few scattered hardwoods. Elevation ranges from 100 to 1,500 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is gray shaly loam about 12 inches thick. The subsoil is pale brown, weakly cemented, very shaly clay to a depth of about 22 inches. The underlying material to a depth of 60 inches or more is very pale brown shaly sandy clay loam. The profile is medium acid at the surface and becomes very strongly acid as depth increases. In places, the surface texture is shaly sandy clay loam or sandy loam.

Included in this map unit are a few small areas that have been severely eroded, exposing the subsoil. Also included are minor areas of Diablo clay, Lopez and Santa Lucia very shaly clay loams, and Zaca clay.

Permeability of this Chamise soil is very slow, and the available water capacity is very low or low. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 7 to 30 inches. A few roots extend along cracks in the clay.

Most areas of this soil are used for small grains or as rangeland. A few areas are used for urban development.

Areas farmed for small grains could be improved by ripping the cemented clayey subsoil to improve the water holding capacity and root penetration. Working tilled areas on the contour or across the slope helps to control erosion. A cropping system consisting of crop rotation or cover crops, crop residue utilization, and fertilization helps to improve the soil tilth, structure, and fertility. Grain stubble left in place after harvest helps to control erosion. Structural measures, such as grassed waterways and diversions, also help to control erosion.

This soil is moderately suited to rangeland. The slope and shaly loam surface layer increase the hazard of sheet erosion. Sheet erosion results in a buildup of shale fragments on the surface. This creates replanting problems following wildfires or years of low rainfall. Erosion can be controlled by maintaining adequate plant residue on the soil surface. Typically, this soil is open grassland with live oak occurring singly on south slopes or in groves on protected slopes or north slopes. Understory vegetation includes California coffeeberry and ripgut brome. Forage plants are mainly annual grasses supplemented by burclover. Purple needlegrass is important in some areas. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants include cheeseweed, coyotebush, and California sagebrush.

If this soil is used for urban development, foundation and footing design should take into consideration the moderate shrink-swell potential. Shallow excavations are difficult because of the weakly cemented, very shaly clay subsoil. Septic tank absorption fields do not function properly because of the very slow permeability. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability. If this soil is irrigated, some of the main limitations are slope and droughtiness and slow percolation because of the clay subsoil. Sprinkler or drip methods of irrigation are best suited. Care should be taken so that the application rate does not exceed the intake rate in order to avoid waterlogging and runoff.

This Chamise soil is in capability subclass VIe (15), irrigated and nonirrigated.

116—Chamise shaly loam, 15 to 30 percent slopes. This very deep, well drained, moderately steep soil is on dissected terraces and foothills. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular or elongated in shape and range from 10 to 250 acres. The natural vegetation is mainly annual grasses and forbs with some areas of hardwoods or sparse brush. Elevation ranges from 100 to 1,500 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is gray shaly loam about 12 inches thick. The subsoil is pale brown, weakly cemented very shaly clay to a depth of 22 inches. The underlying material to a depth of 60 inches is very pale brown shaly sandy clay loam. The profile is medium acid at the surface and becomes very strongly acid as depth increases. In places, the surface layer is shaly clay loam.

Included in this map unit are areas of Chamise soils on slopes of more than 30 percent. Also included are minor areas of Lopez and Santa Lucia very shaly clay loams and Zaca clay.

Permeability of this Chamise soil is very slow, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 7 to 30 inches. A few roots extend along cracks in the clay.

Most areas of this soil are used as rangeland. Small areas are used for urban development.

This soil is moderately suited to rangeland. The slope and shaly loam surface layer increase the hazard of sheet erosion. Sheet erosion results in the buildup of shale fragments on the surface. This creates replanting problems following wildfires or years of low rainfall. Erosion can be controlled by maintaining adequate plant

residue on the soil surface. Typically, this soil is open grassland with live oak occurring singly on south slopes or in groves on protected slopes or north slopes. Understory vegetation includes California coffeeberry and ripgut brome. Forage plants are mainly annual grasses supplemented by burclover. Purple needlegrass is important in some areas. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants include cheeseweed, coyotebush, and California sagebrush.

If this soil is used for urban development, special design considerations may be required for most engineering practices because of the slope, very slow permeability, and high clay content. Septic tank absorption fields do not function well in this soil. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability. Special foundation and footing designs that are adapted to the slope and moderate shrink-swell potential are needed. Excavations are difficult because of the weakly cemented, very shaly clay subsoil.

This Chamise soil is in capability subclass VIe (15), nonirrigated.

117—Chamise shaly sandy clay loam, 5 to 9 percent slopes. This very deep, well drained, moderately sloping soil is on dissected terraces. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular or elongated in shape and range from 5 to 400 acres. The natural vegetation is mainly annual grasses and forbs with a few scattered hardwoods. Elevation ranges from 100 to 1,500 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is gray shaly sandy clay loam about 12 inches thick. The subsoil is pale brown, weakly cemented very shaly clay to a depth of 22 inches. The underlying material to a depth of 60 inches is very pale brown shaly sandy clay loam. The profile is medium acid at the surface and becomes very strongly acid as depth increases. In places, the surface layer is shaly loam.

Included in this map unit are a few small areas that have been severely eroded, exposing the subsoil. Also included are minor areas of Lopez and Santa Lucia shaly clay loams and very shaly clay loams.

Permeability of this Chamise soil is very slow, and the available water capacity is very low or low. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 7 to 30 inches. A few roots extend along cracks in the clay.

Most areas of this soil are used for small grains or as rangeland. A few areas are used for urban development.

Areas farmed for small grains can be improved by ripping the claypan to improve water holding capacity and root penetration. Cultivation is not recommended on steep areas because of the erosion hazard. Tilled areas should be worked on the contour. If contour farming is not possible, the soil should be worked across the slope. A cropping system consisting of crop rotation or cover crops, crop residue utilization, and fertilization help to improve the soil tilth, structure, and fertility. Grain stubble left in place after harvest helps to control erosion. Structural measures, such as grassed waterways and diversions, also help to control erosion.

This soil is well suited to rangeland. However, the shaly sandy clay loam surface layer is subject to sheet erosion. Sheet erosion increases the concentration of shale fragments on the soil surface. The shale fragments hinder both natural reseeding and mechanical range seeding. Maintaining adequate plant cover helps to control soil erosion. Many areas of this soil have been cultivated and do not have a perennial cover. The major forage plants are annuals, including burclover. Purple needlegrass is a common perennial forage. Live oaks occur singly on the open grassland areas. On protected north slopes, dense stands of oak are common. California sycamore is common along drainageways. Understory vegetation includes elderberry, California coffeeberry, and California wild rose. Undesirable plants include cheeseweed, fennel, coyotebush, and California sagebrush.

If this soil is used for urban development, foundations and footings need to be designed to offset the moderate shrink-swell potential. Shallow excavations are difficult because of the weakly cemented, very shaly clay subsoil. Septic tank absorption fields do not function properly because of the very slow permeability. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability. If this soil is irrigated, some of the main limitations are slope, droughtiness, and slow percolation because of the clay subsoil. Sprinkler or drip methods of irrigation are best suited. Care should be taken so that the application rate does not exceed the intake rate in order to avoid waterlogging and runoff.

This Chamise soil is in capability subclass VIe (15), irrigated and nonirrigated.

118—Cieneba-Kinkel Variant loams, 30 to 75 percent slopes. These steep and very steep soils are on mountains near the coast in the northern part of the county. Areas are irregular in shape and range from 2,000 to 3,000 acres. The natural vegetation is mainly annual grasses and forbs with hardwoods normally along drainageways and stands of conifers on Pine Top Mountain. Elevation ranges from 400 to 2,600 feet. The

average annual precipitation ranges from 25 to 45 inches, and the average annual air temperature is about 57 degrees F. The frost-free season ranges from 300 to 350 days, depending on location.

This complex is about 40 percent Cieneba soil and about 35 percent Kinkel Variant soil.

Included in this complex are minor areas of Gazos and Lodo clay loams, Lompico and McMullin loams, Los Osos loam, Millsap loam, and Santa Lucia shaly clay loam. Also included are areas, primarily on north aspects or under coniferous vegetation, that have a darker surface layer. Soils similar to Kinkel Variant soil but without coarse fragments are included along the swales. A few minor areas of exposed rock are along ridgetops. A few scattered areas have slopes of less than 30 percent. Included areas make up about 25 percent of the total acreage.

The Cieneba soil is shallow and somewhat excessively drained. It formed in residual material weathered from sandstone. Typically, the surface layer is pale brown loam about 11 inches thick. This is underlain by fractured, soft to firm sandstone. Some areas have a sandy loam surface layer and contain as much as 35 percent gravel. The profile is medium acid through neutral.

Permeability of the Cieneba soil is moderately rapid, and the available water capacity is very low. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 11 to 20 inches.

The Kinkel Variant soil is deep and well drained. It formed in residual material weathered from sandstone. Typically, the surface layer is pale brown loam about 8 inches thick. The next layer is very pale brown cobbly loam to a depth of about 19 inches. The subsoil to a depth of about 52 inches is very pale brown very cobbly loam; it becomes extremely gravelly loam and sandy loam as depth increases. This is underlain by hard, fractured sandstone. Most of the profile is strongly acid.

Permeability of the Kinkel Variant soil is moderate, and the available water capacity is low or moderate. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 40 to 60 inches. Gully erosion is severe where this soil has been disturbed.

These soils are used mostly as rangeland.

These soils are moderately suited to rangeland. Texture and slope make these soils very susceptible to sheet and gully erosion if overgrazed or if access roads are improperly placed. Erosion can be controlled by maintaining adequate plant residue on the soil surface. Roads can be protected from erosion by constructing water bars and by seeding cuts and fills. The higher rainfall along this part of the coast favors good stands of annual forage. Swale areas typically have stands of live oak. Pine Top Mountain is predominantly under woody vegetation consisting of ponderosa pine, sugar pine, Douglas-fir, and madrone with some oak and such shrubs as manzanita.

If this soil is used for urban development, the main limitations are steep slope, the erosion hazard, and the shallow depth to rock in the Cieneba soil. Excavation and filling operations should be minimized so that the cobbly subsoil is not exposed in areas to be landscaped. Septic tank absorption field trench lines should be placed on the contour and can be enlarged if placed in areas of high rock or clay content. Excavating for roads can cause severe gully erosion. This hazard can be reduced if minimum grading and runoff and sediment control structures are utilized and a permanent plant cover is established on the side slopes.

The Cieneba and Kinkel Variant soils in this complex are in capability subclass VIIe (15), nonirrigated.

119—Cieneba-Millsap loams, 30 to 75 percent slopes. These steep and very steep soils are on foothills and mountains. Areas are irregular in shape and range from 150 to 750 acres. The natural vegetation is annual grasses and forbs or brush with hardwoods along drainageways. Elevation ranges from 500 to 2,000 feet. The average annual precipitation ranges from 18 to 30 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 250 to 300 days, depending on location.

This complex is about 50 percent Cieneba soil and 30 percent Millsap soil. Cieneba soil differs from Millsap soil by being shallow and by not having a clay subsoil.

Included in this complex are very minor areas of Diablo clay and minor areas of Gazos and Lodo clay loams, Los Osos loam, and Rock outcrop. Also included, in the area near Highway 46, are these same soils on slopes of less than 30 percent. Included areas make up about 20 percent of the total acreage.

The Cieneba soil is shallow and somewhat excessively drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is pale brown loam about 11 inches thick. This is underlain by sandstone. Some areas have a sandy loam surface layer.

Permeability of the Cieneba soil is moderately rapid, and the available water capacity is very low. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 11 to 20 inches.

The Millsap soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is pale brown loam about 8 inches thick. The upper part of the subsoil is brown clay to a depth of about 19 inches, and the lower part is light yellowish brown very gravelly clay to a depth of about 27 inches. This is underlain by hard, fractured sandstone. Some areas have a clay loam surface layer.

Permeability of this Millsap soil is very slow, and the available water capacity is very low or low. Surface

runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 20 to 40 inches, although roots in the subsoil are limited to cracks.

Most areas of these soils are used as rangeland.

These soils are moderately suited or poorly suited to rangeland. Texture and slope make these soils susceptible to sheet and gully erosion if the plant cover is disturbed by overgrazing, improperly placed access roads, or wildfire. Typically, Millsap soil is open grassland with blue oak randomly scattered or concentrated in swales. Major forage plants are annuals. Needlegrass and browse species provide additional forage. Typically, Cieneba soil has a dense stand of old growth brush with small amounts of grasses and forbs. This cover does not adequately protect against soil erosion and is susceptible to wildfire. Old growth brush provides poor habitat for wildlife and is a barrier to movement of livestock and big game animals. On these steep and very steep slopes, erosion can be controlled by maintaining adequate plant residue on the soil surface.

Stock trails can improve grazing distribution by providing better access to forage. Normally, wildfires on the Cieneba soil are extremely hot and destroy the vegetation. This is the main cause of accelerated soil erosion. Following a cool fire or controlled burn, an area is most productive and can provide a combination of grass, browse, fruit, and cover for wildlife and livestock. The major browse species on both soils are buckbrush, chamise, and California scrub oak. Undesirable plants on both soils include wooly yerba-santa and black sage.

Most engineering practices require special design considerations because of slope, erosion hazard, the shallow depth to rock of the Cieneba soil, and the high shrink-swell potential and low strength of the Millsap subsoil. Road construction should include runoff and sediment control structures, minimum grading, and establishment of permanent plant cover on side slopes. A more suitable base material sometimes needs to be brought in from outside sources.

The Cieneba and Millsap soils in this complex are in capability subclass VIIe (15), nonirrigated.

120—Concepcion loam, 2 to 5 percent slopes. This very deep, moderately well drained, gently sloping soil is on marine terraces. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 30 to 225 acres. The natural vegetation is mainly annual and perennial grasses and forbs with a few areas of scattered brush. Elevation ranges from 10 to 800 feet. The average annual precipitation ranges from 17 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 330 days, depending on location.

Typically, the surface layer is dark grayish brown loam about 14 inches thick. The next layer is light brownish gray sandy loam about 5 inches thick. The subsoil is brown or dark brown clay to a depth of 47 inches. The underlying material to a depth of 60 inches or more is sandy clay loam with mixed colors of light brownish gray and light gray. The profile is slightly acid at the surface and becomes moderately alkaline as depth increases. Some small areas of this soil have slightly lighter surface color than is typical, and other areas are less acid in the surface layer.

Included in this map unit are a few small areas of Cropley clay, Los Osos loam, Tierra loam, and San Simeon sandy loam.

Permeability of this Concepcion soil is very slow, and the available water capacity is moderate or high. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more, although roots in the subsoil are limited mainly to cracks in the clay. This soil has high shrink-swell potential in the subsoil.

Most areas of this soil are used for small grains and hay crops or as rangeland. In the vicinity of the city of San Luis Obispo, small areas are used for urban development.

The most common dryfarmed crops are small grains, barley hay, and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue utilization, and proper tillage help to improve soil tilth, structure, fertility, and water holding capacity. Subsoiling to break up the underlying clay layer is not recommended because this layer can reseal within a relatively short period.

This soil is well suited to rangeland. The dense clay subsoil, however, restricts movement of water and penetration of plant roots. Because of the dense clay subsoil, this soil is subject to gully erosion. This increases the importance of maintaining a permanent plant cover. In wet years, water sometimes ponds in depressional areas and retards early plant growth. Once forage plants are established, with roots penetrating into the upper few inches of the claypan, forage quality commonly remains high into July. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. This soil typically is open grassland. Major forage is annuals, including burclover and other legumes. California brome, California fescue, and such perennials as purple needlegrass provide forage in localized areas. Undesirable plants include horehound, California sagebrush, and mustard.

In some areas, community development is increasingly important. Building sites and most other engineering practices often require special design considerations because of the high shrink-swell potential, low strength, and hardness to pack of the subsoil. Foundations and footings need to be designed to compensate for these soil characteristics. Care should be taken to avoid removal of the surface layer on areas that are to be

landscaped so that the dense clay subsoil is not exposed. Septic tank absorption fields do not function properly because of the very slow permeability. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability.

Local road and street design can require that the base material be replaced or covered with a more suitable material in order to reduce maintenance. This soil is well suited to pond reservoir areas. However, embankments, dikes, and levees are hard to pack and can require careful placement of the material or mixing with a more desirable material and maintaining a high degree of compaction and moisture control. The amount and rate of applications of irrigation water must be controlled to prevent waterlogging and excessive runoff. Sprinkler or drip methods of irrigation are best suited to this soil.

This Concepcion soil is in capability units IIIe-3 (14), irrigated and nonirrigated.

121—Concepcion loam, 5 to 9 percent slopes. This very deep, moderately well drained, moderately sloping soil is on marine terraces. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 10 to 300 acres. The natural vegetation is mainly annual and perennial grasses and forbs with scattered brush and hardwoods. Elevation ranges from 10 to 800 feet. The average annual precipitation ranges from 17 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 330 days, depending on location.

Typically, the surface layer is dark grayish brown loam about 14 inches thick. The next layer is light brownish gray sandy loam about 5 inches thick. The subsoil is brown or dark brown clay to a depth of 47 inches. The underlying material to a depth of 60 inches or more is sandy clay loam with mixed colors of light brownish gray and light gray. The profile is slightly acid at the surface and becomes moderately alkaline as depth increases. Some small areas of this soil have slightly lighter surface color than is typical, and other areas are less acid in the surface layer.

Included in this map unit are a few small areas of Cropley clay, Los Osos loam, Tierra loam, and San Simeon sandy loam.

Permeability of this Concepcion soil is very slow, and the available water capacity is moderate or high. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth is 60 inches or more, although roots in the subsoil are limited to cracks in the clay. This soil has high shrink-swell potential in the subsoil.

Most areas of this soil are used for small grains and hay crops or as rangeland. A few areas within the city of San Luis Obispo are used for urban development.

The most common dryfarmed crops are small grains, barley hay, and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue utilization, and proper tillage help to improve soil tilth, structure, fertility, and water holding capacity. Subsoiling to break up the underlying clay layer is not recommended because this layer can reseal within a relatively short period. Working tilled areas on the contour or across the slope reduces erosion. Stubble and crop residue left in place after harvest helps to control erosion. Structural measures, such as grassed waterways and water diversions, are sometimes needed to control erosion.

This soil is well suited to rangeland. The dense clay subsoil restricts movement of water and penetration of plant roots. Because of the dense clay subsoil, the soil is subject to gully erosion. This increases the importance of maintaining a permanent plant cover. In wet years, water sometimes ponds in depressional areas and retards early plant growth. Once forage plants are established, with roots penetrating into the upper few inches of the claypan, forage quality commonly remains high into July. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. This soil typically is open grassland. Major forage is annuals, including burclover and other legumes. California brome, California fescue, and such perennials as purple needlegrass provide forage in localized areas. Undesirable plants include horehound, California sagebrush, and mustard.

In some areas, community development is increasingly important. Building sites and most other engineering practices often require special design considerations because of the high shrink-swell potential, low strength, and hardness to pack of the subsoil. Foundations and footings need to be designed to compensate for these soil characteristics. Care should be taken to avoid removal of the surface layer on areas that are to be landscaped so that the dense clay subsoil is not exposed. Septic tank absorption fields do not function properly because of the very slow permeability. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability.

Local road and street design can require that the base material be replaced or covered with a more suitable material in order to reduce maintenance. This soil is well suited to pond reservoir areas. However, embankments, dikes, and levees are hard to pack and can require careful placement of the material or mixing with a more desirable material and maintaining a high degree of compaction and moisture control. If terraces, diversions, or grassed waterways are installed, the slow permeability of the subsoil, which affects the amount of runoff, needs to be considered in the design of these structures. The amount and rate of application of irrigation water must be controlled to prevent waterlogging and excessive

runoff. Sprinkler or drip methods of irrigation are best suited to this soil. Because of the moderate erosion hazard, a permanent plant cover should be maintained at all times.

This Concepcion soil is in capability units IIIe-3 (14), irrigated and nonirrigated.

122—Concepcion loam, 9 to 15 percent slopes. This very deep, moderately well drained, strongly sloping soil is on marine terraces. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 30 to 290 acres. The natural vegetation is mainly annual and perennial grasses and forbs with scattered brush and hardwoods. Elevation ranges from 10 to 800 feet. The average annual precipitation ranges from 17 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 330 days, depending on location.

Typically, the surface layer is dark grayish brown loam about 14 inches thick. The next layer is light brownish gray sandy loam about 5 inches thick. The subsoil is brown or dark brown clay to a depth of 47 inches. The underlying material to a depth of 60 inches or more is sandy clay loam with mixed colors of light brownish gray and light gray. The profile is slightly acid at the surface and becomes moderately alkaline as depth increases. Some small areas of this soil have slightly lighter surface color than is typical, and other areas are less acid in the surface layer.

Included in this map unit are a few small areas of Diablo clay, Los Osos loam, and San Simeon sandy loam.

Permeability of this Concepcion soil is very slow, and the available water capacity is moderate or high. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth is 60 inches or more, although roots in the subsoil are limited mainly to cracks in the clay. This soil has high shrink-swell potential in the subsoil.

Most areas of this soil are used as rangeland or for small grains.

The most common dryfarmed crops are small grains, barley hay, and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue utilization, and proper tillage help to improve soil tilth, structure, fertility, and water holding capacity. Subsoiling to break up the underlying clay layer is not recommended because this layer can reseal within a relatively short period. Working tilled areas on the contour or across the slope reduces erosion. Stubble and crop residue left in place after harvest helps to control erosion. Structural measures, such as grassed waterways and water diversions, are sometimes needed to control erosion.

This soil is well suited to rangeland. The dense clay subsoil restricts movement of water and penetration of plant roots. Because of the dense clay subsoil, the soil is subject to gully erosion. This increases the importance of using proper grazing practices and maintaining a permanent plant cover. Once forage plants are established, with roots penetrating into the upper few inches of the claypan, forage quality commonly remains high into July. This soil typically is open grassland. Major forage is annuals, including burclover and other legumes. California brome, California fescue, and such perennials as purple needlegrass provide forage in localized areas. Undesirable plants include horehound, California sagebrush, and mustard.

Homesite development and most other engineering practices on this soil can require special design considerations because of the high shrink-swell potential and low strength. The soil is hard to pack because of the high clay content in the subsoil. Foundations and footings need to be designed to compensate for these soil characteristics. Care should be taken to avoid removal of the surface layer on areas that are to be landscaped so that the dense clay subsoil is not exposed. Septic tank absorption fields do not function properly because of the very slow permeability. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability.

Local road and street design can require that the base material be replaced or covered with a more suitable material in order to reduce maintenance. This soil is well suited to pond reservoir areas. However, embankments, dikes, and levees are hard to pack and can require careful placement of the material or mixing with a more desirable material and maintaining a high degree of compaction and moisture control. The amount and rate of application of irrigation water must be controlled to prevent excessive runoff. Sprinkler or drip methods of irrigation are best suited to this soil. If terraces, diversions, or grassed waterways are installed, the slow permeability of the subsoil, which affects the amount of runoff, needs to be considered in the design of these structures. Because of the moderate erosion hazard, a permanent plant cover should be maintained at all times.

This Concepcion soil is in capability units IVe-3 (14), irrigated and nonirrigated.

123—Concepcion loam, 15 to 30 percent slopes. This very deep, moderately well drained, moderately steep soil is on marine terraces. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 10 to 100 acres. The natural vegetation is mainly annual and perennial grasses and forbs with a few areas of sparse brush. Hardwoods are along drainageways. Elevation ranges from 10 to 800 feet. The average annual precipitation ranges from 17 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 330 days, depending on location.

Typically, the surface layer is dark grayish brown loam about 14 inches thick. The next layer is light brownish gray sandy loam about 5 inches thick. The subsoil is brown or dark brown clay to a depth of 47 inches. The underlying material to a depth of 60 inches or more is sandy clay loam with mixed colors of light brownish gray and light gray. The profile is slightly acid at the surface and becomes moderately alkaline as depth increases. Some small areas of this soil have slightly lighter surface color than is typical, and other areas are less acid in the surface layer.

Included in this map unit are a few small areas of Diablo clay, Los Osos loam, Millsap loam, and San Simeon sandy loam.

Permeability of this Concepcion soil is very slow, and the available water capacity is moderate or high. Surface runoff is rapid, and the hazard of water erosion is moderate or high. The effective rooting depth is 60 inches or more, although roots in the subsoil are limited mainly to cracks in the clay. This soil has high shrink-swell potential in the subsoil.

Most areas of this soil are used as rangeland.

This soil is well suited to rangeland. The dense clay subsoil restricts movement of water and penetration of plant roots. Because of the dense clay subsoil, the soil is subject to gully erosion. This increases the importance of using proper grazing practices and maintaining a permanent plant cover. Once forage plants are established, with roots penetrating into the upper few inches of the claypan, forage quality commonly remains high into July. This soil typically is open grassland. Major forage is annuals, including burclover and other legumes. California brome, California fescue, and such perennials as purple needlegrass provide forage in localized areas. Undesirable plants include horehound, California sagebrush, and mustard.

Homesite development and most other engineering practices on this soil can require special design considerations because of the high shrink-swell potential, the erosion hazard, and low strength. The soil is hard to pack because of the high clay content in the subsoil. The effects of shrinking and swelling can be minimized by backfilling with material that has low shrink-swell potential and by diverting runoff away from buildings. Septic tank absorption lines should be installed on the contour. Use of sandy backfill for the trench and long absorption lines helps to compensate for the very slow permeability. Because of the erosion hazard, a permanent plant cover should be maintained at all times.

This Concepcion soil is in capability subclass IVe (14), nonirrigated.

124—Corralitos sand, 0 to 2 percent slopes. This very deep, somewhat excessively drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 30 to 150 acres. The natural vegetation is presumed to have been annual grasses. Most areas are presently cultivated. A very few areas are annual grasses with scattered hardwoods. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 330 days, depending on location.

Typically, the surface layer is light brownish gray sand about 24 inches thick. The underlying material to a depth of 60 inches is light gray sand. The profile is medium acid throughout. Some small areas of this soil have thin strata of loamy sand.

Included in this map unit are a few small areas of Mocho silty clay loam and Tujunga loamy sand.

Permeability of this Corralitos soil is rapid, and the available water capacity is low. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for hay crops and pasture. In the Santa Maria Valley, areas of this soil are used for vegetable crops. A few areas are used as rangeland.

This soil is not well suited to dryland farming because of the coarse texture and low water holding capacity. A cropping system that includes crop rotation, cover crop use, crop residue use, fertilization, and minimum tillage operations should be used. Irrigated vegetable crops and pasture are suited to these soils if proper management is used. Irrigation systems, irrigation water management, and a conservation cropping system are needed on this soil. A cropping system that includes crop rotation or cover crops, crop residue use, fertilization, and proper tillage helps to improve the soil tilth, structure, and water holding capacity and reduce the hazard of soil blowing. Sprinkler or drip irrigation systems are suited to this soil. Furrow irrigation systems should have runs of minimum length to reduce erosion and to help offset the rapid permeability. Apply irrigation water at the rate and amount that allows maximum production and avoids excess runoff or losses through deep percolation. Crops with efficient root systems, such as carrots, or deep rooted crops, such as sugar beets, are well suited to this soil. This soil is well suited to strawberry production if drip irrigation is used.

This soil is moderately suited to rangeland. The sand surface texture makes this soil very droughty. It produces forage for a short period. Maintaining a good plant cover reduces the hazard of soil blowing. Typically, this soil supports annual grasses with scattered oaks and such shrubs as California sagebrush and coyotebush. Undesirable plants include cocklebur and Russian-thistle.

This soil has few limitations for homesite development. When making shallow excavations, support is sometimes needed to prevent caving. If this soil is used for pond reservoir areas, seepage is the main limitation. This can

be overcome by sealing. Seepage from septic tanks and landfills can cause pollution of ground water. This soil is a poor source of daily cover for landfills because it is too sandy and is subject to soil blowing. Seepage and piping are the main limitations if this soil is used for embankments, dikes, or levees. Careful placement of the material in the embankment, a high degree of compaction and moisture control, and the use of imported material is sometimes required. Because of the soil blowing hazard, a permanent plant cover should be maintained at all times. A permanent, low-rate-of-application irrigation system is needed because the soil is droughty. The best methods of irrigation on this soil are sprinkler or drip because of the droughtiness and rapid permeability.

This Corralitos soil is in capability unit IVs-4 (14), irrigated and capability subclass VIs (14), nonirrigated.

125—Corralitos sand, 2 to 15 percent slopes. This very deep, somewhat excessively drained, moderately sloping and strongly sloping soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 30 to 250 acres. The natural vegetation is mainly annual grasses with oaks and brush. Many areas are presently cultivated. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 330 days, depending on location.

Typically, the surface layer is light brownish gray sand about 24 inches thick. The underlying material to a depth of 60 inches is light gray sand. The profile is medium acid throughout. Some small areas of this soil have thin strata of loamy sand.

Included in this map unit are a few small areas of Arnold loamy sand and Elder sandy loam. Near Corbett Canyon, small areas of Corralitos Variant loamy sand are included.

Permeability of this Corralitos soil is rapid, and the available water capacity is low. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland or for small grains and hay crops.

Dryfarmed areas should use a cropping system that includes crop rotation or cover crops, crop residue use, and fertilization. Restrict tillage operations to the minimum necessary for crop production. Tilled areas should be worked on the contour or across the slope if contour farming is not possible. In some places structural measures, such as grassed waterways or water diversions, are necessary to reduce erosion.

The soil is moderately suited to rangeland. The sand surface texture makes this soil very droughty with a short period of forage production. The hazard of soil blowing can be controlled by maintaining adequate plant residue on the soil surface. Typically, this soil supports annual grasses with groves of oaks and such shrubs as California coast sagebrush and coyotebush. Undesirable plants include cocklebur and Russian-thistle.

If this soil is used for urban development, the main limitations are slope and coarse texture. Foundation and footing designs sometimes need to be modified, or building site grading is needed to compensate for the slope. Place septic tank absorption fields on the contour. There is a hazard of contaminating the ground water. Because of the high soil blowing hazard, barren side slopes created by the construction of local roads and streets or other grading operations need to have a permanent plant cover established. Because this soil is droughty, a permanent, low-rate-of-application irrigation system can be required for this purpose. Runoff, sediment control structures, and minimum grading should also be utilized. Sprinkler and drip irrigation methods are best suited to this soil.

This Corralitos soil is in capability unit IVs-4 (14), irrigated and capability subclass VIs (14), nonirrigated.

126—Corralitos Variant loamy sand. This very deep, somewhat poorly drained, nearly level soil is on alluvial fans and flood plains. Slopes are 0 to 2 percent. This soil formed in alluvium weathered from sedimentary rocks. Areas are elongated or irregular in shape and range from 30 to 80 acres. The natural vegetation is mainly annual grasses. Most areas are presently cultivated. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 330 days, depending on location.

Typically, the surface layer is pale brown loamy sand 13 inches thick. The underlying material is pale brown, mottled loamy sand to a depth of 60 inches. The profile is moderately alkaline throughout. Some small areas of this soil have thin strata of silty clay loam and very fine sandy loam.

Included in this map unit are a few small areas of Camarillo sandy loam, Corralitos sand, and Tujunga loamy sand.

Permeability of this Corralitos Variant soil is rapid, and the available water capacity is low. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high. The effective rooting depth is limited by a seasonal high water table at a depth of 2 to 3 feet from about December through March. The rooting depth increases to 60 inches as the water table drops during drier periods. This soil is subject to occasional, brief flooding.

Most areas of this soil are used for vegetable crops and pasture.

Areas farmed for vegetable crops should use a cropping system that includes crop rotation, cover crops,

crop residue utilization, fertilization, and proper tillage. This helps to maintain soil tilth, structure, and fertility. Because this soil is subject to flooding and has a fluctuating high water table, the selection of a proper irrigation system and irrigation water management are critical to ensure high yields. Crop selection can be expanded and yields can be increased substantially by installing surface or underground tile drainage systems, or both, to lower the water table. Areas that can not be economically drained can be planted to shallow-rooted vegetable crops, such as broccoli, cabbage, lettuce, or cauliflower, or to irrigated pasture. If planted to pasture, deep-rooted plants, such as alfalfa, should not be included in the plant mix.

Use of this soil for homesite development can require special design considerations because of the fluctuating high water table and the hazard of occasional flooding. Because of the course soil texture, seepage is the main limitation if this soil is used for embankments, dikes, or levees. This can be corrected by careful placement of material and by maintaining a high degree of compaction and moisture control. The high water table can cause abnormal settling of foundations and footings. Drainage can be accomplished by different methods. Installing drainage can be impractical in some low-lying areas.

Septic tank absorption fields do not function properly because of the high water table; their use can contaminate ground water. An alternative is to connect to a community sewage disposal system. Seepage is the main limitation if pond reservoir areas are developed. This can be corrected by sealing. Excessive irrigation can raise the water table and decrease the effective rooting depth. This soil is subject to soil blowing; an adequate plant cover should be maintained at all times.

This Corralitos Variant soil is in capability unit IIIw-2 (14), irrigated and capability unit IVw-2 (14), nonirrigated.

127—Cropley clay, 0 to 2 percent slopes. This very deep, moderately well drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are broad or long and narrow in shape and range from 5 to 350 acres. The natural vegetation is mainly annual and perennial grasses. Elevation ranges from 100 to 700 feet. The average annual precipitation ranges from 14 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 330 days, depending on location.

Typically, the surface layer is dark gray, very dark gray, and light brownish gray clay about 36 inches thick. The underlying material is pale brown and light yellowish brown, calcareous silty clay loam to a depth of 60 inches or more. The profile is neutral in the surface layer and becomes moderately alkaline as depth increases. It is calcareous below a depth of about 32 inches. When the soil is dry, large cracks extend to a depth of 40 inches or more. In places, strata of coarser material are below a depth of 40 inches.

Included in this map unit are a few small areas of Concepcion loam, Diablo clay, Salinas silty clay loam, and a soil that is similar to Cropley soil but differs by being very dark gray throughout and by containing mottles in the substrata, which are assumed to have been caused by wetness in the past.

Permeability of this Cropley soil is slow, and the available water capacity is high. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more. This soil has high shrink-swell potential.

Most areas of this soil are used mainly for dryland farming with some irrigated row crops and pasture. Some areas are used for urban development.

This soil is well suited to vegetable crops, dryland farming, and pasture. Of primary concern are tillage operations, irrigation water management, and drainage. This soil is difficult to cultivate when the soil is too wet or too dry, and it is easily compacted by farming equipment. Restrict tillage to the minimum necessary for crop production. Irrigation water can be applied by any means of conveyance; however, application rate and frequency should be closely monitored to provide for the specific requirements of the crop in production. Crop production is greatly reduced during the winter unless surface and subsurface drainage systems are installed. Grazing rotation allows ample drying time between irrigations and helps to reduce soil compaction by livestock. A cropping system that includes crop rotation or cover crops helps to improve the soil tilth, structure, and water infiltration. Vegetables commonly grown on this soil include celery, lettuce, cauliflower, broccoli, and cabbage.

This soil is well suited to rangeland. However, the clay texture increases the hazard of compaction. This can be reduced by grazing when the surface layer is moderately dry. The high available water capacity of this soil influences a rather long, slow growing forage season. In depressional areas and along drainageways, prolonged water saturation can decrease forage production and favor water-loving plants, such as willows. This soil typically produces annual plants, including burclover and other legumes. Purple needlegrass is a common perennial forage grass. Undesirable plants include milkthistle, poison-hemlock, and cheeseweed.

Urban development is increasingly important on this soil. Foundations and footings should be designed to compensate for the high shrink-swell potential and low strength. Septic tank absorption fields do not function properly because of slow permeability. Using sandy backfill for trench lines and increasing the size of the absorption field help to compensate for the slow permeability. Local road and street design can require that the base material be replaced or covered with a more suitable material so that maintenance is minimized. This soil is a favorable site for pond reservoir areas but

is poorly suited as embankment, dike, and levee material because it is hard to pack and has high shrink-swell potential and low strength. This can be corrected by using a more suitable material, by careful placement of the material in the embankment, and by maintaining a high degree of compaction and moisture control. When irrigated, the amount of water applied must be controlled to prevent excessive runoff. Because of slow permeability, sprinkler or drip methods of irrigation are best suited to this soil.

This Cropley soil is in capability units IIs-5 (14), irrigated and IIIs-5 (14), nonirrigated.

128—Cropley clay, 2 to 9 percent slopes. This very deep, moderately well drained, gently sloping and moderately sloping soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are broad or long and narrow and range from 5 to 350 acres. The natural vegetation is mainly annual and perennial grasses. Elevation ranges from 100 to 700 feet. The average annual precipitation ranges from 14 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 330 days, depending on location.

Typically, the surface layer is dark gray, very dark gray, and light brownish gray clay about 36 inches thick. The underlying material is pale brown and light yellowish brown silty clay loam to a depth of 60 inches or more. The profile is neutral in the surface layer and becomes moderately alkaline as depth increases. This soil is calcareous below a depth of about 32 inches. When the soil is dry, large cracks extend to a depth of 40 inches or more. In some areas, there are strata of coarser material below a depth of 40 inches.

Included in this map unit are a few small areas of Diablo clay, Los Osos loam, and Salinas silty clay loam.

Permeability of this Cropley soil is slow, and the available water capacity is high. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate. The effective rooting depth is 60 inches or more. This soil has high shrink-swell potential.

Most areas of this soil are used as rangeland or for small grains and hay crops. Some areas are used for urban development.

Barley and oats are the principal dryland crops on this soil. Other dryland crops, such as beans, are also well suited to this soil because of the high water holding capacity. Proper tillage and cropping systems are the primary management concerns. These soils are difficult to work when excessively wet or dry. Tillage operations should be timed to periods when soil moisture is slightly below the field moisture capacity. Proper tillage and crop residue use help to improve the soil tilth, structure, and water infiltration. Farming the steeper slopes on the contour or across the slope reduces the potential for water erosion. Natural or artificial drainage ditches should be permanently grassed to prevent erosion.

This soil is well suited to rangeland. However, the clay texture increases the hazard of compaction. This can be reduced by grazing when the surface layer is moderately dry. The high available water capacity of this soil influences a rather long, slow growing forage season. Erosion can be controlled by maintaining adequate plant residue on the soil surface. In depressional areas and along drainageways, prolonged water saturation can decrease forage production and favor water-loving plants, such as willows. This soil typically produces annual plants, including burclover and other legumes. Purple needlegrass is a common perennial forage grass. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants include milkthistle, poison-hemlock, and cheeseweed.

Urban development is increasingly important on this soil. Foundation and footing designs need to compensate for the high shrink-swell potential and low strength. Septic tank absorption fields do not function properly because of the slow permeability. Using sandy backfill for trench lines and increasing the size of the absorption field helps to compensate for the slow permeability. Local road and street design can require that the base material be replaced or covered with a more suitable material so that maintenance is minimized. This soil is a favorable site for pond reservoir areas; however, slopes of more than 6 percent can reduce the pond surface area. The high shrink-swell potential, low strength, and hardness to pack make this soil a poor material for the construction of embankments, dikes, and levees. This can be corrected by using a more suitable material, by careful placement of the material in the embankment, and by maintaining a high degree of compaction and moisture control. When irrigated the amount of water applied must be controlled to prevent excessive runoff. Because of slow permeability, sprinkler or drip methods of irrigation are best suited to this soil.

This Cropley soil is in capability units IIe-5 (14), irrigated and IIIe-5 (14), nonirrigated.

129—Diablo clay, 5 to 9 percent slopes. This deep, well drained, gently rolling soil is on low lying foothills. It formed in residual material weathered from sandstone, shale, or mudstone. Areas are irregular in shape and range from 5 to 150 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 200 to 600 feet. The average annual precipitation ranges from 14 to 25 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a depth of about 58 inches is olive gray clay. This is underlain by

weathered mudstone. The profile is neutral in the surface layer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Included in this map unit are small areas of Cropley clay in concave positions. Also included are minor areas of soils similar to Diablo soil where the underlying rock is at a depth of less than 40 inches or the soil is underlain by hard rock at a depth of 45 to 58 inches.

Permeability of this Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is medium, and the hazard of water erosion is slight or moderate. The effective rooting depth ranges from 45 to 58 inches. This soil has high shrink-swell potential.

Most areas of this soil are used as rangeland or for hay crops and small grains. Some areas are used for urban development.

Barley and oats are the principal dryland crops on this soil. Other dryland crops, such as beans, are also well suited to this soil because of the high water holding capacity. Proper tillage and cropping systems are the primary management concerns. This soil is difficult to work when excessively wet or dry. Tillage operations should be timed to periods when soil moisture is slightly below the field moisture capacity. Proper tillage and crop residue use help to improve the soil tilth, structure, and water infiltration. Farming the steeper slopes on the contour or across the slope reduces the potential for water erosion. Natural or artificial drainage ditches should be permanently grassed to prevent erosion.

This soil is well suited to rangeland. The clay texture, however, increases the hazard of surface compaction. This hazard can be reduced by grazing when the surface layer is moderately dry. The moderate to very high available water capacity influences a rather long, slow growing forage season. Erosion can be controlled by maintaining adequate plant residue on the soil surface. In swales or seep areas, prolonged water saturation decreases forage production and favors water-loving plants, such as willows. This soil typically produces annual plants, including burclover and other annual legumes. Purple needlegrass is a common perennial forage grass. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard.

This soil is increasingly important for urban development. The main limitations are the high shrink-swell potential, low strength, and slow permeability. The soil is hard to pack because of the high clay content. These limitations can require special design considerations for urban development and most other engineering practices. Foundation and footing designs need to offset these limitations. Shallow excavations are difficult to perform because of the high clay content. Septic tank absorption fields do not function properly because of the slow permeability and depth to rock. Using sandy backfill for trench lines and increasing the size of the absorption field helps to compensate for the slow permeability.

Local road and street design can require that the base material be replaced or covered with a more suitable material so that maintenance is minimized. This soil is a moderately favorable site for pond reservoir areas. However, the slope can create minor problems by reducing the storage potential. The high shrink-swell potential, low strength, and hardness to pack make this soil a poor material for the construction of embankments, dikes, and levees. This can be corrected by using a more suitable material, by careful placement of the material in the embankment, and by maintaining a high degree of compaction and moisture control. When irrigated, the amount of water applied must be controlled to prevent excessive runoff. Because of the slow permeability, sprinkler or drip methods of irrigation are best suited to this soil.

This Diablo soil is in capability units IIe-5 (15), irrigated and IIIe-5 (15), nonirrigated.

130—Diablo and Cibo clays, 9 to 15 percent slopes. These strongly sloping soils are on low lying foothills. Areas are irregular in shape and range from 15 to 400 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 200 to 600 feet. The average annual precipitation ranges from 14 to 25 inches, and the average annual air temperature is about 50 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

Diablo soil differs from Cibo soil by being deep, having a darker surface layer, being calcareous in the underlying material, and overlying softer, weathered rock.

Included in this undifferentiated group are a few small areas of Zaca soils. Also included in the Los Osos and Chorro Valleys are areas where the underlying rock is at a depth of more than 60 inches.

The Diablo soil is deep and well drained. It formed in residual material weathered from sandstone, shale, or mudstone. Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a depth of about 58 inches is olive gray clay. This is underlain by weathered mudstone. The profile is neutral in the surface layer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Permeability of the Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is medium, and the water erosion hazard is moderate. The effective rooting depth ranges from 45 to 58 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

The Cibo soil is moderately deep and well drained. It formed in residual material weathered from hard sandstone or shale. Typically, the surface layer is dark brown clay about 31 inches thick. The underlying material to a depth of about 39 inches is dark brown clay loam. This is underlain by hard sandstone. The profile is neutral throughout. Some areas have a clay loam surface layer.

Permeability of the Cibo soil is slow, and the available water capacity is very low to moderate. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

Most areas of these soils are used as rangeland. A few areas are used for urban development.

These soils are well suited to rangeland. The clay texture, however, increases the hazard of surface compaction. This hazard can be reduced by grazing when the surface layer is moderately dry. The high available water capacity of the Diablo soil influences a rather long, slow growing forage season. Erosion can be controlled by maintaining adequate plant residue on the soil surface. These soils typically produce annual plants, including burclover and other annual legumes. Purple needlegrass is a common perennial forage grass. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard.

These soils are increasingly important for urban development. The main limitations are the high shrink-swell potential, low strength, and slow permeability. The soil is hard to pack because of the high clay content. These limitations can require that special design considerations be used for urban development and most other engineering practices. Foundation and footing design should consider these limitations. Shallow excavations are difficult to perform because of the high clay content. Septic tank absorption fields do not function properly because of the slow permeability and depth to rock. Using sandy backfill for trench lines and increasing the size of the absorption field help to compensate for the slow permeability.

Local road and street design can require that the base material be replaced or covered with a more suitable material so that maintenance is minimized. Pond reservoir areas are poorly suited to these soils because the slope causes a reduction in the storage capacity. When irrigated, the amount of water applied must be controlled to prevent excessive runoff. Because of the slope and the slow permeability, sprinkler or drip methods of irrigation are best suited to these soils.

The Diablo and Cibo soils in this undifferentiated group are in capability units IIIe-5 (15), irrigated and nonirrigated.

131—Diablo and Cibo clays, 15 to 30 percent slopes. These moderately steep soils are on foothills and mountains. Areas are irregular in shape and range from 5 to 250 acres. The natural vegetation is mainly annual grasses and forbs. Hardwoods are common in swales. Elevation ranges from 200 to 3,000 feet. The average annual precipitation ranges from 14 to 28 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Diablo soil differs from Cibo soil by being deep, having a darker surface layer, being calcareous in the underlying material, and overlying softer, weathered rock.

Included in this undifferentiated group are minor areas of Lodo clay loam, Los Osos loam, and Zaca clay. Also included are small areas of Rock outcrop.

The Diablo soil is deep and well drained. It formed in residual material weathered from sandstone, shale, or mudstone. Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a depth of about 58 inches is olive gray clay. Below this is weathered mudstone. The profile is neutral in the surface layer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Permeability of the Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is rapid, and the hazard of water erosion is moderate. The effective rooting depth ranges from 45 to 58 inches. The soil has high shrink-swell potential and is subject to slippage when wet.

The Cibo soil is moderately deep and well drained. It formed in residual material weathered from hard sandstone or shale. Typically, the surface layer is dark brown clay about 31 inches thick. The underlying material to a depth of about 39 inches is dark brown clay loam. Below this is hard sandstone. The profile is neutral throughout. Some areas have a clay loam surface layer.

Permeability of the Cibo soil is slow, and the available water capacity is very low to moderate. Surface runoff is rapid, and the hazard of water erosion is moderate. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

Most areas of these soils are used as rangeland.

These soils are well suited to rangeland. The clay texture, however, increases the hazard of surface compaction. This hazard can be reduced by grazing when the surface layer is moderately dry. The high available water capacity of the Diablo soil influences a rather long, slow growing forage season. These fine textured soils respond to fertilizer or amendment applications that increase forage production. Erosion can

be controlled by maintaining adequate plant residue on the soil surface. These soils typically produce annual plants that include burclover and other annual legumes. Purple needlegrass is a common perennial forage grass. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard.

Homesite development and most other engineering practices require special designs because of the slope, high shrink-swell potential, low strength, slow permeability, hardness to pack, and the susceptibility of these soils to slippage when wet. Foundation and footing designs should consider these limitations. The high clay content makes shallow excavations difficult. Septic tank absorption fields do not function properly because of the slow permeability and depth to rock. Using sandy backfill for trench lines and increasing the size of the absorption field help to compensate for the slow permeability. Local road and street design can require that the base material be replaced or covered with a more suitable material so that maintenance is minimized. Pond reservoir areas are poorly suited to these soils because the slope causes a reduction in the storage capacity. If the soils are irrigated, excessive runoff can be prevented by controlling the amount of water applied. Because of the slope and the slow permeability, sprinkler or drip methods of irrigation are best suited to these soils.

The Diablo and Cibo soils of this undifferentiated group are in capability unit IVe-5 (15), nonirrigated.

132—Diablo and Cibo clays, 30 to 50 percent slopes. These steep soils are on foothills and mountains. Areas are irregular in shape and range from 10 to 400 acres. The natural vegetation is mainly annual grasses and forbs; hardwoods are common in swales. Elevation ranges from 200 to 3,000 feet. The average annual precipitation ranges from 14 to 28 inches, and the average air temperature is about 59 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

Diablo soil differs from Cibo soil by being deep, having a darker surface layer, being calcareous in the underlying material, and overlying softer, weathered rock.

Included in this undifferentiated group are minor areas of Lodo clay loam and Los Osos loam. Also included are small areas of Rock outcrop.

The Diablo soil is deep and well drained. It formed in residual material weathered from sandstone, shale, or mudstone. Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a depth of about 58 inches is olive gray clay. Below this is weathered mudstone. The profile is neutral in the surface layer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Permeability of the Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 45 to 58 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

The Cibo soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is dark brown clay about 31 inches thick. The underlying material to a depth of about 39 inches is dark brown clay loam. Below this is hard sandstone. The profile is neutral throughout. Some areas have a clay loam surface layer.

Permeability of the Cibo soil is slow, and the available water capacity is very low to moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

Most areas of these soils are used as rangeland.

These soils are well suited to rangeland. The clay texture, however, increases the hazard of surface compaction. This hazard can be reduced by grazing when the surface layer is moderately dry. The high available water capacity of the Diablo soil influences a rather long, slow growing forage season. These fine textured soils respond to fertilizer or amendment applications that increase forage production. Erosion can be controlled by maintaining adequate plant residue on the soil surface. These soils typically produce annual plants, including burclover and other annual legumes. Purple needlegrass is a common perennial forage grass. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard.

Homesite development and most other engineering practices require special design considerations because of the slope, high shrink-swell potential, low strength, slow permeability, hardness to pack, and the susceptibility of these soils to slippage when wet. Foundation and footing designs need to compensate for the high shrink-swell potential and low strength. Septic tank absorption fields do not function properly because of the slow permeability and slope. The septic tank absorption field trench lines should be placed on the contour and can be lengthened. Excavation can result in water erosion. This hazard can be reduced if minimum grading and runoff and sediment control structures are utilized and a permanent cover is established on the side slopes.

These Diablo and Cibo soils in this undifferentiated group are in capability subclass VIe (15), nonirrigated.

133—Diablo-Lodo complex, 15 to 50 percent slopes. These moderately steep and steep soils are on foothills and mountains (fig. 10). Areas are irregular in shape and range from 10 to 650 acres. The natural vegetation is mainly annual grasses and forbs with areas of brush (fig. 11). Hardwoods are present along some drainageways. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 28 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 45 percent Diablo soil and about 35 percent Lodo soil. Diablo soil differs from Lodo soil by being deep and having a clay texture throughout.

Included in this complex are small areas of Cibo clay, Lopez very shaly clay loam, Los Osos loam, Millsap loam, Obispo clay, and Rock outcrop. Also included are small areas of soils that are similar to Lodo soil but are underlain by softer rock. Included areas make up about 20 percent of the total acreage.

At the Monterey-San Luis Obispo County line, this complex joins with Monterey's Climara-Montara complex Neither of these soils was extensive enough to map in this survey area; therefore, the areas of Climara and Montara soils are included in this Diablo-Lodo complex. Use and management of this complex and the Climara-Montara complex is similar.

The Diablo soil is deep and well drained. It formed in residual material weathered from sandstone, shale, or mudstone. Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a depth of about 58 inches is olive gray clay. Below this is weathered mudstone. The profile is neutral in the surfac

Figure 10—The western side of the Santa Lucia Mountains, in the northern part of the survey area, is characterized by open grassy areas of Diablo-Lodo complex, 15 to 50 percent slopes Areas of this soil are dominantly used for grazing The brush covered mountains in the background are areas of Henneke-Rock outcrop complex, 15 to 75 percent slopes Burnett Peak is on the skyline.

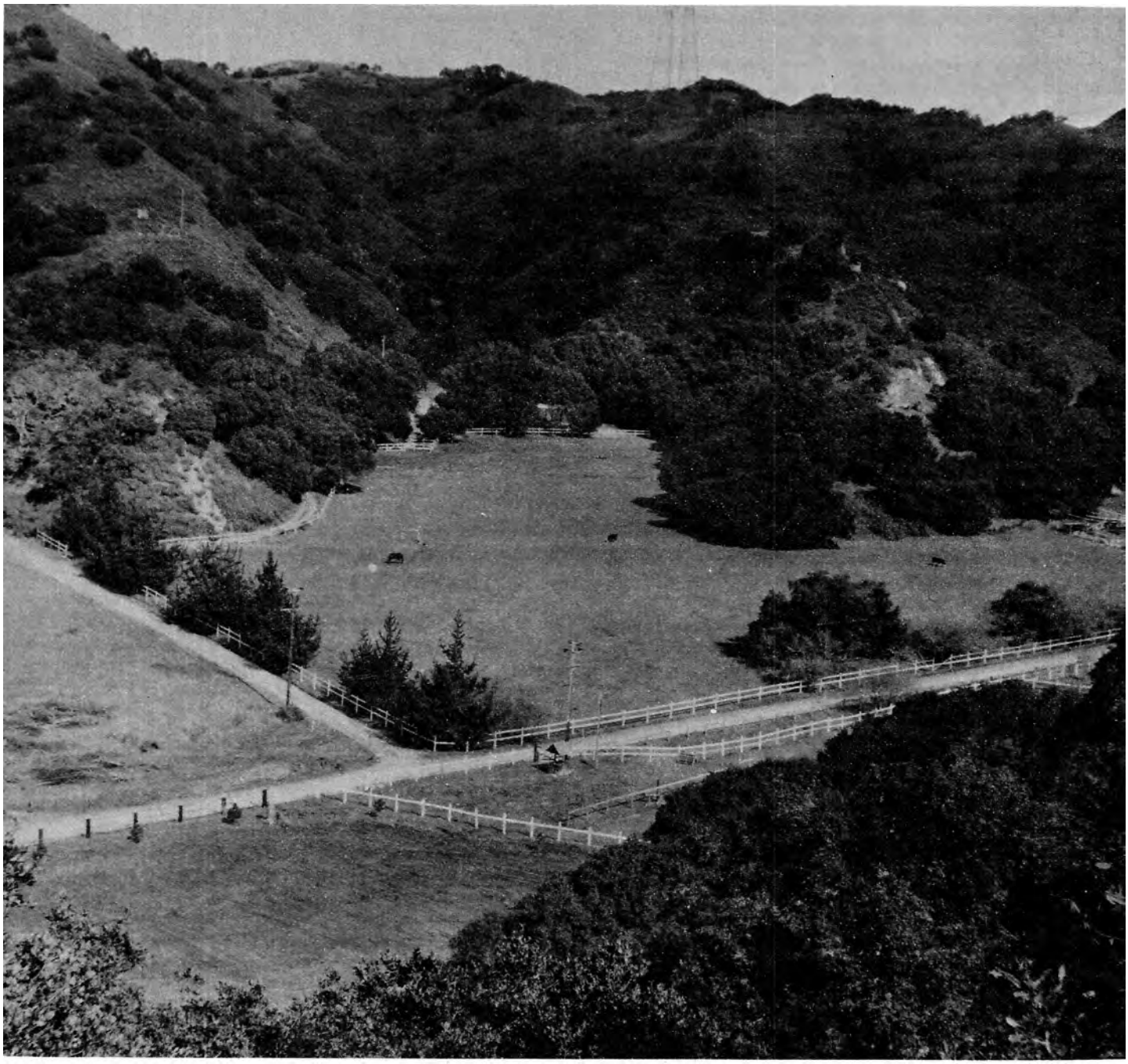

Figure 11 —The soil under grass vegetation in the foreground is Diablo-Lodo complex, 15 to 50 percent slopes. The Henneke soils in the background are characterized by chaparral vegetation with occasional Digger pine.

ayer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Permeability of the Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is rapid, and the hazard of water erosion is moderate or high. The effective rooting depth ranges from 45 to 58 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

The Lodo soil is very shallow or shallow and somewhat excessively drained. It formed in residual material weathered from red rock, sandstone, or shale. Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain directly by

fractured, hard sandstone. Some small areas of this soil have a sandy loam or loam surface layer and contain as much as 35 percent gravel.

Permeability of the Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The clay texture of the Diablo soil increases the hazard of surface compaction. The Lodo soil has very low or low available water capacity; it produces less forage and is often overgrazed. This often causes excessive sheet erosion of the Lodo soil. Erosion can be controlled by maintaining adequate plant residue on the soil surface. Major forage plants are annuals, including burclover and other legumes. Purple needlegrass is a common perennial forage grass. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of the less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard.

Homesite development and most other engineering practices require special design considerations. The main limitations are the high shrink-swell potential, low strength, slow permeability, and hardness to pack; the susceptibility to slippage when wet for the Diablo soil; the shallow depth to rock for the Lodo soil; and the moderately steep and steep slopes. Foundations and footings should be designed to offset the high shrink-swell potential of the Diablo soil. Care should be taken to avoid exposing the rock by removal of the surface layer on Lodo soil in areas that are to be landscaped. Septic tank absorption fields do not function properly because of the slow permeability and shallow depth to rock. Septic tank absorption field trench lines should be placed on the contour and can be lengthened. Excavating for urban development and roads can result in water erosion. This hazard can be reduced if minimum grading and runoff and sediment control structures are utilized and a permanent cover is established on the side slopes.

The Diablo and Lodo soils in this complex are in capability subclass VIe (15), nonirrigated.

134—Dune land. This map unit consists of hilly areas along the coast that are composed of sand-sized particles that shift with the wind. It is along the coastal beaches from the Santa Maria River north to Pismo Beach and from Montana de Oro to Morro Bay. Most areas are almost devoid of vegetation; included are some areas that are partially covered with California sagebrush or beach grass and are somewhat stabilized.

Included in this map unit are small areas of Baywood and Caspistrano soils and Beaches.

Permeability of this map unit is very rapid, and the available water capacity is very low. Surface runoff is slow, and the hazard of soil blowing is very high.

Most areas of Dune land are used for recreation.

This map unit is in capability subclass VIIIe.

135—Elder sandy loam, 2 to 5 percent slopes. This very deep, well drained, gently sloping soil is on alluvial fans and plains (fig. 12). It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow or irregular in shape and range from 20 to 150 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 100 to 1,000 feet. The average annual precipitation ranges from 12 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 200 to 300 days, depending on location.

Typically, the surface layer is dark gray and dark grayish brown sandy loam about 37 inches thick. The underlying material is mixed dark grayish brown and brown sandy loam that extends to a depth of 60 inches or more. The profile is slightly acid throughout. Some places have a loam surface layer.

Included in this map unit are a few small areas of Corralitos sand and Tujunga loamy sand. Also included are a few areas that have slopes of less than 2 percent or more than 5 percent.

Permeability of this Elder soil is moderately rapid, and the available water capacity is moderate or high. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland or for hay crops. Some areas are used for irrigated row crops.

The soil is well suited to a wide variety of truck and field crops if it is properly leveled and irrigated. Cropping systems that include crop rotation and crop residue utilization help to preserve good soil structure and fertility. Land leveling is sometimes necessary to ensure proper distribution of irrigation water. Dryland farming done across the slope minimizes erosion. Most of the dryland farming areas are used for oat hay production; however, other dryland crops, such as barley and beans, are well suited to this soil. Soil blowing can be reduced by returning crop residue to the soil and practicing minimum tillage.

This soil is well suited to rangeland. Surface moisture is rapidly depleted, making the germination of annuals difficult. This soil produces quality forage for short periods. Many areas of this soil have been cultivated and are without perennial cover. This soil typically is open grassland with individual live oaks. The major forage is annuals, including burclover and other annual legumes. Perennial forage plants, such as purple needlegrass and Australian saltbush, are locally common. Undesirable plants include cocklebur, verbena, coyotebush, and California sagebrush.

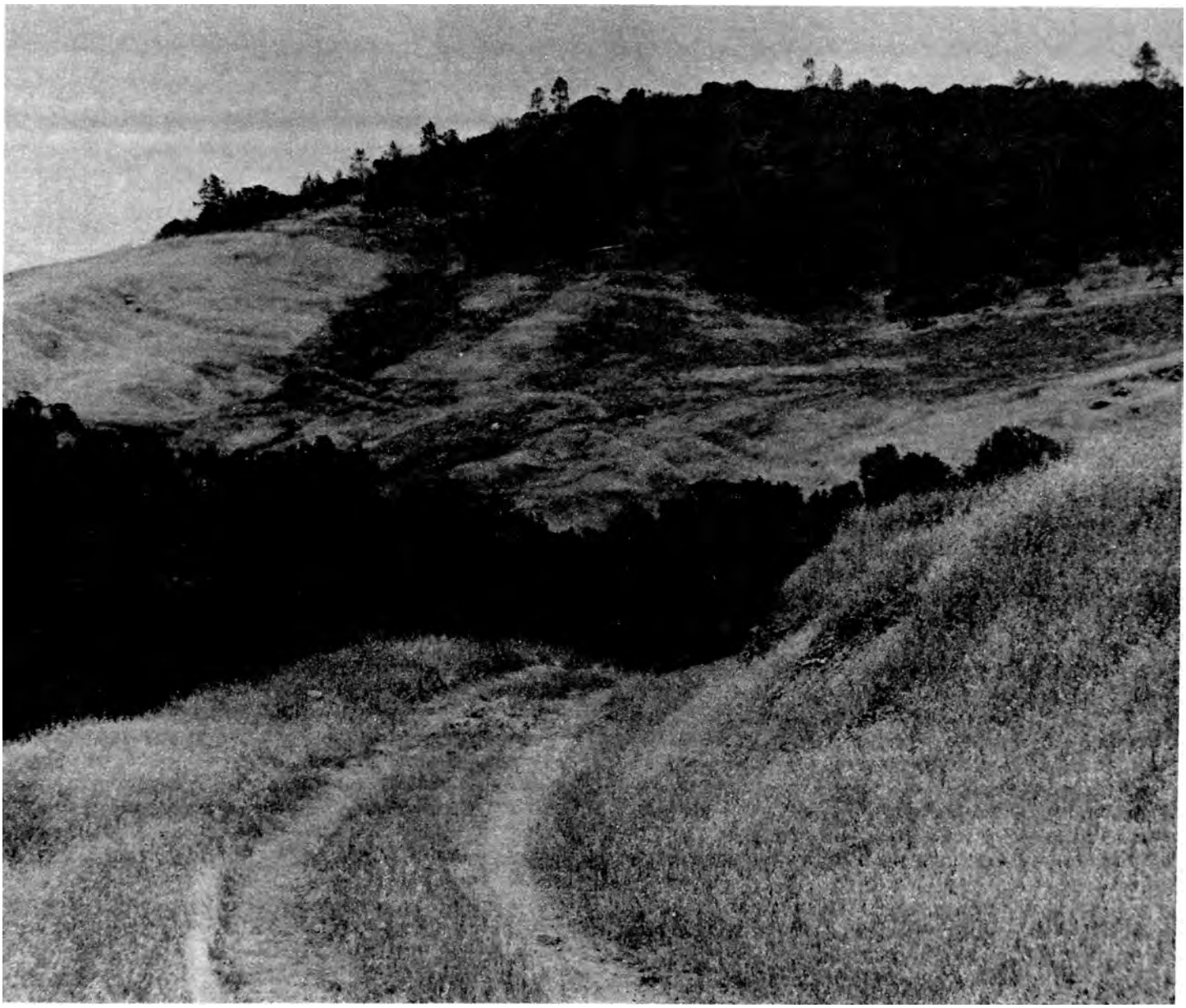

Figure 12.—The soil in the foreground is Elder sandy loam, 2 to 5 percent slopes. Gaviota soil is on the hillsides.

This soil has few limitations if used for homesite development. Seepage is a problem if this soil is used for pond reservoir areas. This can be corrected by sealing. Embankments, dikes, levees, terraces, and diversions, if constructed from this material, are subject to piping. This can be corrected by careful placement of material and by using a high degree of compaction and moisture control.

This Elder soil is in capability units IIe-1 (14), irrigated and IIIe-1 (14), nonirrigated.

136—Elder sandy loam, 5 to 9 percent slopes. This very deep, well drained, moderately sloping soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow or irregular in shape and range from 20 to 150 acres. The

natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 100 to 1,000 feet. The average annual precipitation ranges from 12 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 200 to 300 days, depending on location.

Typically, the surface layer is dark gray and dark grayish brown sandy loam about 37 inches thick. The underlying material is mixed dark grayish brown and brown sandy loam that extends to a depth of 60 inches or more. The profile is slightly acid throughout. Some areas have a loam surface layer.

Included in this map unit are a few small areas of Arnold loamy sand and Briones loamy sand. Also included are a few small areas that have slopes of less than 5 percent or more than 9 percent.

Permeability of this Elder soil is moderately rapid, and the available water capacity is moderate or high. Surface runoff is medium, and the hazards of water erosion and soil blowing are moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland. Some areas are used for small grains or hay crops.

The most common dryfarmed crops are grain barley and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue use, and proper tillage help to maintain soil tilth, structure, and fertility. Tilled areas should be worked on the contour or across the slope. Structural measures, such as grassed waterways and water diversions, are sometimes necessary to reduce the erosion hazard. Soil blowing can be reduced by returning crop residue to the soil and by practicing minimum tillage.

This soil is well suited to rangeland. Because of the sandy loam texture, however, it is subject to gully erosion. This is especially a problem during years of high rainfall because of channeling from upslope runoff. Surface moisture is rapidly depleted, making the germination of annuals difficult. This soil produces quality forage for short periods. The moderate water erosion and soil blowing hazards increase the importance of maintaining a permanent plant cover. Some areas of this soil have been cultivated, and are without perennial cover. This soil typically is open grassland with individual live oaks. The major forage is annuals, including burclover and other annual legumes. Perennial forage plants, such as purple needlegrass and Australian saltbush, are locally common. Undesirable plants include cocklebur, verbena, coyotebush, and California sagebrush.

This soil has few limitations if used for homesite development. If this soil is used for pond reservoir areas, seepage and slope are the main limitations. Seepage can be corrected by sealing. As slope increases, the storage potential decreases unless additional excavation is performed; reservoirs should be placed on the lesser slopes. Embankments, dikes, levees, terraces, and diversions, if constructed from this material, are subject to piping. This can be corrected by careful placement of material and by using a high degree of compaction and moisture control. If irrigated, because of the slope and water erosion hazard, sprinkler or drip methods of irrigation are best suited to this soil.

This Elder soil is in capability units IIe-1 (14), irrigated and IIIe-1 (14), nonirrigated.

137—Elder sandy loam, 9 to 15 percent slopes. This very deep, well drained, strongly sloping soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow or irregular in shape and range from 20 to 150 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 100 to 1,000 feet. The average annual precipitation ranges from 12 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 200 to 300 days, depending on location.

Typically, the surface layer is dark gray and dark grayish brown sandy loam about 37 inches thick. The underlying material is mixed dark grayish brown and brown sandy loam that extends to a depth of 60 inches or more. The profile is slightly acid throughout. Some places have a loam surface layer.

Included in this map unit are a few small areas of Arnold loamy sand and Briones loamy sand. Also included are a few areas that have slopes of less than 9 percent or more than 15 percent.

Permeability of this Elder soil is moderately rapid, and the available water capacity is moderate or high. Surface runoff is medium, and the hazards of water erosion and soil blowing are moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland. Some areas are used for urban development.

This soil is well suited to rangeland. Because of the sandy loam texture, however, it is subject to gully erosion. This is especially a problem during years of high rainfall because of channeling from upslope runoff. Surface moisture is depleted rather rapidly, making the germination of annuals difficult. This also influences a relatively short period of quality forage. These hazards increase the importance of maintaining a permanent plant cover. This soil typically is open grassland with individual live oaks. The major forage is annuals, including burclover and other annual legumes. Perennial forage plants, such as purple needlegrass and Australian saltbush, are locally common. Undesirable plants include cocklebur, verbena, coyotebush, and California sagebrush.

Some areas of this soil are used for homesite development. The slope and the moderately rapid permeability can require that septic tank absorption fields be placed on the contour and be larger than normal. Foundation and footing design can require modification or building site grading to compensate for slope. Terraces and diversions, if constructed from this material, are subject to piping. This can be corrected by careful placement of material and by maintaining a high degree of compaction and moisture control. Also, a close spacing can be required because of the slope. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of slope and the water erosion hazard, sprinkler or drip methods of irrigation are best suited to these soils. Maintaining a permanent plant cover at all times reduces the soil blowing hazard.

This Elder soil is in capability units IIIe-1 (14), irrigated and nonirrigated.

138—Elder sandy loam, occasionally flooded, 0 to 2 percent slopes. This very deep, well drained, nearly level soil is on alluvial fans and flood plains. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow and range from 10 to 150 acres. Small channels or gullies are sometimes present. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 12 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 200 to 300 days, depending on location.

Typically, the surface layer is dark gray sandy loam about 12 inches thick. The underlying material is brown and dark grayish brown sandy loam to a depth of 60 inches or more. The profile is slightly acid throughout. Some small areas of this soil have a loam surface layer, and other areas are shaly.

Included in this map unit are a few small areas of Corralitos sand.

Permeability of this Elder soil is moderately rapid, and the available water capacity is moderate or high. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more. This soil is subject to brief flooding during moderate or severe storms.

Most areas of this soil are used for hay crops and pasture. Some areas are used as rangeland.

This soil is well suited to hay crops and pasture. When dryfarmed, proper tillage and crop residue utilization help to maintain soil tilth and structure and reduce the hazard of soil blowing. Pastures should be managed to include ample drying periods after irrigation and after flooding. Structural measures, such as drainage ditches and water diversions, should be considered to reduce the flooding hazard.

This soil is moderately suited to rangeland. It is subject to soil deposition. This is especially a problem during years of high rainfall because of the sediment load from upslope runoff. Surface moisture is rapidly depleted, making germination of annuals difficult. The soil produces quality forage for short periods. The hazards increase the importance of maintaining a permanent plant cover. Most areas of this soil have been cultivated and are without perennial cover. This soil typically is open grassland, with water-loving plants, such as willows and coyotebush, in areas of higher available water, such as swales and drainageways. These wetland areas are important because they are unique plant and wildlife areas. The major forage is annuals, including burclover and other annual legumes. Perennial forage plants, such as purple needlegrass and saltgrass, are locally abundant. Undesirable plants include cocklebur, California saltbush, coyotebush, and California sagebrush.

Because this soil is subject to flooding, community development and most other engineering practices must be protected from damaging overflow. Embankments, dikes, and levees, if constructed of this material, are subject to piping. This can be corrected by careful placement of material and by maintaining a high degree of compaction and moisture control. Maintaining a permanent plant cover at all times reduces the soil blowing hazard.

This Elder soil is in capability units IIw-2 (14), irrigated and IIIw-2 (14), nonirrigated.

139—Elder sandy loam, occasionally flooded, 2 to 9 percent slopes. This very deep, well drained, gently sloping and moderately sloping soil is on alluvial fans and flood plains. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow and range from 10 to 150 acres. Small channels or gullies are sometimes present. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 12 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 200 to 300 days, depending on location.

Typically, the surface layer is dark gray sandy loam about 12 inches thick. The underlying material is brown and dark grayish brown sandy loam to a depth of 60 inches or more. The profile is slightly acid throughout. A few places have a loam surface layer, and other places are shaly.

Included in this map unit are a few small areas of Corralitos sand.

Permeability of this Elder soil is moderately rapid, and the available water capacity is moderate or high. Surface runoff is slow or medium. The hazard of water erosion is slight or moderate, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or

more. This soil is subject to brief flooding during moderate or severe storms.

Most areas of this soil are used as rangeland or for hay crops.

This soil is well suited to hay crops and pasture. When dryfarmed, proper tillage and crop residue utilization help to maintain soil tilth and structure and reduce the hazard of soil blowing. Pasture should be managed to include stock rotation to allow ample drying periods after irrigation and after flooding. Structural measures, such as drainage ditches and water diversions, can help to reduce the flooding hazard.

This soil is moderately suited to rangeland. It is subject to soil deposition. This is especially a problem during years of high rainfall because of the sediment load from upslope runoff. Surface moisture is rapidly depleted, making the germination of annuals difficult. This soil produces quality forage for short periods. The hazards increase the importance of maintaining a permanent plant cover. Many areas of this soil have been cultivated and are without perennial cover. This soil typically is open grassland with water-loving plants, such as willows and coyotebush, in areas of swales and drainageways. These wetland areas are important because they are unique plant and wildlife areas. The major forage is annuals, including burclover and other annual legumes. Perennial forage plants, such as purple needlegrass and saltgrass, are locally abundant. Undesirable plants include cocklebur, California saltbush, coyotebush, and California sagebrush.

Because this soil is subject to flooding, community development and most other engineering practices should be protected from damaging overflow. Embankments, dikes, and levees, if constructed of this material, are subject to piping. This can be corrected by careful placement of material and by maintaining a high degree of compaction and moisture control. Because of the slope and the erosion hazard, sprinkler or drip methods of irrigation are best suited to this soil. Maintaining a permanent plant cover at all times reduces the soil blowing hazard.

This Elder soil is in capability units IIw-2 (14), irrigated and IIIw-2 (14), nonirrigated.

140—Garey sandy loam, 2 to 9 percent slopes. This very deep, well drained, gently sloping and moderately sloping soil is on old stabilized sand dunes. It formed in windblown deposits. Areas are irregular in shape and range from 50 to 600 acres. The natural vegetation is mainly annual grasses with minor areas of brush. Elevation ranges from 200 to 1,000 feet. The average annual precipitation is about 15 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 220 to 300 days, depending on location.

Typically, the surface layer is brown and pale brown sandy loam 36 inches thick. The upper part of the subsoil is brown loam to a depth of 64 inches. The lower part to a depth of 75 inches is light yellowish brown loamy sand. Strata of finer textured material are common below a depth of 36 inches. The profile is medium acid in the surface layer and becomes neutral as depth increases. In places, this soil has a loamy sand surface layer.

Included in this map unit are a few small areas of Oceano sand. Oceano soil differs from Garey soil by being somewhat excessively drained. Also included are a few areas of Garey soils on slopes of more than 9 percent.

Permeability of this Garey soil is moderately slow, and the available water capacity is moderate. Surface runoff is slow or medium. The hazard of water erosion is slight or moderate, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland.

This soil is well suited to rangeland. Because of the sandy loam texture, however, the soil is subject to gully erosion. This is especially a problem during years of high rainfall because of channeling from upslope runoff. Surface moisture is rapidly depleted, making the germination of annuals difficult. This soil produces quality forage for short periods. The hazards of water erosion and soil blowing increase the importance of maintaining a permanent plant cover. This soil typically is open grassland. The major forage is annuals, including burclover and other annual legumes. Perennial forage plants, such as purple needlegrass, are locally common. Undesirable plants include cocklebur, verbena, coyotebush, and California sagebrush.

Urban development is increasingly important on areas of this soil. If the soil is used for septic tank absorption fields, the absorption lines should be placed below the moderately slow permeable layer. Increasing the size of the absorption area helps to compensate for the moderately slow permeability. If sewage lagoons or pond reservoir areas are located on this soil, seepage is the main limitation. This can be corrected by sealing. Seepage and piping are the main limitations if this soil is used for embankments, dikes, and levees. Careful placement of material, a high degree of compaction and moisture control, and the use of imported material are sometimes required. Because this soil is susceptible to water erosion and soil blowing, a permanent plant cover should be maintained at all times. A permanent, low-rate-of-application irrigation system is needed because the soil is droughty. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the erosion hazard and droughtiness, sprinkler or drip methods of irrigation are best suited to this soil.

This Garey soil is in capability units IIe-1 (14), irrigated and IIIe-1 (14), nonirrigated.

141—Gaviota sandy loam, 50 to 75 percent slopes. This shallow, well drained, very steep soil is on

mountains (see fig. 12). It formed in residual material weathered from sandstone. Areas are irregular in shape and range from 20 to 350 acres. The natural vegetation is mainly brush, scattered hardwoods, and annual grasses and forbs. Elevation ranges from 250 to 3,000 feet. The average annual precipitation ranges from 16 to 28 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 250 to 350 days, depending on location.

Typically, the surface layer is light brownish gray fine sandy loam 13 inches thick. This is underlain directly by hard sandstone. The profile is slightly acid or neutral. Some minor areas have a loamy sand surface layer or contain higher amounts of organic matter and are medium acid throughout the profile.

Included in this map unit are a few small areas of Briones and Pismo loamy sands and Lopez very shaly clay loam.

Permeability of this Gaviota soil is moderately rapid, and the available water capacity is very low. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 10 to 20 inches.

Most areas of this soil are used as rangeland or watershed.

This soil is poorly suited to rangeland. Coarse texture, shallow depth, and steep slopes make this droughty soil subject to sheet and gully erosion. The characteristic dense stand of old growth brush with small amounts of grasses and forbs does not adequately protect against soil erosion and is susceptible to wildfire. Old growth brush provides poor habitat for wildlife and is a barrier to movement of livestock and big game animals. Normally, wildfires on this soil are extremely hot and destroy the vegetation. This is the main cause of accelerated soil erosion. Following a cool fire or controlled burn, an area is most productive and can provide a combination of grass, browse, fruit, and cover for wildlife and livestock. Brushland management and properly engineered fuel breaks and access roads are necessary to limit wildfires and soil erosion. The natural terrain barriers associated with this soil should be utilized as livestock management area boundaries. The major browse species are buckbrush, California coffeeberry, toyon, and deerweed. Undesirable plants include chamise and black sage.

Homesite development and most other engineering practices require special design considerations because of the slope, erosion hazard, and shallow depth to rock. Road construction should include runoff and sediment control structures, minimum grading, and establishment of permanent plant cover on side slopes. Foundation and footing designs may need to be modified or building site grading may be necessary to compensate for slope. Septic tank absorption fields should be installed on the contour and the trench lines lengthened to compensate for slope and shallow depth to rock.

This Gaviota soil is in capability subclass VIIe (15), nonirrigated.

142—Gaviota fine sandy loam, 15 to 50 percent slopes. This shallow, well drained, moderately steep and steep soil is on foothills and mountains (see fig. 12). It formed in residual material weathered from sandstone. Areas are irregular in shape and range from 20 to 350 acres. The natural vegetation is mainly brush, scattered hardwoods, and annual grasses and forbs. Elevation ranges from 250 to 3,000 feet. The average annual precipitation ranges from 16 to 28 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is light brownish gray fine sandy loam 13 inches thick. This is underlain directly by hard sandstone. The profile is slightly acid or neutral. Some minor areas have a loamy sand surface layer.

Included in this map unit are a few small areas of Briones and Pismo loamy sands. Also included are small areas of a similar soil that contains higher amounts of organic matter and areas that are medium acid throughout the profile.

Permeability of this Gaviota soil is moderately rapid, and the available water capacity is very low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 10 to 20 inches.

Most areas of this soil are used as rangeland. A few small areas are used for urban development.

This soil is poorly suited to rangeland. Coarse texture, shallow depth, and steep slopes make this droughty soil subject to sheet and gully erosion. The characteristic dense stand of old growth brush with small amounts of grasses and forbs does not adequately protect against soil erosion and is susceptible to wildfire. Old growth brush provides poor habitat for wildlife and is a barrier to movement of livestock and big game animals. Normally, wildfires on this soil are extremely hot and destroy the vegetation. This is the main cause of accelerated soil erosion. Following a cool fire or controlled burn, an area is most productive and can provide a combination of grass, browse, fruit, and cover for wildlife and livestock. Brushland management and properly engineered fuel breaks and access roads are necessary to limit wildfires and soil erosion. The natural terrain barriers associated with this soil should be utilized as livestock management area boundaries. The major browse species are buckbrush, California coffeeberry, toyon, and deerweed. Undesirable plants include chamise and black sage.

Homesite development is increasingly important on this soil. However, because of the slope, erosion hazard, and depth to rock, most engineering practices require special design considerations. Road construction should include runoff and sediment control structures, minimum grading, and establishment of permanent plant cover on side slopes. Foundation and footing designs may need

to be modified or building site grading may be necessary to compensate for slope. Septic tank absorption fields should be installed on the contour and trench lines lengthened to compensate for slope and shallow depth to rock.

This Gaviota soil is in capability subclass VIIe (15), nonirrigated.

143—Gazos-Lodo clay loams, 15 to 30 percent slopes. These moderately steep soils are on foothills and mountains. Areas are irregular in shape and range from 50 to 300 acres. The natural vegetation is mainly annual grasses and forbs or brush with scattered hardwoods. Elevation ranges from 300 to 2,000 feet. The average annual precipitation ranges from 15 to 28 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 250 to 350 days, depending on location.

This complex is about 45 percent Gazos soil and 40 percent Lodo soil. Lodo soil differs from Gazos soil by being shallow and somewhat excessively drained.

Included in this complex are a few small areas of Diablo and Cibo clays, Los Osos loam, and soils similar to Gazos soil that are deep. Also included are areas of Lompico and McMullin loams. Included areas make up about 15 percent of the total acreage.

The Gazos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown clay loam about 11 inches thick. The underlying material is grayish brown and brown clay loam to a depth of 30 inches. Hard, fractured sandstone is at a depth of about 30 inches.

Permeability of the Gazos soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 22 to 38 inches.

The Lodo soil is shallow and somewhat excessively drained. It formed in residual material weathered from red rock, sandstone, or shale. Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain directly by hard, fractured sandstone.

Permeability of the Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The clay loam surface layer is subject to sheet and gully erosion and soil compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain on the steeper slopes. Because it is shallower, the Lodo soil has less available water capacity and less average plant production. The Lodo soil is often overgrazed while the Gazos soil is still underutilized. Proper placement of livestock watering facilities and salt promotes good distribution of grazing. The major forage plants are annuals, including burclover. Purple needlegrass and, in the drier areas, foothill needlegrass are locally abundant perennial forage grasses. Because of the shallowness of the Lodo soil, plants mature earlier, becoming dry and flammable. Dense stands of chamise often dominate both soils, indicating a history of fire. Undesirable plants, which indicate soil disturbance, are black sage, California sagebrush, and tarweed. Stock trails through dense stands of brush can improve grazing distribution by providing better access to forage.

In some areas, these soils are used for rural homesite development. However, because of the moderately steep slopes, low strength, moderately slow and slow permeability, and depth to rock, urban development and most other engineering practices require special design considerations. When installing septic tank absorption fields, choose areas that have lesser slopes and the deepest soils, place absorption lines on the contour, and increase the size of the absorption field. Building site and local road and street designs should include measures to prevent erosion, such as minimum grading, installing runoff and sediment control structures, and the establishment of a permanent plant cover on the side slopes.

The Gazos and Lodo soils in this complex are in capability unit IVe-1 (15), nonirrigated.

144—Gazos-Lodo clay loams, 30 to 50 percent slopes. These steep soils are on foothills and mountains. Areas are irregular in shape and range from 50 to 300 acres. The natural vegetation is mainly annual grasses and forbs or brush with scattered hardwoods. Elevation ranges from 300 to 2,000 feet. The average annual precipitation ranges from 15 to 28 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 250 to 350 days, depending on location.

This complex is about 45 percent Gazos soil and 40 percent Lodo soil. Lodo soil differs from Gazos soil by being shallow and somewhat excessively drained.

Included in this complex are a few small areas of Diablo and Cibo clays, Los Osos loam, and soils similar to Gazos soil that are deep. Also included are areas of Lompico and McMullin loams. Included areas make up about 15 percent of the total acreage. At the San Luis Obispo-Monterey county line, this complex matches with the Monterey survey's Millsholm-Gazos complex. The Millsholm soil differs from Lodo soil by having lighter colors. Millsholm soil is not extensive enough to be included as a named soil in this survey.

The Gazos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown clay loam about 11 inches thick. The underlying material is grayish brown and brown clay loam 19 inches thick. Hard, fractured sandstone is at a depth of about 30 inches.

Permeability of the Gazos soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 22 to 38 inches.

The Lodo soil is shallow and somewhat excessively drained. It formed in residual material weathered from red rock, sandstone, or shale. Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain directly by hard, fractured sandstone.

Permeability of the Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The clay loam surface layer is subject to sheet and gully erosion and soil compaction. These problems can be reduced if the grazing is restricted when the surface is wet or moist and by allowing greater amounts of plant residue to remain on the surface. Because it is shallower, the Lodo soil has less available water capacity and less average plant production. The Lodo soil is often overgrazed while the Gazos soil is still underutilized. Proper placement of livestock watering facilities and salt promotes good distribution of grazing. The major forage plants are annuals, including burclover. Purple needlegrass and, in the drier areas, foothill needlegrass are locally abundant perennial forage grasses. Because of the shallowness of the Lodo soil, plants mature earlier and become dry and flammable. Dense stands of chamise often dominate both soils, indicating a history of fire. Undesirable plants, which indicate soil disturbance, are black sage, California sagebrush, and tarweed. Stock trails through dense stands of brush can improve grazing distribution by providing better access to forage.

In a few areas, these soils are used for rural homesite development. However, because of the steep slopes, low strength, moderately slow and slow permeability, and depth to rock, urban development and most other engineering practices require special design considerations. The cuts needed to provide relatively level building sites can expose bedrock. Septic tank absorption fields do not function properly on these soils. Septic tank absorption lines should be installed on the contour. The use of sandy backfill for the trench and long absorption lines helps to compensate for the moderately slow and slow permeability and the depth to rock. An alternative method of waste disposal would be connecting to a community disposal system. Road design should include measures to decrease water erosion, such as minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on the side slopes.

The Gazos and Lodo soils in this complex are in capability subclass VIe (15), nonirrigated.

145—Gazos-Lodo clay loams, 50 to 75 percent slopes. These very steep soils are on mountains. Areas are irregular in shape and range from 50 to 300 acres. The natural vegetation is mainly annual grasses and forbs, brush, and scattered hardwoods. Elevation ranges from 300 to 2,000 feet. The average annual precipitation ranges from 15 to 28 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 250 to 350 days, depending on location.

This complex is about 45 percent Gazos soil and 40 percent Lodo soil. Lodo soil differs from Gazos soil by being shallow and somewhat excessively drained.

Included in this complex are a few small areas of Diablo and Cibo clays, Los Osos loam, and soils that are similar to Gazos soil but are deep. Also included are areas of Lompico and McMullin loams under a dense canopy of hardwoods. Included areas make up about 15 percent of the total acreage. At the San Luis Obispo-Monterey county line, this complex matches with the Monterey survey's Millsholm-Gazos complex. The Millsholm soil differs from Lodo soil by having lighter colors. Millsholm soil is not extensive enough to be included as a named soil in this survey.

The Gazos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown clay loam about 11 inches thick. The underlying material is grayish brown and brown clay loam 19 inches thick. Hard, fractured sandstone is at a depth of about 30 inches.

Permeability of the Gazos soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 22 to 38 inches.

The Lodo soil is shallow and somewhat excessively drained. It formed in residual material weathered from red rock, sandstone, or shale. Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain directly by hard, fractured sandstone.

Permeability of the Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of these soils are used as rangeland or watershed.

These soils are poorly suited to rangeland. Because of the clay loam surface layer and very steep slopes, these soils are subject to sheet and gully erosion and soil compaction. These problems can be reduced by grazing when surface layer is moderately dry and by allowing greater amounts of plant residue to remain on the surface. Because it is shallower, the Lodo soil has less available water capacity and less average plant production. The Lodo soil is often overgrazed while the Gazos soil is still underutilized. Proper placement of

livestock watering facilities and salt promotes good distribution of grazing. The major forage plants are annuals. Purple needlegrass and, in the drier areas, foothill needlegrass are locally abundant perennial forage grasses. Because of the shallowness of the Lodo soil, plants mature earlier and become dry and flammable. Dense stands of chamise often dominate both soils, indicating a history of fire. Undesirable plants, which indicate soil disturbance, are black sage, California sagebrush, and tarweed. Stock trails through dense stands of brush can improve grazing distribution by providing better access to forage.

Most engineering practices require special design considerations because of the very steep slopes. Road design should include measures to decrease erosion, such as minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on the side slopes.

The Gazos and Lodo soils in this complex are in capability subclass VIIe (15), nonirrigated.

146—Henneke-Rock outcrop complex, 15 to 75 percent slopes. This moderately steep to very steep soil is on foothills and mountains (see fig. 10). Areas are irregular in shape and range from 15 to 1,200 acres. The natural vegetation is mainly brush, annual grasses, and perennial grasses with a few scattered hardwoods or conifers (see fig. 11). Elevation ranges from 1,000 to 3,000 feet. The average annual precipitation ranges from 18 to 35 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 200 to 250 days, depending on location.

This complex is about 45 percent Henneke soil and 35 percent Rock outcrop.

Included in this complex are a few small areas of Obispo clay and a deep soil similar to Henneke soil. Included areas make up about 20 percent of the total acreage.

The Henneke soil is shallow and somewhat excessively drained. It formed in residual material weathered from serpentine. Typically, the surface layer is reddish brown very cobbly clay loam about 8 inches thick. The subsoil is dark reddish brown very cobbly clay about 11 inches thick. This is underlain by hard serpentine rock at a depth of about 19 inches (fig. 13).

Permeability of this Henneke soil is moderately slow, and the available water capacity is very low. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 10 to 20 inches.

The Rock outcrop is hard serpentine that is exposed or near the soil surface.

Most areas of this complex are used as rangeland, watershed, and wildlife habitat.

This complex is poorly suited to rangeland. Because of the clay loam surface layer and steep to very steep slopes, the soil is subject to sheet erosion. The exposed

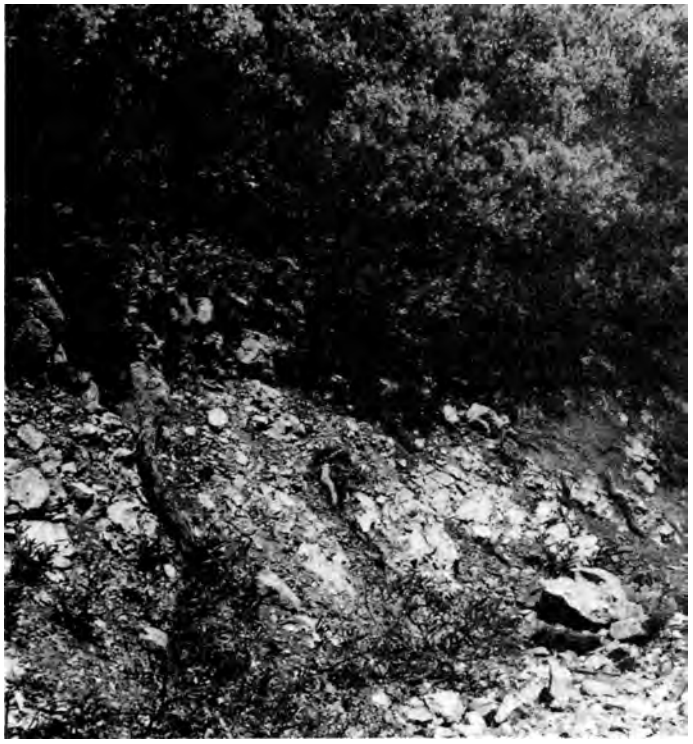

Figure 13.—A profile of Henneke soil in an area of Henneke-Rock outcrop complex, 15 to 75 percent slopes

cobbles and Rock outcrop hinder livestock movement and increase the hazard of soil erosion. The rocks prevent water infiltration, increasing the amount of surface runoff. Natural terrain barriers should be utilized as management area boundaries. The serpentine parent material causes a calcium-magnesium imbalance, which prevents the normal growth of many plants. The forage produced on this soil is often of low palatability. The major forage plants are perennial grasses, including squirreltail and purple needlegrass. Shrubs, such as leather oak and manzanita, and forage, such as mast and berries, provide wildlife cover and forage. Wildfire is a hazard because the shrubs are often in dense stands. Properly engineered access roads and fuel breaks can improve livestock distribution, reducing the hazards of soil erosion and wildfire. Undesirable plants include locoweed and tocalote.

Most engineering practices require special design considerations because of slope, depth to rock, and large stones. Septic tank absorption fields should be installed on the contour. Increasing the size of the absorption field helps to compensate for the shallow depth and large stones. The placement of absorption fields may not be possible because of the high cobble content. Excavations for foundations and roads can be protected from erosion by minimum grading, using runoff

and sediment control structures, and establishing a permanent plant cover on side slopes. The base material may also need to be replaced with a more suitable material.

This complex is in capability subclass VIIe (15), nonirrigated.

147—Lodo clay loam, 5 to 15 percent slopes. This shallow, somewhat excessively drained, moderately sloping and strongly sloping soil is on foothills and mountains. It formed in residual material weathered from red rock, shale, or sandstone. Areas are irregular in shape and range from 5 to 150 acres. The natural vegetation is mainly brush, annual grasses, and forbs. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 250 to 365 days, depending on location.

Typically, the surface layer is dark brown clay loam about 12 inches thick. It is underlain directly by fractured, hard sandstone. In places, this soil has a sandy loam or loam surface layer and contains as much as 35 percent gravel.

Included in this map unit are a few small areas of Cibo clay, Diablo clay, Gazos clay loam, and Los Osos loam.

Permeability of this Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 6 to 20 inches.

Most areas of this soil are used as rangeland. Some areas are used for urban development.

This soil is moderately suited to rangeland. The clay loam surface layer is subject to gully erosion and soil compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by maintaining adequate plant residue on the soil surface. The major forage plants are annuals, including burclover. Purple needlegrass, a perennial forage grass, is locally abundant. Because the soil is shallow and frequently overgrazed, such shrubs as California sagebrush and coyotebush become established. Undesirable plants, which indicate soil disturbance, are black sage, tocalote, and tarweed. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Some areas are becoming increasingly important for homesite development. Special design considerations may be required, however, for foundations and footings because of the shallow depth to rock. Septic tank absorption fields do not function properly on this soil. Septic tank absorption lines should be placed on the contour. Using sandy backfill for the trench and long absorption lines helps to compensate for the depth to rock. An alternative method of disposal should be selected. If areas are to be landscaped, topsoil may need to be imported. Excavation for local road and street construction is difficult because of the hard, fractured underlying rock. Erosion can be minimized if minimum grading and runoff and sediment control structures are used and a permanent plant cover is established on side slopes.

This Lodo soil is in capability unit IVe-1 (15), nonirrigated.

148—Lodo clay loam, 15 to 30 percent slopes. This shallow, somewhat excessively drained, moderately steep soil is on foothills and mountains. It formed in residual material weathered from red rock, shale, or sandstone. Areas are irregular in shape and range from 5 to 150 acres. The natural vegetation is mainly brush and annual grasses and forbs. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is 59 degrees F. The average frost-free season ranges from 250 to 365 days, depending on location.

Typically, the surface layer is dark brown clay loam about 12 inches thick. It is underlain directly by fractured, hard sandstone. Some small areas of this soil have a sandy loam or loam surface layer and contain as much as 35 percent gravel. Some minor areas have softer underlying rock than is typical for the series.

Included in this map unit are small areas of Cibo clay, Diablo clay, Gazos clay loam, and Los Osos loam.

Permeability of this Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. The clay loam surface layer is subject to sheet and gully erosion and soil compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by maintaining adequate plant residue on the soil surface. The major forage plants are annuals, including burclover. Purple needlegrass, a perennial forage grass, is locally abundant. Because the soil is shallow and frequently overgrazed, such shrubs as California sagebrush and coyotebush become established. Undesirable plants, which indicate soil disturbance, are black sage, tocalote, and tarweed. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Homesite development and most other engineering practices require special design considerations because of the slope and shallow depth to rock. Septic tank absorption fields do not function properly because of the slope and the shallow depth to rock. If they are to be used, inclusions of Gazos soils and less sloping areas should be used as absorption field areas, or absorption lines should be placed on the contour. Using sandy backfill for the trench and long absorption lines helps to compensate for the depth to rock. Excavation for road construction is difficult because of the slope and hard,

fractured underlying rock. Erosion can be minimized if minimum grading and runoff and sediment control structures are used and a permanent plant cover is established on side slopes.

This Lodo soil is in capability subclass VIe (15), nonirrigated.

149—Lodo clay loam, 30 to 50 percent slopes. This shallow, somewhat excessively drained, steep soil is on foothills and mountains. It formed in residual material weathered from red rock, shale, or sandstone. Areas are irregular in shape and range from 5 to 150 acres. The natural vegetation is mainly brush and annual grasses and forbs. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 250 to 365 days, depending on location.

Typically, the surface layer is dark brown clay loam about 12 inches thick. It is underlain directly by fractured, hard sandstone. Some small areas of this soil have a sandy loam or loam surface layer and contain as much as 35 percent gravel. Some minor areas have softer underlying rock than is typical for the series.

Included in this map unit are a few small areas of Cibo clay, Diablo clay, Gazos clay loam, and Los Osos loam.

Permeability of this Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. The clay loam surface layer is subject to sheet and gully erosion and soil compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain. The major forage plants are annuals, including burclover. Purple needlegrass and, in the drier areas, foothill needlegrass are locally abundant perennial forage grasses. Because the soil is shallow, plants tend to mature early and become dry and flammable. Dense stands of chamise often dominate this soil following fire. Undesirable plants, which indicate soil disturbance, are black sage, California sagebrush, and tarweed. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Most engineering practices require special design considerations because of the steep slopes and shallow depth to rock. Road construction and other excavations should include runoff and sediment control structures and minimum grading. A more suitable base material may need to be brought in from an outside source. Because of the high erosion hazard, a permanent plant cover should be maintained at all times.

This Lodo soil is in capability subclass VIe (15), nonirrigated.

150—Lodo clay loam, 50 to 75 percent slopes. This shallow, somewhat excessively drained, very steep soil is on foothills and mountains. It formed in residual material weathered from red rock, shale, or sandstone. Areas are irregular in shape and range from 5 to 150 acres. The natural vegetation is mainly brush with a few areas of annual grasses and forbs. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 250 to 365 days, depending on location.

Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain directly by fractured, hard sandstone. Some small areas of this soil have a sandy loam or loam surface layer and contain as much as 35 percent gravel.

Included in this map unit are a few small areas of Cibo clay, Diablo clay, Gazos clay loam, and Los Osos loam.

Permeability of this Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of this soil are used as rangeland.

This soil is poorly suited to rangeland. Because of the clay loam surface layer and steep slopes, this soil is subject to sheet and gully erosion and soil compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain. Uniform utilization is difficult because of the very steep slopes. Properly engineered access roads and proper placement of livestock watering facilities and salt promote good distribution of grazing. The major forage plants are annuals. Purple needlegrass and, in the drier areas, foothill needlegrass are locally abundant perennial forage grasses. Because the soil is shallow, plants mature early and become dry and flammable. Dense stands of chamise often dominate this soil following fire. Undesirable plants, which indicate soil disturbance, are black sage, California sagebrush, and tarweed. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Most engineering practices require special design considerations because of the steep slopes and shallow depth to rock. Road construction and other excavations should include runoff and sediment control structures and minimum grading. A more suitable base material may need to be brought in from an outside source. Because of the high erosion hazard, a permanent plant cover should be maintained at all times.

This Lodo soil is in capability subclass VIIe (15), nonirrigated.

151—Lodo-Rock outcrop complex, 9 to 30 percent slopes. This strongly sloping and moderately steep soil is on foothills and mountains (fig. 14). Areas are irregular

in shape and range from 10 to 330 acres. The natural vegetation is mainly annual grasses and brush. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 250 to 365 days, depending on location.

This complex is about 55 percent Lodo soil and 40 percent Rock outcrop.

Included in this complex are a few small areas of Chamise shaly loam, Gaviota sandy loam, Lopez very shaly clay loam, and Santa Lucia shaly clay loam. Also included, in the northern part of the survey area, are Cieneba, Lompico, and McMullin loams. Included areas make up about 5 percent of the total acreage.

The Lodo soil is shallow and somewhat excessively drained. It formed in residual material weathered from red rock, sandstone, or shale. Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain by hard, fractured sandstone.

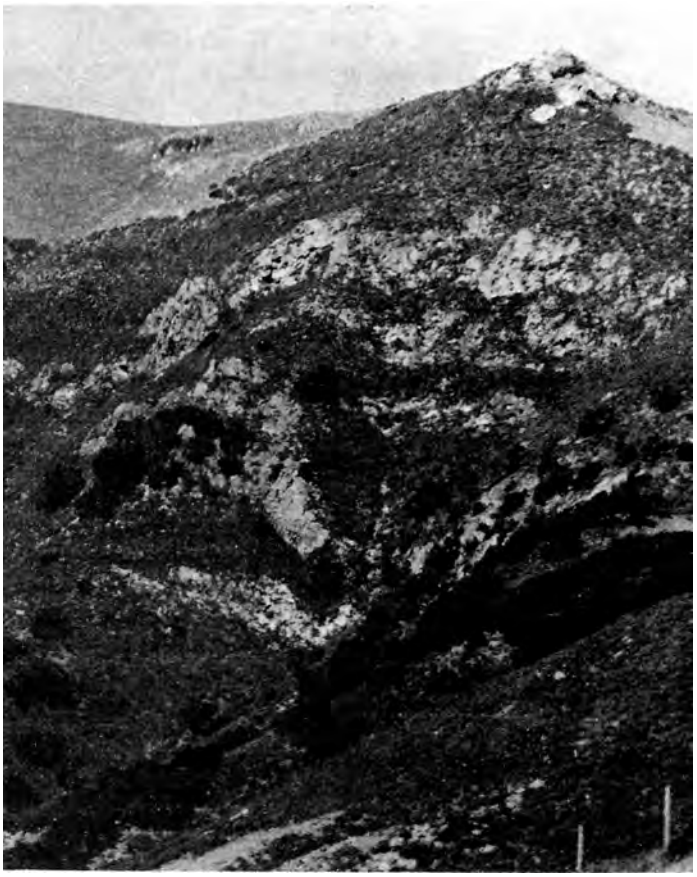

Figure 14.—A typical view of an area of Lodo-Rock outcrop complex.

Permeability of this Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is medium or rapid, and the hazard of water erosion is moderate or high. The effective rooting depth ranges from 6 to 20 inches.

The Rock outcrop is hard sandstone, red rock, or shale at or near the soil surface.

Most areas of this complex are used as rangeland.

This complex is moderately suited to rangeland. The clay loam surface layer is subject to sheet erosion and soil compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain on the surface. Uniform forage utilization is difficult because of the Rock outcrop, which concentrates or channels the flow of livestock traffic. The major forage plants are annuals, including burclover. Browse and wildlife cover, such as coyotebush, California coffeeberry, and California sagebrush, are common in the very shallow areas among the Rock outcrop. Purple needlegrass is a locally abundant perennial forage grass. Because it is shallow, this soil is often overgrazed, allowing such shrubs as California sagebrush and coyotebush to become established. Undesirable plants, which indicate soil disturbance, are black sage, tocalote, and tarweed. Livestock grazing should be managed so that the desired balance of plant species is maintained. Properly engineered access roads and proper placement of livestock watering facilities and salt promotes good distribution of grazing.

Homesite development and most other engineering practices require special design considerations because of the slope, depth to rock, and the presence of Rock outcrop. Septic tank absorption fields do not function properly because of the slope and the shallowness of the soil. The absorption field trench lines should be placed on the contour and enlarged. Local road and street construction is difficult because of the depth to rock and the quantity of Rock outcrop. Erosion can be reduced if minimum grading and runoff and sediment control structures are used and a permanent plant cover is established on side slopes.

This complex is in capability subclass VIe (15), nonirrigated.

152—Lodo-Rock outcrop complex, 30 to 75 percent slopes. This steep and very steep soil and Rock outcrop are on foothills and mountains (see fig. 14). Areas are irregular in shape and range from 10 to 330 acres. The natural vegetation is mainly brush with a few areas of annual grasses. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 250 to 365 days, depending on location.

This complex is about 55 percent Lodo soil and 40 percent Rock outcrop.

Included in this map unit are a few small areas of Chamise shaly loam, Gaviota sandy loam, Lopez very shaly clay loam, and Santa Lucia shaly clay loam. Also included in the northern part of the survey area are Cieneba loam, Lompico loam, and McMullin loam. Included areas make up about 5 percent of the total acreage. At the San Luis Obispo-Monterey county line, a small area of this complex matches with Monterey's McMullin-Plaskett complex. A natural vegetation break occurs where these two complexes meet. The McMullin-Plaskett complex has a denser vegetative cover and a cooler soil temperature than the Lodo-Rock outcrop complex. These complexes are similar in most other respects.

The Lodo soil is shallow and somewhat excessively drained. It formed in residual material weathered from red rock, sandstone, or shale. Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain by hard, fractured sandstone.

Permeability of this Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 6 to 20 inches.

The Rock outcrop is hard sandstone, red rock, or shale at or near the surface.

Most areas of this map unit are used as rangeland.

This complex is poorly suited to rangeland. Because of its clay loam surface layer and steep slopes, the Lodo soil is subject to sheet erosion and soil compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain on the surface. Uniform forage utilization is difficult because the steep slopes and Rock outcrop concentrate or channel the flow of livestock traffic. The major forage plants are annuals. Browse and wildlife cover, such as coyotebush, California coffeeberry, and California sagebrush, are common in the very shallow areas among the Rock outcrop. Purple needlegrass and, in the driest areas, foothill needlegrass are locally abundant perennial forage grasses. Because the soil is shallow, plants tend to mature early and become dry and flammable. Dense stands of chamise often dominate the soil following fire. Undesirable plants, which indicate soil disturbance, are black sage, California sagebrush, and locatote. Livestock grazing should be managed so that the desired balance of plant species is maintained. Properly engineered access roads and proper placement of livestock watering facilities and salt promote good distribution of grazing.

Most engineering practices require special design considerations because of the steep and very steep slopes, shallow depth to rock, and presence of Rock outcrop. Because of the high or very high erosion hazard, a permanent plant cover should be maintained at all times.

This complex is in capability subclass VIIe (15), nonirrigated.

153—Lompico-McMullin loams, 15 to 30 percent slopes. These moderately steep soils are on foothills and mountains. Areas are irregular in shape and range from 30 to 310 acres. The natural vegetation is mainly hardwoods with small areas of annual grasses and forbs. Elevation ranges from 400 to 3,000 feet. The average annual precipitation ranges from 25 to 45 inches, and the average annual air temperature ranges from 54 to 57 degrees F. The frost-free season ranges from 250 to 300 days, depending on location.

This complex is about 45 percent Lompico soil and 20 percent McMullin soil. Lompico soil differs from McMullin soil by being moderately deep to softer sandstone.

Included in this complex are minor areas of soils on lesser slopes, Gazos and Lodo clay loams, Los Osos loam, and Rock outcrop. Also included are soils that are similar to Lompico soil but differ by being very gravelly throughout, underlain by harder bedrock, or deeper to the bedrock; soils like McMullin soil that have soft bedrock; and areas that are very gravelly. Included areas make up about 35 percent of the total acreage.

The Lompico soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown loam about 17 inches thick. The underlying material to a depth of about 32 inches is light brownish gray loam. This lies directly over firm, fractured sandstone. Some areas have a sandy loam or clay loam surface layer that is 15 to 30 percent clay.

Permeability of this Lompico soil is moderate, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches.

The McMullin soil is shallow and somewhat excessively drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is grayish brown gravelly loam about 15 inches thick. This is underlain by fractured, hard sandstone. Some small areas have a sandy loam surface layer and contain as much as 35 percent gravel.

Permeability of the McMullin soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 12 to 20 inches.

Most areas of these soils are used for watershed. Some small areas are used as rangeland.

These soils are poorly suited to rangeland. Compaction, the erosion hazard, and a predominance of woody species are the main limitations. Compaction and the erosion hazard can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain on the soil surface.

Most areas of this map unit are in tree vegetation. However, if woody plants can be economically managed to create open areas, Lompico soil produces a good cover of desirable grasses and forbs. McMullin soil is too shallow and droughty to allow good forage production. Forage plants are annual grasses supplemented by burclover and other annual legumes. Woody plants include live oak, California-laurel, and toyon. Care should be taken to maintain a good plant cover that will protect this watershed area from erosion.

The Lompico soil is suited to live oak and California-laurel. A net volume of 3,722 cubic feet of wood fiber per acre has been measured on this soil. The main concern in producing and harvesting wood is erosion. Erosion control is essential.

Rural homesite development must take into consideration the shallow depth to rock of the McMullin soil and the slope and low strength of both soils. Septic tank absorption fields do not function properly on these soils. Trench lines should be placed on the contour, and the size of the filter field may need to be increased. Footing and foundation designs must be adapted to the slope. Because of the low strength, base material for local roads may need to be removed or covered with a more suitable material, or a high degree of compaction and moisture control must be maintained. Erosion can be reduced by minimum grading, using runoff and sediment control structures, and maintaining a permanent plant cover on side slopes.

The Lompico and McMullin soils in this complex are in capability unit IVe-1 (15), nonirrigated.

154—Lompico-McMullin loams, 30 to 75 percent slopes. These steep and very steep soils are on foothills and mountains. Areas are irregular in shape and range from 10 to 600 acres. The natural vegetation is mainly hardwoods with small areas of annual grasses or brush. Elevation ranges from 400 to 3,000 feet. The average annual precipitation ranges from 25 to 45 inches, and the average annual air temperature ranges from 54 to 57 degrees F. The frost-free season ranges from 250 to 300 days, depending on location.

This complex is about 45 percent Lompico soil and 20 percent McMullin soil. Lompico soil differs from McMullin soil by being moderately deep to softer sandstone.

Included in this complex are minor areas of Gazos clay loam, Los Osos loam, Lodo clay loam, and Rock outcrop. Also included are small areas of soils that are similar to Lompico soil but are deeper or underlain by harder rock and areas where the rock underlying McMullin soil is softer than is typical of the series. Some areas have soils that are similar to Lompico and McMullin soils but are very gravelly throughout. Included areas make up about 35 percent of the total acreage. At the San Luis Obispo-Monterey county line, this complex joins to the Monterey survey's Los Gatos map unit. The Los Gatos soil differs from Lompico soil by having a higher base saturation.

The Lompico soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown loam about 17 inches thick. The underlying material to a depth of about 32 inches is light brownish gray loam. This is underlain by firm, fractured sandstone. Some areas have a sandy loam or clay loam surface layer that is 15 to 30 percent clay.

Permeability of the Lompico soil is moderate, and the available water capacity is low or moderate. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 20 to 40 inches.

The McMullin soil is shallow and somewhat excessively drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is grayish brown gravelly loam about 15 inches thick. This is underlain by hard, fractured sandstone. Some small areas have a sandy loam surface layer and contain as much as 35 percent gravel.

Permeability of the McMullin soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 12 to 20 inches.

Most areas of these soils are used as watershed and wildlife habitat. Some small areas are used as rangeland.

These soils are poorly suited to rangeland. Compaction, the erosion hazard, and a predominance of woody plants are the main limitations. Compaction and the erosion hazard can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain on the soil surface. Most areas of this map unit are in tree vegetation. However, if woody plants can be economically managed to create open areas, Lompico soil produces a good cover of desirable grasses and forbs. McMullin soil is too shallow and droughty to allow good forage production. Forage plants consist of annual grasses supplemented by burclover and other annual legumes. Woody plants include live oak, California-laurel, and toyon. Care should be taken to maintain a good plant cover that will protect this watershed area from erosion.

The Lompico soil is suited to live oak and California-laurel. A net volume of 3,722 cubic feet of wood fiber per acre has been measured on this soil. The main concerns in producing and harvesting wood are erosion and the steep and very steep slopes. The steepness of slope limits the kind of equipment that can be used in woodland management. Erosion control is essential.

Rural homesite development and most other engineering practices require special design considerations because of the steep and very steep slopes, the erosion hazard, depth to rock, and low strength of these soils. Footing and foundation designs must be adapted to the slope. Septic tank absorption

fields do not function properly on these soils. Trench lines should be placed on the contour, and the size of the filter field may need to be increased. Road construction and other excavations should include runoff and sediment control structures and minimum grading. A more suitable base material may need to be brought in from an outside source.

The Lompico and McMullin soils in this complex are in capability subclass VIIe (15), nonirrigated.

155—Lopez very shaly clay loam, 9 to 30 percent slopes. This shallow, somewhat excessively drained, strongly sloping and moderately steep soil is on foothills and mountains. It formed in residual material weathered from hard shale. Areas are irregular in shape and range from 15 to 320 acres. The natural vegetation is mainly brush, annual grasses and forbs, and scattered hardwoods and Digger pine. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 16 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 210 to 300 days, depending on location.

Typically, the surface layer is gray very shaly clay loam about 18 inches thick. This is underlain by hard shale. Some small areas have a very shaly loam surface layer.

Included in this map unit are a few small areas of Lodo clay loam, Los Osos loam, Rock outcrop, and Santa Lucia very shaly clay loam.

Permeability of this Lopez soil is moderate, and the available water capacity is very low. Surface runoff is medium or rapid, and the hazard of water erosion is moderate or high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of this soil are used as rangeland.

This soil is poorly suited to rangeland. The very shaly clay loam surface layer is subject to sheet erosion, which increases the concentration of shale fragments on the soil surface. The shale fragments hinder both natural reseeding and range seeding. Some areas have been cleared for range use, and some areas have been cleared by wildfire and currently have barren areas of upturned strata of shale. The maintenance of adequate plant cover helps to control soil erosion. The major forage plants are annuals. Buckbrush is common and is browsed by both wildlife and livestock. Scattered areas of hardwoods consist of live oak. Wildfire is a hazard because dense brush stands of manzanita or chamise are common. Fire access roads and fuel management programs can reduce the extensiveness and damaging effects of wildfire and encourage livestock grazing in areas where access is limited. Undesirable plants include black sage and California sagebrush.

Some areas are increasingly important for homesite development. Special design considerations may be required because of the shallow depth to rock and slope. Septic tank absorption fields do not function properly on this soil. Absorption lines should be long and placed on the contour. An alternative method of waste disposal should be selected. If areas are to be landscaped, topsoil may need to be imported. Excavation for local road and street construction is difficult because of the hard, fractured underlying rock. Erosion can be reduced if minimum grading and runoff and sediment control structures are used and a permanent plant cover is established on side slopes.

This Lopez soil is in capability subclass VIIe (15), nonirrigated.

156—Lopez very shaly clay loam, 30 to 75 percent slopes. This shallow, somewhat excessively drained, steep and very steep soil is on mountains. It formed in residual material weathered from hard shale. Areas are irregular in shape and range from 10 to 3,500 acres. The natural vegetation is mainly brush, annual grasses and forbs, and scattered hardwoods. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 16 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 210 to 300 days, depending on location.

Typically, the surface layer is gray very shaly clay loam about 18 inches thick. This is underlain by hard shale. Some small areas have a very shaly loam surface layer.

Included in this map unit are a few small areas of Lodo clay loam, Los Osos loam, Rock outcrop, and Santa Lucia very shaly clay loam.

Permeability of this Lopez soil is moderate, and the available water capacity is very low. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of this soil are used as rangeland.

This soil is poorly suited to rangeland. Because of the very shaly clay loam surface layer and steep slopes, the soil is subject to sheet erosion, which increases the concentration of shale fragments on the soil surface. The shale fragments hinder both natural reseeding and range seeding. Some areas have been cleared by wildfire and currently have barren areas of upturned strata of shale. The maintenance of adequate plant cover helps to control soil erosion. The major forage plants are annuals. Buckbrush is common and is browsed by both wildlife and livestock. Scattered areas of hardwoods consist of live oak. Wildfire is a hazard because dense brush stands of manzanita or chamise are common. Fire access roads and fuel management programs can reduce the extensiveness and the damaging effects of wildfire and encourage livestock grazing in areas where access is limited. Undesirable plants include black sage and California sagebrush.

Most engineering practices require special design considerations because of the steep and very steep slopes and the shallow depth to rock. Because of the

high or very high erosion hazard, a permanent plant cover should be maintained at all times.

This Lopez soil is in capability subclass VIIe (15), nonirrigated.

157—Lopez-Rock outcrop complex, 75 to 100 percent slopes. This extremely steep soil is on mountains. Areas are irregular in shape and range from 30 to 700 acres. The natural vegetation is mainly brush. Elevation ranges from 1,000 to 3,000 feet. The average annual precipitation ranges from 16 to 20 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 210 to 300 days, depending on location.

This complex is about 60 percent Lopez soil and about 35 percent Rock outcrop.

Included in this complex are a few small areas of Santa Lucia very shaly clay loam and Lopez soils that have slopes of less than 75 percent. Included areas make up about 5 percent of the total acreage.

The Lopez soil is shallow and somewhat excessively drained. It formed in residual material weathered from shale. Typically, the surface layer is gray very shaly clay loam about 18 inches thick. This is underlain by hard shale. Some small areas of this soil have a very shaly loam surface layer.

Permeability of the Lopez soil is moderate, and the available water capacity is very low. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 6 to 20 inches.

The Rock outcrop is exposed hard, acid shale.

Most areas of this complex are used as watershed.

This complex is poorly suited to rangeland. Because of its very shaly clay loam surface texture and extremely steep slopes, the Lopez soil is subject to sheet erosion, which increases the concentration of shale fragments on the soil surface. The shale fragments hinder natural reseeding. Some areas have been cleared by wildfire and currently have barren areas of upturned strata of shale. The maintenance of an adequate plant cover helps to control soil erosion. Natural terrain features common to this soil should be utilized as livestock management area boundaries. The major forage plants are annuals. Buckbrush is common and browsed by both wildlife and livestock. Wildfire is a hazard because dense brush stands of manzanita or chamise are common. Fire access roads and fuel management programs can reduce the extensiveness and the damaging effects of wildfire and encourage livestock grazing in areas where access is limited. Undesirable plants include black sage and California sagebrush.

Most engineering practices are very difficult to accomplish because of the extremely steep slopes. A permanent plant cover should be maintained on this soil at all times to protect this watershed area from erosion.

This complex is in capability subclass VIIe (15), nonirrigated.

158—Los Osos loam, 5 to 9 percent slopes. This moderately deep, well drained, gently rolling soil is on foothills and mountain ridgetops. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 5 to 150 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 100 to 2,000 feet. The average annual precipitation ranges from 15 to 25 inches, and the average annual air temperature ranges from 56 to 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam to a depth of about 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. Weathered, fractured sandstone is at a depth of 39 inches. A few areas have a clay loam surface layer.

Included in this map unit are small areas of Cibo and Diablo clays, Gazos and Lodo clay loams, Millsap loam, Rock outcrop, and Los Osos soils that have slopes of 9 to 15 percent. Also included are a few areas where the underlying rock is harder than is typical for the series.

Permeability of this Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil.

Most areas of this soil are used as rangeland or for small grains and hay crops. Some areas are used for urban development.

The most common dryfarmed crops are small grains, barley hay, and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue utilization, and proper tillage help to maintain soil tilth, structure, fertility, and water holding capacity. Tilled areas should be worked on the contour or across the slope to reduce erosion. Stubble and crop residue left in place after harvest helps to control erosion. Structural measures, such as grassed waterways and water diversions, are sometimes necessary to control erosion.

This soil is well suited to rangeland. The clay subsoil restricts movement of water and penetration of plant roots. The clay subsoil and the loam surface layer make this soil subject to gully erosion. This increases the importance of maintaining a permanent plant cover and leaving adequate plant residue on the soil surface. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Well established forage plants, with roots penetrating into the clay subsoil, commonly produce quality forage into June. This soil is typically under annual grasses. Protected drainageways have a canopy of live oak with an understory of shrubs. These shrubs, which include blue elderberry, bush monkeyflower, toyon, and California coffeeberry, provide browse, fruit, and

cover for many kinds of wildlife. The major forage plants are annuals, including burclover and other annual legumes. Purple needlegrass is a perennial forage that is abundant in many areas. Undesirable plants include coyotebush, California sagebrush, and tocalote. Near the coast, milkthistle and mustard are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

This soil is increasingly important for urban development. Foundations and footings should be designed to offset the high shrink-swell potential of the clay subsoil. The low strength of the subsoil can require that the subgrade be removed and replaced with a more suitable material and that a high degree of compaction and moisture control be maintained before constructing foundations. Local roads and streets can also require special design considerations so that maintenance is minimized. Septic tank absorption fields do not function properly because of the slow permeability of the subsoil and the depth to rock. Absorption lines should be placed below the slowly permeable layer. Increasing the size of the absorption area helps to compensate for the slow permeability and depth to rock. If pond reservoir areas are located on this soil, the slope limits the storage potential, and the moderate depth to rock can cause seepage problems. This soil, if used for embankments, dikes, and levees, requires a high degree of compaction and moisture control. It is poor as a borrow area because of the depth to rock. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the slope and the slow permeability and moderate rooting depth, sprinkler or drip methods of irrigation are best suited to this soil.

This Los Osos soil is in capability units IIIe-3 (15), irrigated and nonirrigated.

159—Los Osos loam, 9 to 15 percent slopes. This moderately deep, well drained, rolling soil is on foothills and mountain ridgetops. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 5 to 150 acres. The natural vegetation is mainly annual grasses and forbs with some areas of hardwoods in drainageways. Elevation ranges from 100 to 2,000 feet. The average annual precipitation ranges from 15 to 25 inches, and the average air temperature ranges from 56 to 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam to a depth of 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. Weathered, fractured sandstone is at a depth of 39 inches. A few areas have a clay loam surface layer.

Included in this map unit are small areas of Cibo and Diablo clays, Gazos and Lodo clay loams, Millsap loam, Rock outcrop, and Los Osos soils that have slopes of less than 9 percent and more than 15 percent.

Permeability of this Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil and is subject to slippage when saturated.

Most areas of this soil are used as rangeland. Some areas are used for urban development.

This soil is well suited to rangeland. The clay subsoil, however, restricts uniform movement of water and penetration of plant roots. The clay subsoil and the loam surface layer make this soil subject to gully erosion. This increases the importance of maintaining a permanent plant cover and leaving adequate plant residue on the soil surface. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Well established forage plants that have roots penetrating into the clay subsoil can produce quality forage into June. This soil is typically under annual grasses. Protected drainageways have an overstory of live oak with an understory of shrubs. These shrubs, which include blue elderberry, bush monkeyflower, toyon, and California coffeeberry, provide browse, fruit, and cover for many kinds of wildlife. The major forage plants are annuals, including burclover and other annual legumes. Purple needlegrass is a perennial forage that is abundant in many areas. Undesirable plants include coyotebush, California sagebrush, and tocalote. Near the coast, milkthistle and mustard are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

This soil is increasingly important for urban development. Foundation and footings should be designed to offset the high shrink-swell potential of the clay subsoil. The low strength of the subsoil can require that the subgrade be removed and replaced with a more suitable material and that a high degree of compaction and moisture control be maintained before constructing foundations. Local roads and streets can require special design considerations so that maintenance is minimized. Septic tank absorption fields do not function properly because of the slow permeability of the subsoil and depth to rock. Absorption lines should be placed below the slowly permeable layer. Increasing the size of the absorption area helps to compensate for the slow permeability and depth to rock. If pond reservoir areas are located on this soil, the slope limits storage potential

and the depth to rock can cause seepage problems. This soil, if used for embankments, dikes, and levees, requires a high degree of compaction and moisture control. It is poor as a borrow area because of the depth to rock. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the slope, the slow permeability, and the moderate rooting depth, sprinkler or drip irrigation methods of irrigation are best suited to this soil.

This Los Osos soil is in capability units IIIe-3 (15), irrigated and nonirrigated.

160—Los Osos loam, 15 to 30 percent slopes. This moderately deep, well drained, moderately steep soil is on foothills and mountain ridgetops. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 10 to 300 acres. They are normally dissected by drainageways. The natural vegetation is mainly annual grasses and forbs with brush in a few areas. Hardwoods are normally along drainageways. Elevation ranges from 100 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature ranges from 56 to 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown loam to a depth of 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. It lies directly over weathered, fractured sandstone. A few areas have a clay loam surface layer or are deeper to harder rock.

Included in this map unit are small areas of Cibo and Diablo clays, Gazos and Lodo clay loams, Millsap loam, Rock outcrop, and Los Osos soils on slopes of less than 15 percent or more than 30 percent. Also included are Lompico and McMullin soils, which normally occur in areas of dense hardwood canopy.

Permeability of this Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil and is subject to slippage when wet.

Most areas of this soil are used as rangeland. Some areas are also used for urban development.

This soil is well suited to rangeland. The clay subsoil, however, restricts uniform movement of water and penetration of plant roots. The clay subsoil and the moderately steep slopes and loam surface layer make this soil subject to gully erosion, increasing the importance of maintaining a permanent plant cover and leaving adequate plant residue on the soil surface. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Well established forage plants that have roots penetrating into the clay subsoil can produce quality forage into June. This soil is typically under annual grasses. Protected drainageways have an overstory of live oak with an understory of shrubs. These shrubs, which include blue elderberry, bush monkeyflower, toyon, and California coffeeberry, provide browse, fruit, and cover for many kinds of wildlife. The major forage plants are annuals, including burclover and other annual legumes. Purple needlegrass is a perennial forage that is abundant in many areas. Undesirable plants include coyotebush, California sagebrush, and tocalote. Near the coast, milkthistle and mustard are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Urban development is increasingly important on this soil. Foundations and footings should be designed to offset the moderately steep slopes, the high shrink-swell potential, and the low strength of the clay subsoil. These soil characteristics can require that the subgrade be removed and replaced with a more suitable material or that a high degree of compaction and moisture control be maintained. Local roads and streets can require special design considerations so that maintenance is minimized. The high erosion hazard can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes. Septic tank absorption fields do not function properly because of the slope, slow permeability of the subsoil, and the depth to rock. Absorption lines should be placed on the contour and below the slowly permeable layer. Increasing the size of the absorption field helps to compensate for the slow permeability.

This Los Osos soil is in capability unit IVe-1 (15), nonirrigated.

161—Los Osos loam, 30 to 50 percent slopes. This moderately deep, well drained, steep soil is on foothills and mountain ridgetops. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 10 to 150 acres. They are normally dissected by drainageways. The natural vegetation is mainly annual grasses and forbs with brush in a few areas. Hardwoods are normally along drainageways. Elevation ranges from 100 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature ranges from 56 to 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam to a depth of 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. This lies directly over weathered, fractured sandstone. A few areas have a clay loam

surface layer, are deeper, or are underlain by harder rock.

Included in this map unit are small areas of Cibo and Diablo clays, Gazos and Lodo clay loams, Rock outcrop, and Los Osos soils that have slopes of less than 30 percent or more than 50 percent. Lompico and McMullin soils normally are in areas of dense hardwood canopy.

Permeability of this Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil and is subject to slippage when wet.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. The clay subsoil restricts uniform penetration of plant roots. The steep slopes, the loam surface layer, and the clay subsoil make this soil subject to gully erosion. This hazard increases the importance of maintaining a permanent plant cover and leaving adequate plant residue on the soil surface. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Well established forage plants that have roots penetrating into the clay subsoil can produce quality forage into June. This soil is typically under annual grasses. Drainageways have an overstory of live oak and an understory of shrubs. These shrubs, which include blue elderberry, bush monkeyflower, toyon, and California coffeeberry, provide browse, fruit, and cover for many kinds of wildlife. Purple needlegrass is a perennial forage that is abundant in many areas. Undesirable plants include coyotebush, California sagebrush, and tocalote. Near the coast, milkthistle and mustard are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Urban development and most other engineering practices require special design considerations because of the erosion hazard, steep slopes, depth to rock, and the high shrink-swell potential, low strength, and slow permeability of the subsoil. The high erosion hazard can be reduced by minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on side slopes. Foundations and footings can require special designs to help overcome the high shrink-swell potential of the clay subsoil. Subgrade or base material should be replaced or covered with suitable soil. Care should be taken to avoid removal of the surface layer on areas that are to be landscaped so that the clay subsoil is not exposed. Septic tank absorption lines should be placed on the contour and below the slowly permeable layer. Increasing the size of the absorption area helps to compensate for the slow permeability.

This Los Osos soil is in capability subclass VIe (15), nonirrigated.

162—Los Osos-Diablo complex, 5 to 9 percent slopes. These gently rolling soils are on foothills and mountain ridgetops. Areas are irregular in shape and range from 10 to 350 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 200 to 1,500 feet. The average annual precipitation ranges from 15 to 25 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 35 percent Los Osos soil and 30 percent Diablo soil. The Diablo soil differs from the Los Osos soil by being deep and having a clay texture throughout.

Included in this complex are small areas of Cibo clay, Lodo clay loam, and Millsap loam. Also included are a few areas of soils that are similar to Los Osos soils but are deeper or are underlain by harder rock. Included areas make up about 35 percent of the total acreage.

The Los Osos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam about 18 inches thick. This is underlain by pale yellow sandy loam to a depth of 39 inches. Weathered, fractured sandstone is at a depth of 39 inches. Some areas have a clay loam surface layer.

Permeability of the Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 20 to 40 inches. This soil has high skrink-swell potential in the subsoil.

The Diablo soil is deep and well drained. It formed in residual material weathered from sandstone, shale, or mudstone. Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a depth of about 58 inches is olive gray clay. Below this is weathered mudstone. This soil is neutral in the surface layer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Permeability of the Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is medium, and the hazard of water erosion is slight. The effective rooting depth ranges from 45 to 58 inches. This soil has high shrink-swell potential.

Most areas of these soils are used for hay crops and small grains or as rangeland. A few areas are used for urban development.

The most common dryfarmed crops are grain barley and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue utilization,

and proper tillage help to maintain soil tilth, structure, fertility, and water holding capacity. Tilled areas should be worked on the contour or across the slope if contour farming is not possible. Leaving stubble and crop residue in place after harvest helps to control erosion. Structural measures, such as grassed waterways and water diversions, help to control erosion. The Diablo soils are difficult to work when excessively wet or dry. Tillage operations should be timed to periods when soil moisture is slightly below field moisture capacity.

These soils are well suited to rangeland. The clay subsoil of the Los Osos soil, however, restricts uniform movement of water and penetration of plant roots. The clay subsoil and the loam surface layer make this soil subject to gully erosion. For this reason, it is important to maintain a permanent plant cover and leave adequate plant residue on the soil surface. The clay texture of the Diablo soil increases the hazard of soil compaction. This hazard can be reduced by grazing when the surface layer is moderately dry. The clay texture of Diablo soil and the Los Osos subsoil influences a rather long, slow growing forage season.

These soils are typically under annual grasses, although the Los Osos soil occasionally supports groves of live oak and such understory plants as bush monkeyflower, blue elderberry, and California peony. Major forage components on both soils include burclover and other annual legumes. Purple needlegrass produces over 50 percent of the dry weight forage in many areas. Undesirable plants include coyotebush, black sage, and cheeseweed. Near the coast, milkthistle, poison-hemlock, and mustard are undesirable and increase following soil disturbance, especially on the Diablo soil. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

These soils are increasingly important for urban development. The main limitations are high shrink-swell potential, low strength, and slow permeability. The high clay content of the Diablo soil and the Los Osos subsoil makes these soils hard to pack. These limitations can require special design considerations for urban development and most other engineering practices. Foundations and footings should be designed to offset these limitations. Septic tank absorption fields do not function properly because of slow permeability and depth to rock. The use of sandy backfill for the trench and long absorption lines helps to compensate for these limitations.

Local road and street design can require that the base material be replaced or covered with a more suitable material in order to minimize maintenance. If pond reservoir areas are located on these soils, the slope limits storage potential, and the depth to rock of the Los Osos soil can create seepage problems. The high shrink-swell potential, low strength, and hardness to pack make these soils a poor material for the construction of embankments, dikes, and levees. This can be corrected by using a more suitable base material, carefully placing the material in the embankment, mixing the soil with more desirable material, and maintaining a high degree of compaction and moisture control. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the slope and slow permeability, sprinkler or drip methods of irrigation are best suited to these soils.

The Los Osos and Diablo soils in this complex are in capability units IIIe-3 (15), irrigated and nonirrigated.

163—Los Osos-Diablo complex, 9 to 15 percent slopes. These rolling soils are on foothills and mountain ridgetops. Areas are irregular in shape and range from 10 to 300 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 200 to 1,500 feet. The average annual precipitation ranges from 15 to 25 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 35 percent Los Osos soil and 30 percent Diablo soil. Diablo soil differs from Los Osos soil by being deep and by having a clay texture throughout.

Included in this complex are small areas of Cibo clay, Lodo clay loam, and Millsap loam. Also included are a few areas of soils that are similar to Los Osos soil but deeper or underlain by harder rock. Included areas make up about 35 percent of the total acreage.

The Los Osos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam to a depth of 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. This lies directly over weathered, fractured sandstone. Some areas have a clay loam surface layer.

Permeability of the Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil and is subject to slippage when wet.

The Diablo soil is deep and well drained. It formed in residual material weathered from sandstone, shale, or mudstone. Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a depth of about 58 inches is olive gray clay. This is underlain by weathered mudstone. The profile is neutral in the surface layer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Permeability of the Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 45 to 58 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

Most areas of these soils are used for hay crops and small grains or as rangeland. A few areas are used for urban development.

The most common dryfarmed crops are grain barley and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue utilization, and proper tillage help to maintain soil tilth, structure, fertility, and water holding capacity. Tilled areas should be worked on the contour or across the slope if contour farming is not possible. Stubble and crop residue should be left in place after harvest to help control erosion. Structural measures, such as grassed waterways and water diversions, are sometimes necessary to control erosion. The Diablo soils are difficult to work when excessively wet or dry. Tillage operations should be timed to periods when soil moisture is slightly below the field moisture capacity.

These soils are well suited to rangeland. The clay subsoil of the Los Osos soil, however, restricts uniform movement of water and penetration of plant roots. Because of the clay subsoil and the loam surface layer, this soil is subject to gully erosion. This increases the importance of maintaining a permanent plant cover and leaving adequate plant residue on the soil surface. The clay texture of the Diablo soil creates a hazard of soil compaction. This hazard can be reduced by grazing when the surface layer is moderately dry. The clay texture of Diablo soil and of the Los Osos subsoil influences a rather long, slow growing forage season. These soils are typically under annual grasses, although Los Osos soils occasionally support groves of live oak with such understory plants as bush monkeyflower, blue elderberry, and California peony. Major forage plants on both soils include burclover and other annual legumes, with purple needlegrass producing over 50 percent of the dry weight forage in many areas. Undesirable plants include coyotebush, black sage, and cheeseweed. Near the coast, milkthistle, poison-hemlock, and mustard are undesirable and increase following soil disturbance, especially on the Diablo soil. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

These soils are increasingly important for urban development. The main limitations are the slope, high shrink-swell potential, low strength, and slow permeability. The soil is hard to pack because of the high clay content. Because of these limitations, special design considerations are often needed for urban development and most other engineering practices. Foundation and footing designs should offset these limitations. Septic tank absorption fields do not function properly because of the slow permeability and depth to rock. The use of sandy backfill for the trench and long absorption lines helps to compensate for the slow permeability and depth to rock.

Local road and street design can require that the base material be replaced or covered with a more suitable material so that maintenance is minimized. If pond reservoir areas are located on these soils, the slope limits the storage potential, and the depth to rock of the Los Osos soil can create seepage problems. The high shrink-swell potential, low strength, and hardness to pack make these soils a poor material for the construction of embankments, dikes, and levees. This can be corrected by using a more suitable material, careful placement of the material in the embankment, or mixing the soil with more desirable material and maintaining a high degree of compaction and moisture control. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the slope and slow permeability, sprinkler or drip irrigation methods of irrigation are best suited to these soils.

The Los Osos and Diablo soils in this complex are in capability units IIIe-3 (15), irrigated and nonirrigated.

164—Los Osos-Diablo complex, 15 to 30 percent slopes. These moderately steep soils are on foothills and mountains. Areas are irregular in shape and range from 15 to 300 acres. The natural vegetation is mainly annual grasses and forbs with brush in a few areas and hardwoods along drainageways. Elevation ranges from 200 to 3,000 feet. The average annual precipitation ranges from 15 to 28 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 35 percent Los Osos soil and 30 percent Diablo soil. Diablo soil differs from Los Osos soil by being deep and by having a clay texture throughout.

Included in this complex are small areas of Rock outcrop, Cibo clay, Gazos and Lodo clay loams, and Lompico and McMullin loams. Also included are a few areas of soils that are similar to Los Osos soil but deeper or underlain by harder rock. Included areas make up about 35 percent of the total acreage.

The Los Osos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam to a depth of about 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. This lies directly over weathered, fractured sandstone. Some areas have a clay loam surface layer.

Permeability of the Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil and is subject to slippage when wet.

The Diablo soil is deep and well drained. It formed in residual material weathered from sandstone, shale, or mudstone. Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a depth of about 58 inches is olive gray clay. This is underlain by weathered mudstone. The profile is neutral in the surface layer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Permeability of the Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is rapid, and the hazard of water erosion is moderate. The effective rooting depth ranges from 45 to 58 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

Most areas of these soils are used as rangeland. Some areas are used for urban development.

These soils are well suited to rangeland. The clay subsoil of the Los Osos soil, however, restricts uniform movement of water and penetration of plant roots. Because of the clay subsoil and the loam surface layer, this soil is subject to gully erosion. This increases the importance of maintaining a permanent plant cover and leaving adequate plant residue on the soil surface. The clay texture of the Diablo soil creates a hazard of soil compaction. This hazard can be reduced by grazing when the surface layer is moderately dry. The clay texture of Diablo soil and of the Los Osos subsoil influences a rather long, slow growing forage season. These soils are typically under annual grasses, although Los Osos soil occasionally supports groves of live oak with such understory plants as bush monkeyflower, blue elderberry, and California peony. Major forage plants on both soils include burclover and other annual legumes, with purple needlegrass producing over 50 percent of the dry weight forage in many areas. Undesirable plants include coyotebush, black sage, and cheeseweed. Near the coast, milkthistle, poison-hemlock, and mustard are undesirable and increase following soil disturbance, especially on the Diablo soil. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that desired balance of plant species is maintained.

Urban development is increasingly important on these soils. However, foundation and footing designs should take into consideration the moderately steep slopes and the high shrink-swell potential and low strength of the Diablo soil and the Los Osos subsoil. Because of these limitations, the subgrade often needs to be removed and replaced with a more suitable material, or a high degree of compaction and moisture control needs to be maintained during construction. Septic tank absorption fields do not function properly because of the slope, slow permeability, and depth to rock. Install septic tank absorption lines on the contour. The use of sandy backfill for the trench and long absorption lines helps to compensate for the slow permeability and depth to rock. Local road and street design can require that the base material be replaced or covered with a more suitable material so that maintenance is minimized. The erosion hazard can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on sides slopes.

The Los Osos and Diablo soils in this complex are in capability unit IVe-1 (15), nonirrigated.

165—Los Osos-Diablo complex, 30 to 50 percent slopes. These steep soils are on foothills and mountains. Areas are irregular in shape and range from 10 to 400 acres. The natural vegetation is mainly annual grasses and forbs with a few areas of brush and hardwoods along drainageways. Elevation ranges from 200 to 3,000 feet. The average annual precipitation ranges from 15 to 28 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 40 percent Los Osos soil and 35 percent Diablo soil. Diablo soil differs from Los Osos soil by being deep and by having a clay texture throughout.

Included in this complex are small areas of Cibo clay, Gaviota sandy loam, Gazos clay loam, Obispo clay, Rock outcrop, and a soil that is similar to Los Osos soil but is deep or is underlain by harder rock. Also included are small areas of Lompico and McMullin loams in areas that have a dense hardwood canopy. Included areas make up about 25 percent of the total acreage.

The Los Osos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam to a depth of about 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. This lies directly over weathered, fractured sandstone. Some areas have a clay loam surface layer.

Permeability of the Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil and is subject to slippage when wet.

The Diablo soil is deep and well drained. It formed in residual material weathered from sandstone, shale, or mudstone. Typically, the surface layer is very dark gray clay about 38 inches thick. The underlying material to a

depth of about 58 inches is olive gray clay. This is underlain by weathered mudstone. The profile is neutral in the surface layer and becomes moderately alkaline and calcareous as depth increases. Some areas have a clay loam or silty clay surface layer.

Permeability of the Diablo soil is slow, and the available water capacity is moderate to very high. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 45 to 58 inches. This soil has high shrink-swell potential and is subject to slippage when wet.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The steep slopes, clay subsoil, and loam surface layer of the Los Osos soil increase the hazard of gully erosion. Erosion can be controlled by maintaining adequate plant residue on the soil surface. The clay surface layer of the Diablo soil is subject to compaction. This problem can be reduced by grazing when the surface layer is moderately dry. Proper grazing use and the use of properly engineered access roads and fuel breaks improve livestock distribution, reducing the hazards of soil erosion and wildfire. These soils have a rather long, slow growing forage season. The soils are typically under annual grasses, although Los Osos soil supports groves of live oak with such understory plants as bush monkeyflower, blue elderberry, and California peony. Major forage plants on both soils include burclover and other annual legumes, with purple needlegrass producing over 50 percent of the dry weight forage in many areas. Undesirable plants include coyotebush, black sage, and cheeseweed. Near the coast, milkthistle, poison-hemlock, and mustard are undesirable and increase following soil disturbance, especially on the Diablo soil. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Urban development and most other engineering practices require special design considerations because of the erosion hazard, steep slopes, and the high shrink-swell potential, low strength, and slow permeability of the Diablo soil and the Los Osos subsoil. Foundation and footing designs need to compensate for the high shrink-swell potential and low strength caused by the high clay content of these soils. Subgrade material sometimes needs to be removed and replaced with a more suitable material, or a high degree of compaction and moisture control needs to be maintained during construction. Septic tank absorption fields do not function properly because of the slow permeability and slope. Septic tank absorption field trench lines should be placed on the contour. Increasing the length of the lines helps to compensate for the slow permeability. The high erosion hazard can be reduced by minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on side slopes.

The Los Osos and Diablo soils in this complex are in capability subclass VIe (15), nonirrigated.

166—Los Osos-Lodo complex, 15 to 30 percent slopes. These moderately steep soils are on foothills and mountains. Areas are irregular in shape and range from 10 to 300 acres. The natural vegetation is mainly annual grasses and forbs with areas of brush; hardwoods are along drainageways. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 50 percent Los Osos soil and 30 percent Lodo soil. Los Osos soil differs from Lodo soil by being moderately deep to softer sandstone and by having a clay subsoil.

Included in this complex are minor areas of Diablo and Cibo clays, Gazos clay loam, and Rock outcrop. Lompico and McMullin soils normally are in areas of dense hardwood canopy. Also included are small areas of soils that are similar to Los Osos soil but are deeper to the underlying rock, and areas where the rock underlying Lodo soil is softer than is typical for the series. Included areas make up about 20 percent of the total acreage.

The Los Osos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam to a depth of about 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. This lies directly over weathered, fractured sandstone. Some areas have a clay loam surface layer or lie over harder rock.

Permeability of this Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil and is subject to slippage when wet.

The Lodo soil is shallow and somewhat excessively drained. It formed in residual material weathered from red rock, sandstone, or shale. Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain directly by fractured, hard sandstone. Some small areas have a sandy loam or loam surface layer and contain as much as 35 percent gravel. A few minor areas have softer underlying rock than is typical for the series.

Permeability of this Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The clay subsoil of the Los Osos soil restricts uniform movement of water and penetration of plant roots. Because of the clay subsoil, the loam surface layer, and the steep slopes, this soil is subject to gully erosion. Erosion can be controlled by maintaining adequate plant residue on the soil surface. The Lodo soil, being shallower, has a lower available water capacity and therefore less plant production than the Los Osos soil. The Lodo soil is often overgrazed while the Los Osos soil is still underutilized. This often causes excessive sheet erosion on the Lodo soil. This increases the importance of maintaining a permanent plant cover. Properly engineered access roads, stock trails, and proper placement of livestock watering facilities and salt promote good distribution of grazing. Well established forage plants, with roots penetrating into the clay subsoil of the Los Osos soil, commonly produce quality forage into June. These soils are typically under annual grasses; drainageways have a live oak overstory and an understory of shrubs. In many areas, the predominant vegetation on Lodo soils is shrubs. The major forage is annuals, including burclover and other annual legumes. A perennial forage, purple needlegrass, is abundant in many areas. Undesirable plants include coyotebush, California sagebrush, and tocalote. Near the coast, milkthistle and mustard are undesirable and increase following soil disturbance, especially on the Los Osos soils. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Therefore, livestock grazing should be managed so that the desired balance of plant species is maintained.

Rural homesite development and most other engineering practices require special design considerations because of the erosion hazard, slope, the high shrink-swell potential of the Los Osos subsoil, and depth to rock. The high erosion hazard is reduced by minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on side slopes. Septic tank absorption fields do not function properly because of the slope and depth to rock of both soils and the slow permeability of the Los Osos subsoil. Install septic tank absorption trench lines on the contour. Increasing the size of the absorption field helps to compensate for the slow permeability and depth to rock. Foundation and footing designs need to compensate for slope and depth to rock. Care should be taken to avoid removal of the surface layer on areas that are to be landscaped so that the clay subsoil of the Los Osos soil or the parent rock of the Lodo soil is not exposed.

The Los Osos and Lodo soils in this complex are in capability unit IVe-1 (15), nonirrigated.

167—Los Osos-Lodo complex, 30 to 75 percent slopes. These steep and very steep soils are on foothills and mountains. Areas are irregular in shape and range from 10 to 400 acres. The natural vegetation is mainly annual grasses and forbs with areas of brush; hardwoods are along drainageways. Elevation ranges from 300 to 3,000 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 50 percent Los Osos soil and about 30 percent Lodo soil. Los Osos soil differs from Lodo soil by being moderately deep to softer sandstone and by having a clay subsoil.

Included in this complex are minor areas of Cibo and Diablo clays, Cieneba loam, Millsap loam, Gazos clay loam, and Rock outcrop. Lompico and McMullin soils normally are in areas that have a dense hardwood canopy. Also included are small areas of soils that are similar to Los Osos soil but deeper to the underlying rock, and areas where the rock underlying Lodo soil is softer than is typical for the series. Included areas make up about 20 percent of the total acreage. At the San Luis Obispo-Monterey county line, this complex joins to the Monterey survey's Los Osos-Millsholm complex. The Millsholm soil differs from Lodo soil by having lighter colors. Millsholm soil is not extensive enough to be included as a named soil in this survey area.

The Los Osos soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay and light yellowish brown clay loam to a depth of 32 inches. The underlying material is pale yellow sandy loam to a depth of 39 inches. This lies directly over weathered, fractured sandstone. Some areas have a clay loam surface layer or lie over harder rock.

Permeability of the Los Osos soil is slow, and the available water capacity is low or moderate. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 20 to 40 inches. This soil has high shrink-swell potential in the subsoil and is subject to slippage when wet.

The Lodo soil is shallow and somewhat excessively drained. It formed in residual material weathered from red rock, sandstone, or shale. Typically, the surface layer is dark brown clay loam about 12 inches thick. This is underlain directly by fractured, hard sandstone. Some small areas have a sandy loam or loam surface layer and contain as much as 35 percent gravel. A few minor areas have softer underlying rock than is typical for the series.

Permeability of the Lodo soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid or very rapid, and the hazard of water

erosion is high or very high. The effective rooting depth ranges from 6 to 20 inches.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The clay subsoil of the Los Osos soil restricts uniform movement of water and penetration of plant roots. The clay subsoil, the loam surface layer, and the very steep slopes make this soil subject to gully erosion. Erosion can be controlled by maintaining adequate plant residue on the soil surface. The Lodo soil, being shallower, has a lower available water capacity and, therefore, less plant production than the Los Osos soil. The Lodo soil is often overgrazed while the Los Osos soil is still underutilized. This often causes excessive sheet erosion on the Lodo soils. These characteristics increase the importance of maintaining a permanent plant cover. Properly engineered access roads, stock trails, and proper placement of livestock watering facilities and salt promote good distribution of grazing. Well established forage plants, with roots penetrating into the clay subsoil of Los Osos soil, commonly produce quality forage into June.

These soils are typically under annual grasses. Drainageways have a live oak overstory and an understory of shrubs. In many areas, the predominant vegetation on the Lodo soil is shrubs. The major forage is annuals, including burclover and other annual legumes. A perennial forage, purple needlegrass, is abundant in many areas. Undesirable plants include coyotebush, California sagebrush, and tocalote. Near the coast, milkthistle and mustard are undesirable and increase following soil disturbance, especially on the Los Osos soil. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Rural homesite development and most other engineering practices require special design considerations because of the erosion hazard, steep slope, high shrink-swell potential of the Los Osos subsoil, and depth to rock. The erosion hazard can be reduced by minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on side slopes. Foundation and footing designs need to compensate for slope and depth to rock. Care should be taken to avoid removal of the surface layer on areas that are to be landscaped so that the Los Osos clay subsoil or the Lodo parent rock is not exposed. Septic tank absorption fields do not function properly because of the slope, depth to rock of both soils, and slow permeability of the Los Osos subsoil. Septic tank absorption trench lines should be placed on the contour. Increasing the size of the absorption field helps to compensate for the slow permeability and depth to rock.

The Los Osos and Lodo soils in this complex are in capability subclass VIIe (15), nonirrigated.

168—Los Osos Variant clay loam, 15 to 50 percent slopes. This very deep, well drained, moderately steep and steep soil is on foothills and mountains. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape or long and narrow and range from 15 to 375 acres. The natural vegetation is mainly annual grasses and forbs or brush; hardwoods are along drainageways. Elevation ranges from 300 to 1,500 feet. The average annual precipitation ranges from 14 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 240 to 300 days.

Typically, the surface layer is grayish brown clay loam about 12 inches thick. The subsoil to a depth of about 27 inches is pale brown clay. The underlying material is light yellowish brown clay loam, which is moderately alkaline and calcareous, to a depth of 60 inches or more. Some areas have a clay surface layer.

Included in this map unit are minor areas of Calodo loam, Diablo clay, Los Osos clay loam, Millsap loam, Nacimiento silty clay loam, and Rock outcrop. Also included are small areas that have slopes of more than 50 percent.

Permeability of this Los Osos Variant soil is slow, and the available water capacity is high or very high. Surface runoff is rapid, and the hazard of water erosion is moderate or high. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland.

This soil is well suited to rangeland. The clay loam surface layer, however, increases the hazard of compaction. Grazing when the soil is moderately dry reduces this hazard. Well established forage plants, with roots penetrating into the clay subsoil, commonly produce quality forage into June. This soil is under annual grasses or shrubs. Drainageways have an overstory of live oak and an understory of shrubs. These shrubs, which include blue elderberry, bush monkeyflower, toyon, and California coffeeberry, provide browse, fruit, and cover for many kinds of wildlife. The major forage is annual grasses, including burclover and other annual legumes. A perennial forage, purple needlegrass, is abundant in many areas. Undesirable plants include coyotebush, California sagebrush, and tocalote. If the range is overgrazed, the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Rural homesite development and most other engineering practices require special design considerations because of the slope, low strength, and high shrink-swell potential and slow permeability of the subsoil. Minimum grading, using runoff and sediment control structures, and establishing a permanent plant

cover on side slopes reduces the erosion hazard. Foundations and footings can require special designs to help overcome the high shrink-swell potential of the clay subsoil. Subgrade or base material needs to be replaced or covered with suitable soil. Care should be taken to avoid removal of the surface layer on areas that are to be landscaped so that the clay subsoil is not exposed. Septic tank absorption fields do not function properly because of the slope and slow permeability of the subsoil. Septic tank absorption trench lines should be placed on the contour. Absorption lines should be placed below the slowly permeable layer. Increasing the size of the absorption area helps to compensate for the slow permeability.

This Los Osos Variant soil is in capability subclass VIe (15), nonirrigated.

169—Marimel sandy clay loam, occasionally flooded. This very deep, somewhat poorly drained, nearly level soil is on alluvial fans, flood plains, and narrow valleys. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow or irregular in shape and range from 30 to 150 acres. The natural vegetation is mainly annual grasses, forbs, and water-tolerant plants. Elevation ranges from 0 to 800 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature ranges from 56 to 59 degrees F. The average frost-free season ranges from 300 to 365 days, depending on location.

Typically, the surface layer is grayish brown sandy clay loam about 16 inches thick. The underlying material to a depth of 60 inches or more is stratified grayish brown clay loam and gray and pale olive silty clay loam containing mottles of light yellowish brown and strong brown. The underlying material is mildly alkaline and calcareous. Some areas have a surface layer of loam, clay loam, or silty clay loam.

Included in this map unit are minor areas of Camarillo sandy loam; Tujunga loamy sand, frequently flooded; and Psamments and Fluvents, occasionally flooded. Included in the Huasna area are Marimel soils that are overlain by 4 to 12 inches of loamy sand. In the Cienega Valley bordering Celery Lake are highly stratified soils containing layers of humus and having a water table within 12 inches of the soil surface. Also included, just north of Celery Lake and near Warden Lake, are similar soils that have a very dark gray clay layer 36 inches thick.

Permeability of this Marimel soil is moderately slow, and the available water capacity is high or very high. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more. This soil has a water table within 2 to 3 feet of the surface from about November to July in most years and is subject to occasional, brief flooding from December to March.

Most areas of this soil are used for cultivated crops. A few areas are used as rangeland.

Areas farmed for vegetable crops should use a cropping system that includes crop rotation or cover crops and crop residue utilization, fertilization, and proper tillage to help maintain soil tilth, structure, and fertility. Since this soil is subject to flooding and has a fluctuating high water table, selection of a proper irrigation system and irrigation water management are critical to ensure high yields. Crop selection and yields can be increased substantially by installing surface or underground tile drainage systems, or both, to lower the water table. Those areas that cannot be economically drained can be planted to shallow-rooted vegetable crops, such as broccoli, cabbage, lettuce, and cauliflower, or to irrigated pasture. If planted to pasture, deep-rooted plants, such as alfalfa, should not be included in the plant mix.

This soil is moderately suited to rangeland. The sandy clay loam surface layer is subject to soil deposition where unprotected, salt accumulation, and soil compaction. Soil deposition is especially a problem during years of high rainfall because of the sediment load from upslope runoff. The seasonally high water table and fine textured surface layer allows forage quality to remain high into August. Compaction by livestock traffic can be reduced by grazing when the surface layer is moderately dry. Most areas of this soil have been cultivated and are without perennial cover. The major forage plants in areas that were once cultivated are annuals, including burclover. In areas of natural vegetation, water-loving and salt-tolerant plants, such as willows, coyotebush, and saltgrass, are found. These areas are important because they are unique plant and wildlife areas. Undesirable plants include poison-hemlock, California saltbush, and fennel. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

If this soil is used for urban development, the main limitations are the high water table and the hazard of occasional flooding. If this soil is used for embankments, dikes, or levees, the design of the structure needs to consider the limitation of low strength. This limitation can be corrected by careful placement of material or mixing the soil with more desirable material and by maintaining a high degree of compaction and moisture control. Drainage is needed if roads and building foundations are constructed. Roads, streets, and buildings should be located above the expected flood level. During the rainy season, effluent from onsite sewage disposal systems can seep to the surface. Community sewage systems are needed to prevent contamination of ground water resulting from seepage.

This Marimel soil is in capability units IIIw-2 (14), irrigated and nonirrigated.

170—Marimel silty clay loam, drained. This very deep, well drained, nearly level soil is on alluvial fans and in narrow valleys. It has been naturally drained because of the downcutting of nearby streams. The soil formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 5 to 615 acres. The natural vegetation is presumed to have been annual grasses and forbs. Most areas are presently cultivated. Elevation ranges from 0 to 400 feet. The average annual precipitation ranges from 15 to 20 inches, and the average annual air temperature ranges from 56 to 59 degrees F. The average frost-free season ranges from 300 to 365 days, depending on location.

Typically, the surface layer is grayish brown silty clay loam about 16 inches thick. The underlying material to a depth of 60 inches or more is stratified grayish brown clay loam and gray and pale olive silty clay loam containing mottles of light yellowish brown and strong brown. The underlying material is mildly alkaline and calcareous. Some areas have a loam, clay loam, or sandy clay loam surface layer.

Included in this map unit are minor areas of Camarillo loam, drained; Cropley clay; and Mocho and Salinas soils. Also included are small areas that are noncalcareous throughout and areas near the edge of the Nipomo mesa that are poorly drained.

Permeability of this Marimel soil is moderately slow, and the available water capacity is high or very high. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for cultivated crops. A few areas are used for orchards.

This soil has few limitations for agriculture if irrigated and properly drained; however, a conservation cropping system, proper tillage, and irrigation water management are necessary to maintain optimum production levels. The cropping system should include crop rotation or cover crops, crop residue use, and fertilization. Restrict tillage operations to the minimum necessary for crop production. Irrigation water management is critical, particularly on poorly drained areas. Broccoli, lettuce, cauliflower, potatoes, carrots, and cabbage are some of the crops that grow well on this soil. Walnuts are grown in some areas.

If this soil is used for homesite development, the size of septic tank absorption fields may need to be increased because of the moderately slow permeability. Seepage from septic tanks can pollute the ground water. Local road and street design can require that the subgrade be replaced or covered with a more suitable material to minimize maintenance. This soil is well suited to pond reservoir areas. However, if this soil is used for embankments, dikes, or levees, the design of the structure should consider the limitations of low strength and piping. These limitations can be corrected by careful placement of material, mixing the soil with more desirable material, and maintaining a high degree of compaction and moisture control.

This Marimel soil is in capability class I (14), irrigated and capability unit IIIc-1 (14), nonirrigated.

171—Millsap loam, 15 to 50 percent slopes. This moderately steep and steep, moderately deep, well drained soil is on foothills and mountains. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 10 to 1,500 acres. The natural vegetation is mainly annual grasses and forbs with areas of hardwoods. Elevation ranges from 1,000 to 3,000 feet. The average annual precipitation ranges from 18 to 24 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 250 to 300 days, depending on location.

Typically, the surface layer is pale brown loam about 8 inches thick. The upper part of the subsoil to a depth of about 19 inches is brown clay, and the lower part is light yellowish brown very gravelly clay to a depth of about 27 inches. This is underlain by hard, fractured sandstone. Some areas have a clay loam surface layer.

Included in this map unit are minor areas of Cieneba loam, Diablo clay, Gazos clay loam, Lodo clay loam, and Los Osos loam. Also included are a few small areas of soils that are similar to Millsap soil but have a reddish brown or moderately alkaline subsoil or are more than 40 inches deep to rock.

Permeability of this Millsap soil is very slow, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is moderate or high. The effective rooting depth ranges from 20 to 40 inches.

Most areas of this soil are used as rangeland or watershed.

This soil is moderately suited to rangeland. The clay subsoil restricts uniform movement of water and penetration of plant roots. The clay subsoil, the loam surface layer, and the moderately steep and steep slopes create a hazard of gully erosion. This increases the need to maintain a good plant cover. Properly engineered access roads and drift fencing improve livestock distribution, further reducing the hazards of erosion and wildfires. Natural terrain barriers can be utilized as management area boundaries. This soil is typically under annual grasses, including some burclover, and such perennials as needlegrass. Drier areas typically have a uniform stand of blue oak. Understory shrubs include honeysuckle, deerweed, and redberry and are excellent browse for wildlife and livestock. Undesirable plants include wooly yerba-santa and fiddleneck. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Rural homesite development and most other engineering practices require special design considerations because of the slope, low strength, and the high shrink-swell potential and very slow permeability of the subsoil. The erosion hazard can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes Foundation and footing designs need to compensate for slope and depth to rock. Care should be taken to avoid removal of the surface layer on areas that are to be landscaped so that the clay subsoil is not exposed. Septic tank absorption fields do not function properly because of the slope, depth to rock, and very slow permeability of the subsoil. Septic tank absorption trench lines should be placed on the contour. Absorption lines should be placed below the very slowly permeable layer Increasing the size of the absorption area helps to compensate for the very slow permeability.

This Millsap soil is in capability subclass VIe (15), nonirrigated.

172—Millsap-Rock outcrop complex, 30 to 75 percent slopes. This steep and very steep complex is on mountains. Areas are irregular in shape and range from 65 to 800 acres. The natural vegetation is mainly annual grasses with large areas of brush and hardwoods. Elevation ranges from 1,000 to 3,000 feet. The average annual precipitation ranges from 18 to 24 inches, and the average annual air temperature is about 59 degrees F. The frost-free season ranges from 250 to 300 days, depending on location.

This complex is about 60 percent Millsap soil and 20 percent Rock outcrop.

Included in this complex are minor areas of Cieneba loam, Gazos clay loam, Lodo clay loam, and Los Osos loam Also included are a few small areas of soils that are similar to Millsap soil but have a reddish brown or a moderately alkaline subsoil or are more than 40 inches deep to rock. Included areas make up about 20 percent of the total acreage.

The Millsap soil is moderately deep and well drained. It formed in residual material weathered from sandstone or shale. Typically, the surface layer is pale brown loam about 8 inches thick. The upper part of the subsoil to a depth of about 19 inches is brown clay, and the lower part is light yellowish brown very gravelly clay to a depth of about 27 inches. This is underlain by hard, fractured sandstone. Some areas have a clay loam surface layer.

Permeability of this Millsap soil is very slow, and the available water capacity is very low or low. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 20 to 40 inches.

The Rock outcrop is hard sandstone or shale at or near the surface.

Most areas of this complex are used as rangeland or watershed.

This complex is moderately suited to rangeland. The presence of Rock outcrop significantly decreases the amount of forage. The clay subsoil restricts uniform movement of water and penetration of plant roots. The clay subsoil, the loam surface layer, and the steep and very steep slopes create a hazard of gully erosion. This increases the need to maintain a good plant cover. Properly engineered access roads and drift fencing improve livestock distribution, further reducing the hazards of erosion and wildfires. Natural terrain barriers should be utilized as management area boundaries. This soil is typically under annual grasses, including some burclover and such perennials as bluegrass. Other areas typically have a uniform stand of blue oak. Understory shrubs, which include honeysuckle, deerweed, and redberry, are excellent browse for wildlife and livestock. Undesirable plants include wooly yerba-santa and fiddleneck.

Most engineering practices require special design considerations because of the erosion hazard, slope, presence of Rock outcrop, low strength, and the very slow permeability and high shrink-swell potential of the clay subsoil. The erosion hazard can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes. Foundation and footing designs need to compensate for slope and depth to rock. Care should be taken to avoid removal of the surface layer on areas that are to be landscaped so that the clay subsoil is not exposed. Septic tank absorption fields do not function properly because of the slope, depth to rock, and very slow permeability of the subsoil. Septic tank absorption trench lines should be placed on the contour. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability.

This complex is in capability subclass VIIe (15), nonirrigated.

173—Mocho fine sandy loam. This very deep, well drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape or long and narrow and range from 8 to 160 acres. The natural vegetation is presumed to have been annual grasses and forbs with scattered hardwoods. Most areas are presently cultivated. Elevation ranges from 20 to 500 feet. The average annual precipitation ranges from 12 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 350 days.

Typically, the surface layer is brown fine sandy loam about 18 inches thick. The underlying material is pale brown silty clay loam to a depth of about 45 inches. Below this is stratified pale brown sand and gravelly sand to a depth of 60 inches or more. The profile is moderately alkaline and calcareous throughout.

Included in this map unit are minor areas of Camarillo sandy loam; Camarillo loam, drained; Mocho loam; Mocho silty clay loam; Mocho Variant fine sandy loam; Psamments and Fluvents, wet; Psamments and Fluvents, occasionally flooded; and Salinas loam.

Permeability of this Mocho soil is moderately slow, and the available water capacity is moderate. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for vegetable or hay crops.

The most common vegetable crops are broccoli, lettuce, sugar beets, and cauliflower. The predominant dryfarmed crops are barley or oat hay. The primary farming hazard is soil blowing of unprotected fields. Maintaining a cover crop or keeping crop residue at or near the surface reduces soil blowing and helps to maintain soil tilth and organic matter content. Deep cuts should be avoided when leveling the land because of the underlying coarse textured substratum.

This soil has few limitations if used for homesite development. Septic tank absorption fields function best if trenches are located well into the rapidly permeable sand substratum. Sewage lagoon, sanitary landfill, and pond resevoir areas are subject to seepage. This can be corrected by sealing. If this soil is used for embankments, dikes, or levees, care should be taken to design the structure in regard to limitations of piping and a thin layer. To overcome the piping limitations, a high degree of compaction and moisture control, careful placement of material, or a special design is needed.

This Mocho soil is in capability units IIs-0 (14), irrigated and IIIe-0 (14), nonirrigated.

174—Mocho loam. This very deep, well drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 5 to 160 acres. The natural vegetation is presumed to have been annual grasses and forbs with scattered hardwoods. Most areas are presently cultivated. Elevation ranges from 20 to 500 feet. The average annual precipitation ranges from 12 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 350 days, depending on location.

Typically, the surface layer is brown loam about 18 inches thick. The underlying material to a depth of 60 inches or more is pale brown loam. The profile is moderately alkaline and calcareous throughout.

Included in this map unit are minor areas of Camarillo sandy loam; Camarillo loam, drained; Mocho fine sandy loam; Mocho silty clay loam; Salinas loam; Salinas silty clay loam; and Tujunga loamy sand.

Permeability of this Mocho soil is moderately slow, and the available water capacity is high or very high. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for vegetable or hay crops.

This soil has no hazards or limitations if farmed. It is well suited to irrigated vegetable crops and orchards or dryfarmed barley, beans, or hay crops. Proper tillage and crop residue utilization help to maintain soil tilth, structure, fertility, and water infiltration Subsoiling can be necessary periodically to break up tillage pans.

This soil has few limitations for most engineering practices.

This Mocho soil is in capability class I (14), irrigated and capability unit IIIc-1 (14), nonirrigated.

175—Mocho silty clay loam. This very deep, well drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 15 to 780 acres. The natural vegetation is presumed to have been annual grasses and forbs with scattered hardwoods. Most areas are presently cultivated. Elevation ranges from 20 to 250 feet. The average annual precipitation ranges from 14 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 350 days, depending on location.

Typically, the surface layer is brown silty clay loam about 18 inches thick. The underlying material is pale brown fine sandy loam to a depth of about 38 inches underlain by pale brown silty clay loam to a depth of 45 inches. Stratified pale brown sand and gravelly sand extend to a depth of 60 inches or more. The profile is moderately alkaline and calcareous throughout.

Included in this map unit are minor areas of Camarillo loam, drained; Cropley clay; Marimel silty clay loam, drained; Mocho fine sandy loam; Mocho Variant fine sandy loam; Salinas loam; and Tujunga loamy sand.

Permeability of this Mocho soil is moderately slow, and the available water capacity is moderate. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for vegetable or hay crops.

This soil has no hazards or limitations if farmed. It is well suited to irrigated vegetable crops and orchards or dryfarmed barley, beans, or hay crops. Proper tillage and crop residue utilization help to maintain soil tilth, structure, fertility, and water infiltration. Subsoiling can be necessary periodically to break up tillage pans.

This soil has few limitations if used for homesite development. Septic tank absorption fields function best if trenches are located well into the rapidly permeable sand substratum. Sewage lagoon, sanitary landfill, and pond reservoir areas are subject to seepage. This can be corrected by sealing. If this soil is to be used for embankments, dikes, or levees, care should be taken to

design the structure in regard to the limitations of piping and a thin layer. To overcome the piping limitations, a high degree of compaction and moisture control, careful placement of material, or a special design is needed.

This Mocho soil is in capability units IIs-0 (14), irrigated and IIIs-0 (14), nonirrigated.

176—Mocho Variant fine sandy loam. This very deep, well drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rock. Areas are irregular in shape and range from 30 to 850 acres. The natural vegetation is presumed to have been annual grasses and forbs. Most areas are presently cultivated. Elevation ranges from 0 to 500 feet. The average annual precipitation ranges from 16 to 20 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 300 to 350 days, depending on location.

Typically, the surface layer is brown fine sandy loam about 15 inches thick. Below this to a depth of 33 inches is pale brown very fine sandy loam. The underlying material to a depth of 60 inches or more is stratified pale brown sand and gravelly sand. This soil is moderately alkaline and calcareous throughout.

Included in this map unit are minor areas of Marimel sandy clay loam, occasionally flooded; Marimel silty clay loam, drained; Mocho fine sandy loam; Mocho silty clay loam; and Tujunga loamy sand. Also included are soils on the Hearst Ranch that are similar to Mocho Variant soil but differ by being noncalcareous.

Permeability of this Mocho Variant soil is moderately rapid, and the available water capacity is low or moderate. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for vegetable and hay crops. A few areas are used for orchards.

This soil is suited to intensive agriculture; however, a high degree of management is necessary for optimum production. Minimum requirements include a conservation cropping system, proper tillage, and irrigation water management. The cropping system should include crop rotation and cover crops, crop residue use, and fertilization. This helps to improve soil tilth and structure and helps to increase the water holding capacity and reduce soil blowing. Restrict tillage operations to the minimum required for crop production. Irrigation water should be applied at rates appropriate to the water holding capacity; in general, this means reduced rates and increased frequencies. Crops with efficient root systems, such as sugar beets or carrots, are well suited to these soils. Dryland hay crop yields can be affected by the relatively low water holding capacity.

This soil has few limitations if used for homesite development. Septic tank absorption fields function best if trenches are located well into the rapidly permeable sand substratum. Sewage lagoon, sanitary landfill, and pond reservoir areas are subject to seepage. This can be corrected by sealing. If this soil is to be used for embankments, dikes, or levees, care should be taken to design the structure in regard to the limitations of piping and a thin layer. To overcome the piping limitations, a high degree of compaction and moisture control, careful placement of material, or a special design is needed.

This Mocho Variant soil is in capability units IIIs-0 (14), irrigated and nonirrigated.

177—Nacimiento silty clay loam, 15 to 30 percent slopes. This moderately deep, well drained, moderately steep soil is on foothills and mountains. It formed in residual material weathered from calcareous sandstone or shale. Areas are irregular in shape and range from 10 to 150 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 400 to 2,000 feet. The average annual precipitation ranges from 16 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is grayish brown silty clay loam about 19 inches thick. This is underlain by light brownish gray, calcareous silty clay loam about 20 inches thick. Soft, calcareous shale is at a depth of about 39 inches. A few areas have a clay loam rather than a silty clay loam surface layer.

Included in this map unit are minor areas of Calodo loam and Diablo, Cibo, and Zaca clays. Also included, just east of Santa Maria, are a few areas of Suey silt loam.

Permeability of this Nacimiento soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches.

Most areas of this soil are used as rangeland.

This soil is well suited to rangeland. The silty clay loam surface layer is subject to sheet and gully erosion and surface compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain following grazing. The major forage plants are annuals, including burclover and other legumes. Purple needlegrass is a common perennial grass forage. North slopes and drainageways often support live oak with such understory plants as bush monkeyflower, elderberry, and California peony. Also, such understory shrubs as birchleaf mountainmahogany, toyon, and California coffeeberry provide browse, fruit, and cover for many kinds of wildlife. Undesirable plants include coyotebush, mustard, and cheeseweed. Closer to the coast, milkthistle and poison-hemlock are undesirable

and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

In a few areas, this soil is used for rural homesite development. Because of the moderately steep slope, moderately slow permeability, and the depth to rock, urban development and most other engineering practices require special design considerations. When installing septic tank absorption fields, areas of lesser slopes and the deepest soils should be chosen, lines should be placed on the contour, and the size of the absorption field should be increased. Local road and street design should include measures to prevent erosion, such as minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on the side slopes.

This Nacimiento soil is in capability unit IVe-1 (15), nonirrigated.

178—Nacimiento silty clay loam, 30 to 50 percent slopes. This moderately deep, well drained, steep soil is on foothills and mountains. It formed in residual material weathered from calcareous sandstone or shale. Areas are irregular in shape and range from 10 to 400 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 400 to 1,000 feet. The average annual precipitation ranges from 16 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is grayish brown silty clay loam about 19 inches thick. This is underlain by light brownish gray, calcareous silty clay loam 20 inches thick. Soft, calcareous shale is at a depth of 39 inches.

Included in this map unit are minor areas of Calodo loam and Diablo, Cibo, and Zaca clays. Also included are a few areas of Suey silt loam east of Santa Maria and a few areas near Highway 41 that receive as much as 35 inches of rainfall.

Permeability of this Nacimiento soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches.

Most areas of this soil are used as rangeland.

This soil is well suited to rangeland. Because of the silty clay loam surface layer and steep slopes, this soil is subject to sheet and gully erosion and surface compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain following grazing. The major forage plants are annuals, including burclover and other legumes. Purple needlegrass is a common perennial grass forage. North slopes and drainageways often support live oak with such understory plants as bush monkeyflower and California peony. Also, such understory shrubs as birchleaf mountainmahogany, toyon, and California coffeeberry provide browse, fruit, and cover for many kinds of wildlife. Undesirable plants include coyotebush, mustard, and cheeseweed. Closer to the coast, milkthistle and poison-hemlock are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

In a few areas, this soil is used for rural homesite development. Because of the steep slope, moderately slow permeability, and depth to rock, urban development and most other engineering practices require special design considerations. When installing septic tank absorption fields, areas that have lesser slopes and the deepest soils should be chosen, lines should be placed on the contour, and the size of the absorption field should be increased. Road design should include measures to prevent erosion, such as minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on the side slopes.

This Nacimiento soil is in capability subclass VIe (15), nonirrigated.

179—Nacimiento silty clay loam, 50 to 75 percent slopes. This moderately deep, well drained, very steep soil is on foothills and mountains. It formed in residual material weathered from calcareous sandstone or shale. Areas are irregular in shape and range from 10 to 150 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 400 to 2,000 feet. The average annual precipitation ranges from 16 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is grayish brown silty clay loam about 19 inches thick. This is underlain by light brownish gray, calcareous silty clay loam about 20 inches thick. Soft, calcareous shale is at a depth of about 39 inches.

Included in this map unit are minor areas of Calodo loam and Diablo, Cibo, and Zaca clays.

Permeability of this Nacimiento soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 20 to 40 inches.

Most areas of this soil are used as rangeland.

This soil is well suited to rangeland. Because of the silty clay loam surface texture and very steep slopes, this soil is subject to sheet and gully erosion and surface compaction. These problems can be reduced by grazing when the surface layer is moderately dry and by allowing greater amounts of plant residue to remain following

grazing. The major forage plants are annuals, including burclover and other legumes. Purple needlegrass is a common perennial grass forage. North slopes and drainageways often support live oak with such understory plants as bush monkeyflower and California peony. Also, such understory shrubs as birchleaf mountainmahogany, toyon, and California coffeeberry provide browse, fruit, and cover for many kinds of wildlife. Undesirable plants include coyotebush, mustard, and cheeseweed. Closer to the coast, milkthistle and poison-hemlock are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Most engineering practices require special design considerations because of the very steep slopes. Road design should include measures to reduce erosion, such as minimum grading, installing runoff and sediment control structures, and establishing a perennial plant cover on the side slopes. Foundations and footings should be designed to compensate for slope and depth to rock. Septic tank absorption fields do not function properly because of the slope and depth to rock. The absorption field trench lines should be placed on the contour and enlarged.

This Nacimiento soil is in capability subclass VIIe (15), nonirrigated.

180—Nacimiento-Calodo complex, 15 to 30 percent slopes. These moderately steep soils are on foothills and mountains. Areas are irregular in shape and range from 15 to 335 acres. The natural vegetation is mainly annual grasses and forbs with a few areas of brush. Elevation ranges from 500 to 1,500 feet. The average annual precipitation ranges from 16 to 22 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 45 percent Nacimiento soil and 35 percent Calodo soil. Nacimiento soil differs from Calodo soil by being moderately deep.

Included in this complex are small areas of Gazos and Lodo clay loams, Santa Lucia shaly clay loam, and Zaca clay. East of Santa Maria are a few minor areas of Suey silt loam. Also included are a few small areas of a soil about 18 inches deep that has a clay loam surface layer underlain by a sandy clay subsoil. Included areas make up about 20 percent of the total acreage.

The Nacimiento soil is moderately deep and well drained. It formed in residual material weathered from calcareous sandstone or shale. Typically, the surface layer is grayish brown calcareous silty clay loam about 19 inches thick. This is underlain by light brownish gray, calcareous silty clay loam about 20 inches thick. Soft, calcareous shale is at a depth of about 39 inches.

Permeability of the Nacimiento soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches.

The Calodo soil is shallow and well drained. It formed in residual material weathered from limestone. Typically, the surface layer is gray loam about 16 inches thick. This is underlain by soft limestone.

Permeability of the Calodo soil is moderately slow, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 10 to 20 inches.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The silty clay loam surface layer of the Nacimiento soil and the loam surface layer of the Calodo soil are subject to sheet erosion. The Nacimiento soil is also subject to gully erosion and soil compaction. These problems can be reduced by allowing greater amounts of plant residue to remain following grazing and by grazing when the surface layer is moderately dry. Because the Calodo soil is shallower and coarser textured, it has a lower water holding capacity and a lower average plant production than the Nacimiento soil. The Calodo soil is often overgrazed while the Nacimiento soil is still underutilized. Properly engineered access roads, stock trails, and placement of livestock watering facilities and salt promote good distribution of grazing.

The major forage plants are annual grasses. Purple needlegrass, a perennial forage grass, and burclover and other annual legumes are more prevalent on the Nacimiento soil. North slopes and drainageways of the Nacimiento soils often support live oak with such understory plants as bush monkeyflower and California peony. Also, such understory shrubs as birchleaf mountainmahogany, toyon, and California coffeeberry provide browse, fruit, and cover for many kinds of wildlife. Undesirable plants include coyotebush, mustard, and cheeseweed. Closer to the coast, milkthistle and poison-hemlock are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

In a few areas, these soils are used for rural homesite development. Because of the moderately steep slopes, low strength, moderately slow permeability, and depth to rock, urban development and most other engineering practices require special design considerations. Building site and road designs should include measures to prevent erosion, such as minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on the side slopes. When installing septic tank absorption fields, areas that have lesser slopes and the deepest soils should be chosen,

lines should be placed on the contour, and the size of the absorption field should be increased. Buildings and roads should be designed to offset the limited ability of these soils to support a load.

The Nacimiento and Calodo soils in this complex are in capability unit IVe-1 (15), nonirrigated.

181—Nacimiento-Calodo complex, 30 to 50 percent slopes. These steep soils are on foothills and mountains. Areas are irregular in shape and range from 10 to 2,050 acres. The natural vegetation is mainly annual grasses and forbs with a few areas of brush. Elevation ranges from 500 to 2,500 feet. The average annual precipitation ranges from 16 to 22 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 45 percent Nacimiento soil and 35 percent Calodo soil. Nacimiento soil differs from Calodo soil by being moderately deep.

Included in this complex are small areas of Gazos and Lodo clay loams, Santa Lucia shaly clay loam, and Zaca clay. East of Santa Maria are a few minor areas of Suey silt loam. Also included are a few small areas of a soil about 18 inches deep that has a clay loam surface layer underlain by a sandy clay subsoil. Included areas make up about 20 percent of the total acreage.

The Nacimiento soil is moderately deep and well drained. It formed in residual material weathered from calcareous sandstone or shale. Typically, the surface layer is grayish brown silty clay loam about 19 inches thick. This is underlain by light brownish gray, calcareous silty clay loam about 20 inches thick. Soft, calcareous shale is at a depth of about 39 inches.

Permeability of the Nacimiento soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches.

The Calodo soil is shallow and well drained. It formed in residual material weathered from limestone. Typically, the surface layer is gray loam about 16 inches thick. This is underlain by soft limestone.

Permeability of the Calodo soil is moderately slow, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 10 to 20 inches.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The silty clay loam surface layer of the Nacimiento soil and the loam surface layer of the Calodo soil are subject to sheet erosion. The Nacimiento soil is also subject to gully erosion and soil compaction. These problems can be reduced by allowing greater amounts of plant residue to remain following grazing and by grazing when the surface layer is moderately dry. Because the Calodo soil is shallower and coarser textured, it has a lower water holding capacity and a lower average plant production than the Nacimiento soil. The Calodo soil is often overgrazed while the Nacimiento soil is still underutilized. Properly engineered access roads, stock trails, and proper placement of livestock watering facilities and salt promote good distribution of grazing.

The major forage plants are annual grasses. Purple needlegrass, a perennial forage grass, and burclover and other annual legumes are more prevalent on the Nacimiento soil. North slopes and drainageways of the Nacimiento soil often support live oak with such understory plants as bush monkeyflower and California peony. Also, such understory shrubs as birchleaf mountainmahogany, toyon, and California coffeeberry provide browse, fruit, and cover for many kinds of wildlife. Undesirable plants include coyotebush, mustard, and cheeseweed. Closer to the coast, milkthistle and poison-hemlock are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

In a few areas, these soils are used for rural homesite development. Because of the steep slopes, moderately slow permeability, and the depth to rock, urban development and most other engineering practices require special design considerations. Road design should include measures to prevent erosion, such as minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on the side slopes. When installing a septic tank absorption field, areas that have lesser slopes and the deepest soils should be chosen. Lines should be placed on the contour and the size of the absorption field should be increased. Buildings and roads should be designed to offset the limited ability of these soils to support a load.

The Nacimiento and Calodo soils in this complex are in capability subclass VIe (15), nonirrigated.

182—Nacimiento-Calodo complex, 50 to 75 percent slopes. These very steep soils are on foothills and mountains. Areas are irregular in shape and range from 20 to 415 acres. The natural vegetation is mainly annual grasses and forbs with areas of brush. Elevation ranges from 500 to 2,500 feet. The average annual precipitation ranges from 16 to 22 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 45 percent Nacimiento soil and 25 percent Calodo soil. Nacimiento soil differs from Calodo soil by being moderately deep.

Included in this map unit are small areas of Gazos and Lodo clay loams, Santa Lucia shaly clay loam, Zaca clay, and Rock outcrop. Included areas make up about 30 percent of the total acreage.

The Nacimiento soil is moderately deep and well drained. It formed in residual material weathered from calcareous sandstone or shale. Typically, the surface layer is grayish brown silty clay loam about 19 inches thick. This is underlain by light brownish gray, calcareous silty clay loam about 20 inches thick. Soft, calcareous shale is at a depth of about 39 inches.

Permeability of the Nacimiento soil is moderately slow, and the available water capacity is low or moderate. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 20 to 40 inches.

The Calodo soil is shallow and well drained. It formed in residual material weathered from limestone. Typically, the surface layer is gray loam about 16 inches thick. This is underlain by soft limestone.

Permeability of the Calodo soil is moderately slow, and the available water capacity is very low or low. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 10 to 20 inches.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The silty clay loam surface layer of the Nacimiento soil and the loam surface layer of the Calodo soil are subject to sheet erosion. The Nacimiento soil is also subject to gully erosion and soil compaction. These problems can be reduced by allowing greater amounts of plant residue to remain following grazing and by grazing when the surface layer is moderately dry. Because the Calodo soil is shallower and coarser textured, it has a lower water holding capacity and a lower average plant production than the Nacimiento soil. The Calodo soil is often overgrazed while the Nacimiento soil is still underutilized. Properly engineered access roads, stock trails, and proper placement of livestock watering facilities and salt promote good distribution of grazing. The major forage plants are annual grasses. Purple needlegrass, a perennial forage grass, and burclover and other annual legumes are more prevalent on the Nacimiento soil. North slopes and drainageways of the Nacimiento soil often support live oak with such understory plants as bush monkeyflower and California peony. Also, such understory shrubs as birchleaf mountainmahogany, toyon, and California coffeeberry provide browse, fruit, and cover for many kinds of wildlife. Undesirable plants include coyotebush, mustard, and cheeseweed. Closer to the coast, milkthistle and poison-hemlock are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Most engineering practices require special design considerations because of the very steep slopes. Road design should include measures to decrease erosion, such as minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on the side slopes. If this complex is used for homesite development, septic tank absorption lines should be placed on the contour and the size of the absorption field should be increased. Foundations and footings should be designed to compensate for slope and depth to rock.

The Nacimiento and Calodo soils in this complex are in capability subclass VIIe (15), nonirrigated.

183—Obispo-Rock outcrop complex, 15 to 75 percent slopes. This moderately steep to very steep soil and Rock outcrop are on mountain ridges and side slopes (fig. 15). Areas are irregular in shape and range from 5 to 1,500 acres. The natural vegetation is mainly annual and perennial grasses and forbs with a few areas of brush. Elevation ranges from 200 to 2,500 feet. The average annual precipitation ranges from 16 to 35 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 275 to 350 days, depending on location.

This complex is about 50 percent Obispo soil and 30 percent Rock outcrop.

Included in this complex are a few small areas of Diablo clay, which is commonly in swales, and Henneke clay loam. Also included is a small area on the Hearst Ranch that has slopes of 5 to 9 percent. In some areas there is as much as 35 percent serpentine gravel and cobbles throughout the profile. Included areas make up about 20 percent of the total acreage.

The Obispo soil is shallow and well drained. It formed in residual material weathered from serpentine rock. Typically, the surface layer is very dark gray clay about 11 inches thick. This is directly underlain by firm to hard serpentine.

Permeability of the Obispo soil is slow, and the available water capacity is very low or low. Surface runoff is rapid or very rapid, and the hazard of water erosion is high or very high. Effective rooting depth ranges from 8 to 20 inches.

The Rock outcrop is exposed, hard serpentine at or near the soil surface.

Most areas of this complex are used as rangeland and watershed.

This complex is poorly suited to rangeland. Because of the clay surface layer and steep slopes, the Obispo soil is subject to sheet erosion. The exposed cobbles and Rock outcrop hinder livestock movement and increase soil erosion hazards. The rocks prevent water infiltration, increasing the amount of surface runoff. Natural terrain barriers should be utilized as management area boundaries. The serpentine parent material causes a calcium-magnesium imbalance, which prevents the normal growth of many plants. The forage produced on this soil is often of low palatability. The major forage plants are perennial grasses, including squirreltail and

Figure 15.—A typical view of Obispo-Rock outcrop complex, 15 to 75 percent slopes. This landform separates Los Osos and Chorro Velleys.

purple needlegrass. Undesirable plants include California sagebrush, locoweed, and tocalote.

Most engineering practices require special design considerations because of the slope, shallow depth, and high clay content. Septic tank absorption fields do not function properly because of the high clay content and shallow depth of this soil. Increasing the size of the absorption field can minimize these problems. Placement of the absorption field can be difficult because of the high amount of rock at or near the surface. Excavations for foundations and road construction are also hindered. The base material may need to be replaced with a more suitable material. All disturbed areas should be protected from erosion by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes.

This complex is in capability subclass VIIe (15), nonirrigated.

184—Oceano sand, 0 to 9 percent slopes. This very deep, excessively drained, nearly level to moderately sloping soil is on old stabilized sand dunes. It formed in deposits of windblown sand. Areas are nearly round or long and narrow and range from 50 to 3,000 acres. The natural vegetation is mainly brush, annual grasses, and scattered hardwoods. Elevation ranges from 10 to 500 feet. The average annual precipitation ranges from 15 to 19 inches, and the average annual air temperature is

about 58 degrees F. The average frost-free season ranges from 235 to 365 days, depending on location.

Typically, the surface layer is brown sand about 29 inches thick. The underlying material is stratified pale brown and pink sand to a depth of 60 inches or more (fig. 16). The profile is medium acid throughout. Some areas of this soil have a sandy loam surface layer.

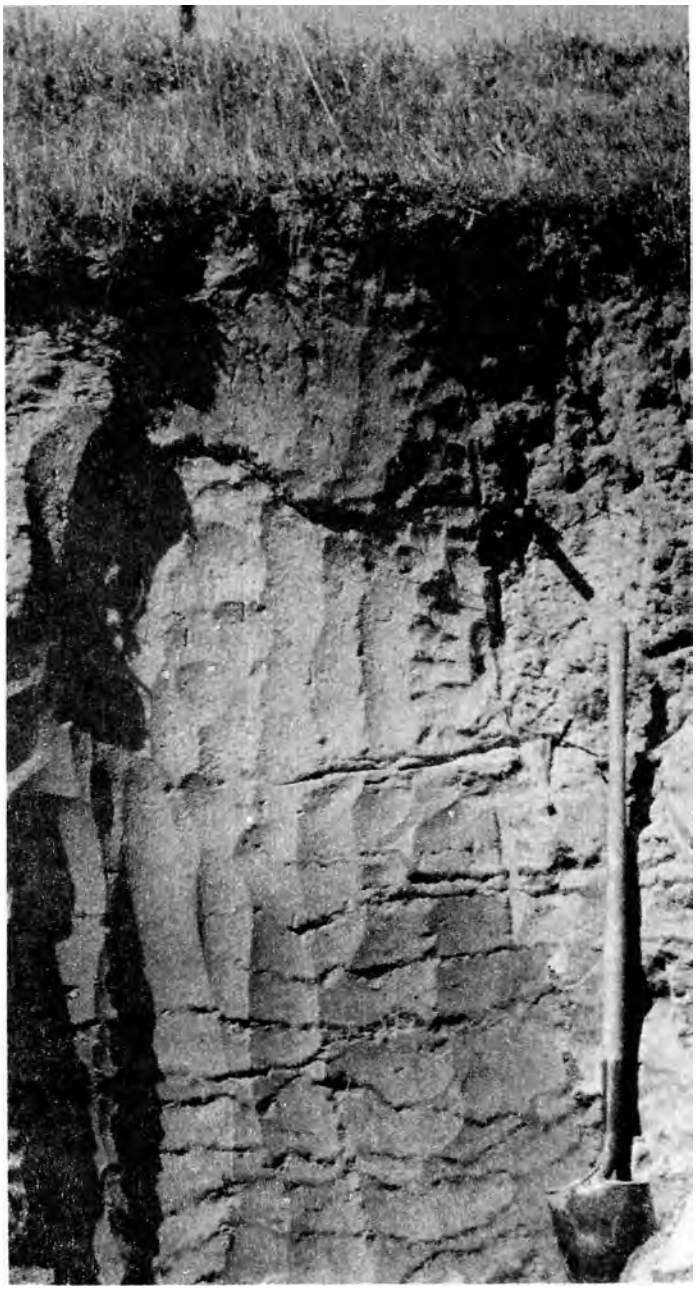

Figure 16.—A profile of Oceano sand Note the lamellae in the lower half of the profile

Included in this map unit are a few small areas of Baywood fine sand, Garey sandy loam, and Dune land.

Permeability of this Oceano soil is rapid, and the available water capacity is low. Surface runoff is slow or medium. The hazard of water erosion is slight or moderate, and the hazard of soil blowing is high. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for recreation, as rangeland, or for urban development. Other areas are used for lemons, Christmas trees, avocados, and strawberries.

All crops must be irrigated because the soil is droughty. In addition to the low water holding capacity, this soil is very susceptible to soil blowing. These problems can be somewhat overcome by providing cover crops in orchards and utilizing all crop residue and prunings as mulch. Cover crops of grasses or legumes can be grown under irrigation. Some dryland cover crops are satisfactory, depending on the location. All cover crops can be mown to desired heights early in the growing season and after the seed is mature in the spring. Irrigation water applications should be closely monitored to provide for crop needs. Excessive water applications rapidly leach nutrients from the plant root zones. This soil is best suited to drip or sprinkler methods of irrigation.

This soil is poorly suited to rangeland. The sand texture makes this soil very droughty with a very short period of quality forage. Gully erosion is a hazard during wet years because of the channeling of runoff water. Erosion can be controlled by maintaining adequate plant residue on the soil surface. This soil sometimes has contrasting vegetation, especially within the coastal fog belt. The cooler temperatures adjacent to the coast influence a closed canopy of live oak with increases in poison-oak, California coffeeberry, and woodfern. Some areas have been cleared and are managed for annual forage. The annual forage is supplemented by California melicgrass in many areas. Deerweed and chamise, although indicators of soil disturbance or fire, are important livestock and wildlife browse. This soil supports excellent groves of bluegum eucalyptus. Some of the plantations have been harvested and have successfully regenerated themselves by stump sprouting. A basal area of 130 square feet has been measured on these plantations, averaging 8 inches in diameter at breast height.

Many areas of this soil are used for urban development. Avoid placing septic tank absorption fields near areas of eucalyputus trees. The root system of eucalyptus trees extends horizontally for many feet and can clog the leach lines. If this soil is used for embankments, dikes, or levees, the design of these structures needs to consider the soil's rapid permeability and susceptibility to piping. Piping and permeability can be reduced by mixing the soil with a more desirable material and by maintaining a high degree of compaction

control. Because of the fast intake rate, sprinkler or drip methods of irrigation are best suited to this soil. Maintaining a good vegetative cover at all times protects the soil from erosion.

This Oceano soil is in capability unit IVe-1 (14), irrigated and capability subclass VIe (14), nonirrigated.

185—Oceano sand, 9 to 30 percent slopes. This very deep, excessively drained, strongly sloping and moderately steep soil is on old established sand dunes. It formed in deposits of windblown sand. Areas are nearly round or long and narrow and range from 50 to 3,000 acres. The natural vegetation is mainly brush, annual grasses, and scattered hardwoods. Elevation ranges from 10 to 500 feet. The average annual precipitation ranges from 15 to 19 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 235 to 365 days, depending on location.

Typically, the surface layer is brown sand about 29 inches thick. The underlying material is stratified, pale brown and pink sand to a depth of 60 inches or more (see fig. 16). The profile is medium acid throughout. Some areas of this soil have a sandy loam surface layer.

Included in this map unit are a few small areas of Baywood fine sand, Garey sandy loam, and Dune land.

Permeability of this Oceano soil is rapid, and the available water capacity is low. Surface runoff is medium or rapid. The hazard of water erosion is moderate or high, and the hazard of soil blowing is high. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for recreation, as rangeland, or for urban development. Other areas are used for eucalyptus trees.

This soil is poorly suited to rangeland. The sand texture makes this soil very droughty with a very short period of quality forage. Gully erosion is a hazard during wet years because of the channeling of runoff water. Erosion can be controlled by maintaining adequate plant residue on the soil surface. This soil sometimes has contrasting vegetation, especially within the coastal fog belt. The cooler temperatures adjacent to the coast influence a closed canopy of live oak with increases in poison-oak, California coffeeberry, and woodfern. Some areas have been cleared and are managed for annual forage. The annual forage is supplemented by California melicgrass in many areas. Deerweed and chamise, although indicators of soil disturbance or fire, are important livestock and wildlife browse.

This soil supports excellent groves of bluegum eucalyptus. Some of the plantations have been harvested and have successfully regenerated themselves by stump sprouting. A basal area of 130 square feet has been measured in these plantations, averaging 8 inches in diameter at breast height.

Many areas of this soil are used for urban development. Slope is the main limitation for homesite development. Septic tank absorption fields should be placed in areas of lesser slopes, if possible, or placed on the contour. Avoid areas of eucalyptus trees. The root system of eucalyptus trees extends horizontally for many feet and can clog the leach lines. Building sites and local roads and streets should include erosion control measures, such as minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes. The droughtiness of this soil makes grassed waterways and areas of permanent plant cover difficult to maintain. This can be overcome by the establishment of a permanent low-rate-of-application irrigation system or by mixing the soil with a more desirable material. Maintaining a good plant cover at all times protects the soil from erosion.

This Oceano soil is in capability subclass VIe (14), nonirrigated.

186—Perkins fine sandy loam, 2 to 9 percent slopes. This very deep, well drained, gently sloping and moderately sloping soil is on dissected terraces. It formed in old alluvium weathered from sedimentary rocks. Areas are commonly long and narrow and range from 5 to 110 acres. The natural vegetation is mainly brush, annual grasses, and scattered hardwoods. Elevation ranges from 300 to 1,700 feet. The average annual precipitation ranges from 15 to 25 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 325 days, depending on location.

Typically, the surface layer is brown fine sandy loam about 17 inches thick. The upper part of the subsoil is reddish brown loam to a depth of about 32 inches. The lower part of the subsoil is light reddish brown gravelly clay loam to a depth of 47 inches becoming very gravelly to a depth of 60 inches or more. Some small areas have a shaly surface layer.

Included in this map unit are a few small areas of Los Osos Variant clay loam.

Permeability of this Perkins soil is slow, and the available water capacity is moderate or high. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland. A few areas are used for irrigated field crops.

This soil is well suited to irrigated vegetable crops, such as carrots, potatoes, lettuce, broccoli, and cabbage. Deep cuts should be avoided when leveling fields for row crop production because of the shaly subsoil. Management practices that include crop rotation or cover crops, fertilization, crop residue utilization, and proper tillage help to maintain soil tilth, structure, and fertility.

This soil is well suited to rangeland. The fine sandy loam surface layer is subject to gully erosion and is relatively droughty. Gully erosion is especially a problem

during years of high rainfall because of channeling from upslope runoff. The available water capacity is moderate or high, but surface moisture is depleted rather rapidly. This makes the germination of annuals difficult and influences a short period of quality forage. It is important to maintain a permanent plant cover. A few areas of this soil have been cultivated and are without perennial cover. This soil is typically under annual grasses with individual live oaks providing shade and understory forage. The major forage is annuals, including burclover and other annual legumes. Perennial forage, such as purple needlegrass and Australian saltbush, is locally common. Undesirable plants include cocklebur, verbena, coyotebush, and California sagebrush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

This soil is increasingly used for homesite development. Septic tank absorption fields do not function properly because of the slow permeability of the subsoil. Septic tank absorption lines should be placed below the slowly permeable layer. Increasing the size of the absorption field or selecting an alternative method of disposal is sometimes necessary. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the slope and the slow permeability of the subsoil, sprinkler or drip irrigation methods of irrigation are best suited to this soil.

This Perkins soil is in capability units IIe-1 (14), irrigated and IIIe-1 (14), nonirrigated.

187—Perkins fine sandy loam, 9 to 30 percent slopes. This very deep, well drained, strongly sloping and moderately steep soil is on dissected terraces. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 5 to 40 acres. The natural vegetation is mainly brush, annual grasses, and scattered hardwoods. Elevation ranges from 300 to 1,700 feet. The average annual precipitation ranges from 15 to 25 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 325 days, depending on location.

Typically, the surface layer is brown fine sandy loam about 17 inches thick. The upper part of the subsoil is reddish brown loam about 15 inches thick. The lower part of the subsoil is light reddish brown gravelly clay loam to a depth of 47 inches becoming very gravelly to a depth of 60 inches or more. Some small areas have a shaly surface layer.

Included in this map unit are a few small areas of Los Osos Variant clay loam.

Permeability of this Perkins soil is slow, and the available water capacity is moderate or high. Surface runoff is slow or medium, and the hazard of water erosion is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. The fine sandy loam surface layer is subject to gully erosion and is relatively droughty. The available water capacity is moderate or high, but surface moisture is depleted rather rapidly. This makes the germination of annuals difficult and influences a short period of quality forage. These hazards increase the importance of maintaining a permanent plant cover. This soil typically is open grassland with individual live oaks and, in areas away from the coast, blue oaks. The major forage is annuals. Browse species, such as purple needlegrass or pine bluegrass, are locally common. Undesirable plants include wooly yerba-santa, fiddleneck, and California sagebrush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Rural homesite development and most other engineering practices sometimes require special design considerations because of the slope and the slow permeability of the subsoil. Septic tank absorption lines should be placed below the slowly permeable layer. Increasing the size of the absorption area helps to compensate for the slow permeability. If located on the moderately steep slopes, absorption lines should be placed on the contour. Building sites and septic tank absorption fields are better suited to lesser slopes. The erosion hazards created by building site preparation and road construction can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes.

This Perkins soil is in capability unit IVe-1 (14), nonirrigated.

188—Perkins gravelly fine sandy loam, 9 to 30 percent slopes. This very deep, well drained, strongly sloping and moderately steep soil is on dissected terraces. It formed in old alluvium weathered from sedimentary rocks. Areas are long and narrow and range from 20 to 100 acres. The natural vegetation is mainly brush, annual grasses and forbs, and scattered hardwoods. Elevation ranges from 300 to 1,700 feet. The average annual precipitation ranges from 15 to 25 inches, and the average annual air temperature is about 59 degrees F. The average frost-free season ranges from 275 to 325 days.

Typically, the surface layer is brown gravelly fine sandy loam about 17 inches thick. The upper part of the subsoil is reddish brown gravelly loam about 15 inches thick. The lower part of the subsoil is light reddish brown gravelly clay loam to a depth of 47 inches becoming very gravelly to a depth of 60 inches or more.

Included in this map unit are a few small areas of Los Osos Variant clay loam.

Permeability of this Perkins soil is slow, and the available water capacity is moderate or high. Surface runoff is medium or rapid, and the hazard of water erosion is moderate or high. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. The gravelly fine sandy loam surface layer is subject to sheet erosion. Sheet erosion increases the concentration of gravel on the soil surface. The high gravel content creates a low specific heat, causing rapid changes in moisture and temperature. This hinders natural and mechanical range seeding. The maintenance of an adequate plant cover is very important in preventing the long-term consequences of soil erosion. Because of the gravelly, coarse textured surface layer, this soil is droughty and has a relatively short period of quality forage. The major forage plants are annuals. Purple needlegrass or, in the drier areas, foothill needlegrass are locally abundant perennial forage grasses. Undesirable plants include bluecurls, California sagebrush, and tarweed.

Rural homesite development and most other engineering practices sometimes require special design considerations because of the slope and slow permeability of the subsoil. If located on the steeper slopes of this soil, septic tank absorption lines should be placed on the contour. Absorption field lines should be placed below the slowly permeable layer. Increasing the size of the absorption area helps to compensate for the slow permeability. Building sites and septic tank absorption fields are better suited to lesser slopes. The erosion hazards created by building site preparation and road construction can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes.

This Perkins soil is in capability unit IVe-1 (15), nonirrigated.

189—Pismo loamy sand, 9 to 30 percent slopes. This shallow, somewhat excessively drained, strongly sloping and moderately steep soil is on foothills and mountains. It formed in residual material weathered from sandstone. Some areas have numerous gullies (fig. 17).

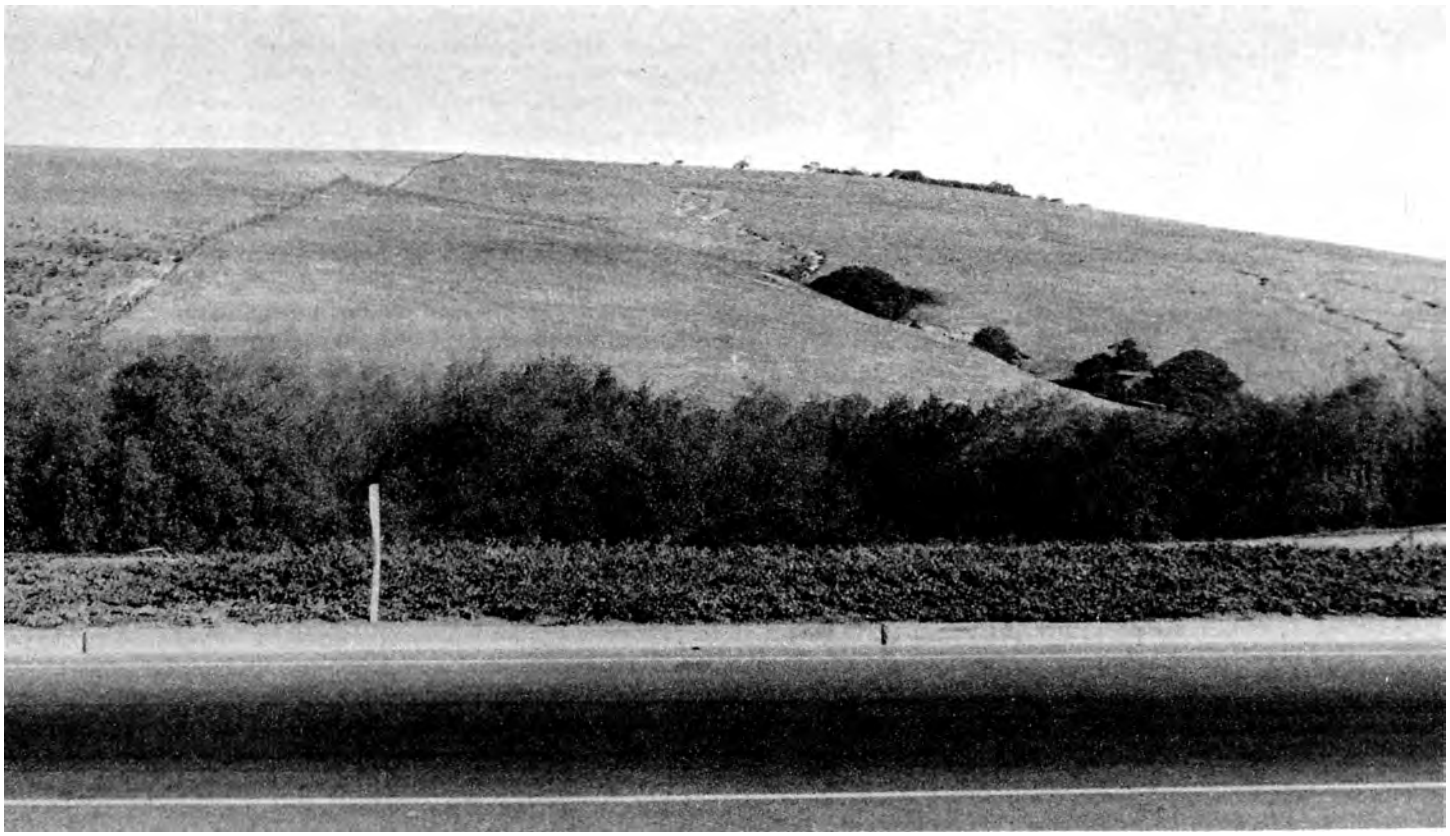

Figure 17.—A typical view of an area of Pismo soils. The gulleys indicate a severe erosion problem.

Areas are irregular in shape and range from 50 to 400 acres. The natural vegetation is mainly annual grasses and forbs, scattered hardwoods, and small areas of brush. Elevation ranges from 25 to 700 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 325 to 350 days, depending on location.

Typically, the surface layer is light brownish gray, medium acid loamy sand about 19 inches thick. Soft fractured sandstone is at a depth of 19 inches. Some areas of this soil have a sand or sandy loam surface layer and darker surface colors. A few areas have steeper slopes. Near Cambria, a small area of this soil has a sandy loam surface layer and is on lesser slopes.

Included in this map unit are a few small areas of Arnold loamy sand and Briones loamy sand and minor areas of Tierra sandy loam.

Permeability of this Pismo soil is rapid, and the available water capacity is very low. Surface runoff is medium or rapid. The hazard of water erosion is moderate or high and the hazard of soil blowing is high. The effective rooting depth ranges from 8 to 20 inches.

Most areas of this soil are used as rangeland.

This soil is poorly suited to rangeland. The loamy sand texture makes this soil very droughty with a short period of quality forage. Downhill movement of the surface layer, when dry, can result from animal and vehicular traffic. The hazard of gully erosion is high during wet years. These problems can be reduced by allowing adequate plant residue to remain on the soil surface after grazing. The soil typically is open grassland with scattered live oaks and areas of shrubs, such as California sagebrush, blue elderberry, manzanita, and mockheather. Cooler temperatures adjacent to the ocean influence an increase in poison-oak, California coffeeberry, and woodfern.

Most engineering practices require special design considerations on this soil because of the slope, shallow depth to rock, high sand content, and the erosion hazard. Erosion hazards created by building site preparation and road construction can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes. A permanent plant cover can be difficult to maintain because of the soil's droughtiness. A permanent, low-rate-of-application irrigation system sometimes needs to be installed. Mulching and fertilizing cut areas help to establish plants. The size of septic tank absorption fields should be increased to compensate for the depth to rock. If located on the steeper slopes, absorption fields may need to be placed on the contour.

This Pismo soil is in capability subclass VIIe (15), nonirrigated.

190—Pismo-Rock outcrop complex, 30 to 75 percent slopes. This steep and very steep complex is on mountains. Areas are irregular in shape and range from 10 to 200 acres. The natural vegetation is mainly brush, scattered hardwoods, and areas of annual grasses and forbs. Elevation ranges from 25 to 700 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 325 to 350 days, depending on location.

This complex is about 40 percent Pismo soil and 35 percent Rock outcrop. Some areas of the Pismo soil have a sand surface layer, and other areas have a darker surface layer.

Included in this complex are a few small areas of Arnold loamy sand, Briones loamy sand, and a soil similar to Tierra sandy loam that is less than 40 inches deep to sandstone. Included areas make up about 25 percent of the total acreage.

The Pismo soil is shallow and somewhat excessively drained. It formed in residual material weathered from sandstone. Typically, the surface layer is light brownish gray, medium acid loamy sand about 19 inches thick. Soft fractured sandstone is at a depth of 19 inches.

Permeability of the Pismo soil is rapid, and the available water capacity is very low. Surface runoff is medium or rapid. The hazard of soil blowing is high. The hazard of water erosion is moderate or high, depending on slope. The effective rooting depth ranges from 8 to 20 inches.

The Rock outcrop is exposed, firm to hard sandstone at or near the soil surface.

Most areas of this soil are used as rangeland.

This complex is poorly suited to rangeland. The loamy sand surface layer and the Rock outcrop make this soil very droughty with a short period of quality forage. On the steeper hillsides, animal and vehicular traffic cause downhill movement of the dry surface layer. Gully erosion is a hazard in wet years because of the channeling of runoff. These problems can be reduced by allowing adequate plant residue to remain on the soil surface after grazing. The Pismo soil typically has an overstory of live oak with such shrubs as California sagebrush, blue elderberry, manzanita, and mockheather. Deerweed and chamise, although indicators of soil disturbance or fire, are important livestock and wildlife browse. Cooler temperatures near the ocean influence an increase in poison-oak, California coffeeberry, and woodfern.

Most engineering practices require special design considerations on this soil because of slope, shallow depth to rock, Rock outcrop, high sand content, and the erosion hazard. The erosion hazards created by building site or road preparation can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes. A permanent plant cover can be difficult to establish

because of the soil's droughtiness; a permanent, low-rate-of-application irrigation system may need to be installed. Fertilizing and mulching cut areas helps to establish plants. Septic tank absorption field size should be increased to compensate for the depth to rock. Absorption fields should be placed on the contour.

This complex is in capability subclass VIIe (15), nonirrigated.

191—Pismo-Tierra complex, 9 to 15 percent slopes. These strongly sloping soils are on foothills and mountains. Areas are irregular in shape and range from 30 to 200 acres. The natural vegetation is mainly brush, annual grasses, and scattered hardwoods. Elevation ranges from 25 to 700 feet. The average annual precipitation ranges from 16 to 22 inches, and the average annual air temperature is about 58 degrees F. The frost-free season ranges from 325 to 350 days, depending on location.

This complex is about 40 percent Pismo soil and 30 percent Tierra soil. Tierra soil differs from Pismo soil by having a clay subsoil and by being very deep.

Included in this complex are a few areas of a soil less than 40 inches deep that is similar to Tierra soil and soils similar to Pismo soil that have darker surface colors and sandy loam texture. Small areas of Arnold and Briones loamy sand are also included. Included areas make up about 30 percent of the total acreage.

The Pismo soil is shallow and somewhat excessively drained. It formed in residual material weathered from sandstone. Typically, the surface layer is medium acid, light brownish gray loamy sand 19 inches thick. Soft fractured sandstone is at a depth of 19 inches. Some areas of this soil have a sand surface layer.

Permeability of the Pismo soil is rapid, and the available water capacity is very low. Surface runoff is medium or rapid. The hazard of soil blowing is high. The hazard of water erosion is moderate or high, depending on slope. Effective rooting depth ranges from 8 to 20 inches.

The Tierra soil is very deep and moderately well drained. It formed in old alluvium weathered from sedimentary rocks. Typically, the surface layer is gray sandy loam about 9 inches thick. The subsurface layer is light gray sandy loam about 2 inches thick. The subsoil is gray, pale brown, and brown sandy clay to a depth of about 42 inches. The underlying material to a depth of 60 inches is pale brown sandy clay loam. The profile is slightly acid at the surface and becomes more alkaline as depth increases.

Permeability of the Tierra soil is very slow, and the available water capacity is low or moderate. Surface runoff is rapid. The hazard of soil blowing is moderate, and the hazard of water erosion is high. The effective rooting depth is 60 inches or more, but roots in the subsoil are limited to cracks. This soil has high shrink-swell potential in the subsoil.

Most areas of these soils are used as rangeland.

These soils are moderately suited to rangeland. The loamy sand surface layer of the Pismo soil and the sandy loam surface layer of the Tierra soil tend to be droughty. This hinders revegetation efforts because of rapid changes in moisture and temperature. The sandy clay subsoil of the Tierra soil restricts uniform movement of water and penetration of plant roots. Lateral water flow along the claypan surface can cause gully erosion. These problems are reduced if an adequate plant cover is maintained. Forage production on the Pismo soil is lower than on the Tierra soil. This causes problems in achieving uniform forage utilization. Shallowness and the lack of a fine textured subsoil decreases the available moisture and decreases the period of quality forage on the Pismo soil. The available water capacity is high in the Tierra soil because of the claypan, allowing forage quality to remain high into June. The Pismo soil is often overgrazed while the Tierra soil is still underutilized. Properly engineered access roads, stock trails, and placement of livestock watering facilities and salt promote good distribution of grazing. The forage plants are annuals. Purple needlegrass or nodding stipa, perennial forage grasses, are common on the Tierra soil. An occasional live oak or valley oak is common on the Pismo soil. Undesirable plants on both soils include California sagebrush, verbenas, and fiddleneck.

Rural homesite development is increasingly important on these soils. The main limitations of these soils for this and other engineering uses are slope, the shallow depth to rock of the Pismo soil, and the very slow permeability, high shrink-swell potential, and low strength of the Tierra soil. Septic tank absorption fields do not function properly because of the very slow permeability of the Tierra soil and the depth to rock of the Pismo soil. The size of absorption fields should be increased to compensate for depth to rock and very slow permeability. Absorption field lines should be placed on the contour.

If building sites or roads are placed on these soils, care should be taken to limit grading and excavation to the minimum necessary. Cuts needed to provide relatively level building sites and road beds can expose the bedrock or clay subsoil. Maintaining sediment control structures and a permanent plant cover at all times reduces the hazards of soil blowing or water erosion during and after construction. Low-rate-of-application irrigation systems are sometimes needed to ensure growth of plant cover on some sites. Mulching and fertilizing cut areas helps to establish plants. Special design considerations are needed to allow for the low strength of the Tierra soil when constructing roads, building sites, and embankments. Subgrade or base material needs to be replaced or covered with suitable base material to minimize maintenance of local roads and streets and to prevent structural damage of the foundations and footings of buildings. The lack of

sufficient soil strength can be corrected by replacing the base material, careful placement of the material in the embankment, or mixing the soil with more desirable material and maintaining a high degree of compaction and moisture control.

The Pismo and Tierra soils in this complex are in capability subclass VIe (15), nonirrigated.

192—Psamments and Fluvents, occasionally flooded. This map unit is on nearly level areas adjacent to stream and river bottoms. It consists of excessively drained, stratified deposits of sand and loamy sand that may contain thin layers of sandy loam, silt, or gravel. Other soil features are variable. This map unit is subject to flooding and deposition during moderate or severe storms. The surface may be uneven because of the channeling of floodwater or deposition. The natural vegetation is commonly scattered clumps of brush with sparse annual and perennial grasses and forbs. Hardwoods are in some places. The average annual precipitation ranges from 14 to 24 inches, and the average annual air temperature is about 58 degrees F.

Included in this map unit are small areas of Riverwash and Corralitos and Tujunga soils.

Permeability is moderately rapid or rapid, and available water capacity is very low or low. Surface runoff is very slow or slow, and the hazard of water erosion is moderate. During unusually heavy storms, damaging overflow and deposition can occur.

Areas of this map unit are presently used as rangeland or for vegetable crops.

These soils are poorly suited to rangeland. The coarse textured surface layer of these soils is subject to soil deposition. The areas of silt and sand deposition are very droughty because of their low available water capacity. Annual forage production is very low. Ground water is usually available on these soils, and deep-rooted, water-loving plants, such as mule fat, willows, and California sycamore, are common. The major forage is browse from these species. Clumps of deergrass and purple needlegrass are common perennial forage grasses. Many areas are considered unique plant and wildlife areas and grazing should be controlled for their preservation. Undesirable plants include poison-oak, cocklebur, and poison-hemlock.

Because the profile of these soils is highly variable, onsite investigation is needed to determine practices needed to control erosion, prevent flooding, and determine suitability for range, farming, and engineering uses.

These Psamments and Fluvents are in capability units VIw-2 (14), irrigated and nonirrigated.

193—Psamments and Fluvents, wet. This map unit consists of small, very poorly drained basins in areas of Dune land or in coarse textured valley alluvium near streams and river bottoms. The soils are wind- or water-deposited sands and loamy sand that commonly contain layers of organic material. These areas are waterlogged all or most of the year. Vegetation is water- and salt-tolerant grasses and forbs.

Included in this map unit are small areas of Psamments and Fluvents, occasionally flooded; Dune land; and Corralitos Variant soil. A few places near Arroyo Grande Creek are composed mostly of organic matter.

These soils are very poorly drained. Free water is within 10 to 20 inches of the surface for most of the year.

Areas of these soils have little or no farming value and are used mainly as wildlife habitat.

These Psamments and Fluvents are in capability subclass VIw (14), nonirrigated.

194—Riverwash. This miscellaneous area is active stream and river channels that consist of excessively drained, water-deposited sand, loamy sand, and sandy loam that have varying amounts of gravel and cobbles. The soil material is highly stratified; most features are too variable to characterize. Areas are subject to flooding during and immediately after every storm, with subsequent scouring and deposition. These areas are essentially barren but include areas that have scattered clumps of sage or water-tolerant plants.

Included with Riverwash in mapping are small areas of Psamments and Fluvents, occasionally flooded, and Corralitos soils.

Riverwash generally is excessively drained, but it ranges to somewhat poorly drained in some low lying areas. Permeability is very rapid. Surface runoff is very slow. The hazard of erosion is variable. The available water capacity is very low.

Areas of Riverwash are used mainly for recreation or as wildlife habitat.

Onsite investigation is needed to determine practices needed to control erosion and prevent flooding.

Riverwash is in capability subclass VIIIw (14), nonirrigated.

195—Rock outcrop-Lithic Haploxerolls complex, 30 to 75 percent slopes. This steep and very steep complex is on mountains. Areas are irregular in shape or long and narrow and range from 10 to 2,000 acres. The natural vegetation is sparse annual grasses or brush. Elevation ranges from 20 to 2,500 feet. The average annual precipitation ranges from 15 to 45 inches, and the average annual air temperature is about 58 degrees F.

This complex is about 55 percent Rock outcrop and 25 percent Haploxerolls.

Included in this complex are small areas of Arnold, Briones, Diablo, Gaviota, and Gazos soils. Included areas make up about 20 percent of the total acreage.

The Rock outcrop is various types of bedrock that are exposed throughout the survey area.

The Lithic Haploxerolls are typically soils of the Lodo, Lopez, and Obispo series. They each are less than 20 inches deep to hard rock. The Lodo soils are clay loam throughout. The Lopez soils are very shaly clay loam, and the Obispo soils are clay.

The shallow depth to rock of the Lithic Haploxerolls, the steepness of slope, and the high percentage of Rock outcrop make this complex poorly suited to most agricultural or engineering uses.

This complex is in capability subclass VIIIs (15), nonirrigated.

196—Salinas loam, 0 to 2 percent slopes. This very deep, well drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 20 to 500 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods Elevation ranges from 5 to 400 feet. The average annual precipitation ranges from 14 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is dark gray loam about 29 inches thick. This is underlain by stratified layers of very pale brown fine sandy loam and light yellowish brown silty clay loam to a depth of 60 inches or more. The profile is neutral at the surface and becomes moderately alkaline and calcareous as depth increases. Some areas of this soil have a sandy loam or clay loam surface layer. Some areas also have stratified layers of coarse sand or gravel in the substratum.

Included in this map unit are a few small areas of Camarillo loam, Cropley clay, Marimel silty clay loam, and Mocho silty clay loam.

Permeability of this Salinas soil is moderately slow, and the available water capacity is high or very high. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for hay crops or irrigated pasture. A few small areas are used for orchards or vegetable crops or as rangeland.

This soil has no hazards or limitations if farmed. It is well suited to irrigated vegetable crops and orchards or dryfarmed barley, beans, or hay crops. Proper tillage and crop residue utilization help to maintain soil tilth, structure, fertility, and permeability. Subsoiling can be necessary periodically to break up the tillage pans.

This soil is well suited to rangeland. Most areas have been cultivated and are open. Major forage is annuals, including burclover during years of normal or high rainfall. Perennial forage includes Australian saltbush, a browse, and purple needlegrass. Undesirable plants include cheeseweed, foxtail barley, and mustard. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

This soil is increasingly used for urban development. The design of septic tank absorption fields should consider the moderately slow permeability of the substratum. The size of the absorption field may have to be enlarged. Seepage limits the use of this soil for sewage lagoons and pond reservoir areas. Seepage can be corrected by sealing. If this soil is used for embankments, dikes, or levees, the structure should be designed in regard to the limitation of piping. To overcome the piping limitation, a high degree of compaction and moisture control, careful placement of material, or a special design is needed.

This Salinas soil is in capability class I (14), irrigated and capability unit IIIc-1 (14), nonirrigated.

197—Salinas silty clay loam, 0 to 2 percent slopes. This very deep, well drained, nearly level soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 10 to 300 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 5 to 400 feet. The average annual precipitation ranges from 14 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is dark gray silty clay loam about 29 inches thick. This is underlain by stratified layers of very pale brown very fine sandy loam and light yellowish brown silty clay loam to a depth of 60 inches or more. The profile is neutral at the surface and becomes moderately alkaline and calcareous as depth increases. Some areas of this soil have a sandy loam or clay loam surface layer. A few areas have stratified layers of coarse sand or gravel in the substratum.

Included in this map unit are a few small areas of Camarillo loam, Cropley clay, Marimel silty clay loam, Mocho loam, and Mocho Variant fine sandy loam. In places, the Salinas soil overlies a heavy clay soil at a depth of 20 to 40 inches.

Permeability of this Salinas soil is moderately slow, and the available water capacity is high or very high. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for vegetable and hay crops. Other areas are used for urban development or as rangeland.

This soil has no hazards or limitations for farming. It is well suited to irrigated vegetable crops and orchards or dryfarmed barley, beans, and hay crops. Proper tillage and utilization of crop residue help to maintain soil tilth, structure, fertility, and permeability. Periodic subsoiling helps to break up tillage pans.

This soil is well suited to rangeland. The silty clay loam surface layer is subject to soil compaction. This may be reduced by grazing when the soil is moderately dry. This soil typically is open grassland with occasional groves of live oak and an understory of such plants as bush monkeyflower, blue elderberry and California peony. Major forage plants are burclover and other annual legumes. Purple needlegrass, a perennial grass, is important in many areas. Some areas were previously cultivated. The vegetation in these areas can differ from the typical perennial species. Undesirable plants include coyotebush, black sage, and cheeseweed. Near the coast, milkthistle and mustard are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Many areas of this soil are used for urban development. The design of septic tank absorption fields needs to consider the moderately slow permeability of the substrata. The size of the absorption field may need to be enlarged. Seepage limits the use of this soil for sewage lagoons and pond reservoirs; this can be corrected by sealing. The design of roads, buildings, and other structures needs to consider the low strength and moderate shrink-swell potential. If this soil is to be used for embankments, dikes, or levees, the design of the structure should consider the limitation of piping. To overcome the piping limitation, a high degree of compaction and moisture control, careful placement of material, or special design is needed.

This Salinas soil is in capability class I (14), irrigated and capability unit IIIc-1 (14), nonirrigated.

198—Salinas silty clay loam, 2 to 9 percent slopes. This very deep, well drained, gently sloping and moderately sloping soil is on alluvial fans and plains. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow or irregular in shape and range from 15 to 125 acres. The natural vegetation is mainly annual grasses and forbs with some hardwoods. Elevation ranges from 5 to 400 feet. The average annual precipitation ranges from 14 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is dark gray silty clay loam about 29 inches thick. This is underlain by stratified layers of very pale brown very fine sandy loam and light yellowish brown silty clay loam to a depth of 60 inches or more. The profile is neutral at the surface and becomes moderately alkaline and calcareous as depth increases. Some areas of this soil have a sandy loam or clay loam surface layer. A few areas have stratified layers of coarse sand or gravel in the substratum.

Included in this map unit are a few small areas of Cropley clay and Marimel silty clay loam. In a few places, the Salinas soil overlies a heavy clay that is at a depth of 20 to 40 inches.

Permeability of this Salinas soil is moderately slow, and the available water capacity is high or very high. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for hay crops or small grains. Other areas are used for urban development or as irrigated pasture or rangeland.

This soil is well suited to irrigated pasture and dryfarmed oat hay, barley, and beans. The erosion hazard increases as slope increases. Such management practices as proper tillage and crop residue utilization help to reduce these hazards. Tillage should be on the contour or across the slope. Irrigated pastures with combinations of grasses and legumes do well. However, rotational grazing systems should be established to reduce the problem of soil compaction by livestock when the soil is wet.

This soil is well suited to rangeland. The silty clay loam surface layer is subject to compaction. This can be reduced by grazing when the soil is moderately dry. This soil typically is open grassland with occasional groves of live oak and an understory of such plants as bush monkeyflower, blue elderberry and California peony. Major forage plants are burclover and other legumes. Purple needlegrass, a perennial grass, is important in many areas. Some areas of this soil have been cultivated in the past and are without the typical perennial vegetation. Undesirable plants include coyotebush, black sage, and cheeseweed. Near the coast, milkthistle and mustard are undesirable and increase following soil disturbance. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Building sites and most engineering uses can require special designs. When considering this soil for septic tank absorption fields, design should consider the moderately slow permeability of the substratum. Absorption field size may have to be enlarged. Seepage limits the use of this soil for sewage lagoons or pond reservoir areas. Seepage can be corrected by sealing. Roads, buildings, and other structures need to be designed with consideration of the soil's moderate strength and moderate shrink-swell potential. The subgrade should be replaced or covered with a more suitable material to minimize maintenance of roads and streets. If this soil is to be used for embankments, dikes, or levees, care should be taken to design the structure in regard to limitations of piping. To overcome the piping limitations, a high degree of compaction and moisture

control, careful placement of material, or a special design is needed.

This Salinas soil is in capability units IIe-1 (14), irrigated and IIIe-1 (14), nonirrigated.

199—San Simeon sandy loam, 2 to 9 percent slopes. This moderately deep, moderately well drained, gently sloping and moderately sloping soil is on foothills and terraces. It formed in residual material weathered from sandstone. Areas are irregular in shape and range from 30 to 90 acres. The natural vegetation is mainly annual and perennial grasses and forbs with areas of brush or conifers. Elevation ranges from 20 to 500 feet. The average annual precipitation ranges from 18 to 25 inches, and the average annual air temperature is about 55 degrees F. The average frost free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is grayish brown, brown, and light yellowish brown sandy loam about 24 inches thick. The subsoil is brown and strong brown, mottled clay to a depth of about 34 inches. This is directly underlain by soft sandstone. The profile is medium acid at the surface and becomes very strongly acid in the subsoil. Some areas of this soil have a loam surface layer.

Included in this map unit are a few small areas of Concepcion loam and Los Osos loam. Near Ragged Point, some areas are loam throughout the profile and rest on consolidated terrace deposits. In areas covered by a heavy canopy of trees, the air and soil temperatures are a few degrees cooler than the rest of this map unit.

Permeability of this San Simeon soil is very slow, and the available water capacity is very low or low. Surface runoff is slow or medium, and the hazard of water erosion is slight or moderate. The effective rooting depth ranges from 20 to 40 inches. The shrink-swell potential of the subsoil is high.

Most areas of this soil are used as rangeland or for dryland farming. In the Cambria area, areas of this soil are used for urban development and recreation.

The most common dryfarmed crops are grain barley and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue utilization, and proper tillage help to improve soil tilth, structure, fertility, and water holding capacity. Subsoiling to break up the underlying clay layer is not recommended because this layer can reseal within a relatively short period. Tilled areas should be worked on the contour or across the slope if contour farming is not possible. Stubble and crop residue left in place after harvest helps to control erosion. Structural measures, such as grassed waterways and water diversions, are sometimes necessary to control erosion.

This soil is poorly suited to use as rangeland. The clay subsoil restricts uniform water movement and root penetration. Because of the loamy surface layer and clay subsoil, this soil is subject to gully erosion. This increases the importance of maintaining a permanent vegetative cover. This soil is typically covered with Monterey pine and understory shrubs, such as live oak, California coffeeberry, and poison-oak. Other areas are dense brush without the pine overstory. The major forage is browse and small areas of understory grasses. The grasses are predominantly annuals with some perennials, such as purple needlegrass, wildryes, and fescues. Undesirable plants include chamise and coyotebush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. This soil supports some excellent stands of Monterey pine. A basal area of 290 square feet has been measured in stands of Monterey pine on this soil, averaging 19 inches in diameter at breast height. Because of the limited rooting depth, windthrow can be a problem on the more exposed, windy locations. Access roads need adequate erosion control measures to prevent accelerated erosion.

In some areas, community development is increasingly important. Building sites and most other engineering uses can require special designs because of the high shrink-swell potential, very slow permeability, low strength, and hardness to pack of the clay subsoil. Septic tank absorption fields do not function properly on these soils because of the very slow permeability and depth to rock. Increasing the size of the absorption area helps to compensate for the very slow permeability and depth to rock. Local road and street design can require that the base material be replaced or covered with a more suitable material in order to reduce maintenance. This soil is moderately suited to pond reservoir areas because of the depth to rock. Embankments, dikes, or levees are hard to pack and can require careful placement of material, mixing with a more suitable material, and maintaining a high degree of compaction and moisture control. If irrigated, controlling the amount of water and the rate of application prevents waterlogging and excessive runoff. Sprinkler or drip methods of irrigation are best suited to this soil.

This San Simeon soil is in capability units IVe-3 (15), irrigated and nonirrigated.

200—San Simeon sandy loam, 9 to 15 percent slopes. This moderately deep, moderately well drained, strongly sloping soil is on foothills and terraces. It formed in residual material weathered from sandstone. Areas are irregular in shape and range from 45 to 75 acres. The natural vegetation is mainly annual and perennial grasses and forbs with areas of brush or conifers. Elevation ranges from 20 to 500 feet. The average annual precipitation ranges from 18 to 25 inches, and the average annual air temperature is about 55 degrees F. The average frost-free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is grayish brown, brown, and light yellowish brown sandy loam about 24 inches thick. The subsoil is brown and strong brown, mottled clay to a depth of about 34 inches. This is directly underlain by soft sandstone. The profile is medium acid at the surface and becomes very strongly acid in the subsoil. Some areas of this soil have a loam surface layer.

Included in this map unit are a few small areas of Concepcion loam and Los Osos loam. In areas covered by a heavy canopy of trees, the air and soil temperatures are a few degrees cooler than the rest of this map unit.

Permeability of this San Simeon soil is very slow, and the available water capacity is very low or low. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 20 to 40 inches. The shrink-swell potential of the subsoil is high.

Most areas of this soil are used as rangeland. In the Cambria area, areas of this soil are used for urban development and recreation.

This soil is poorly suited to use as rangeland. The clay subsoil restricts uniform water movement and root penetration. Because of the loamy surface layer and clay subsoil, this soil is subject to gully erosion. This increases the importance of maintaining a permanent vegetative cover. This soil is typically covered with Monterey pine and understory shrubs, such as live oak, California coffeeberry, and poison-oak. Other areas are dense brush without the pine overstory. The major forage is browse and small areas of understory grasses. The grasses are predominantly annuals with some perennials, such as purple needlegrass, wildryes, and fescues. Undesirable plants include chamise and coyotebush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

In some areas, community development is increasingly important. Building sites and most other engineering uses can require special design because of the slope and the high shrink-swell potential, very slow permeability, low strength, and hardness to pack of the clay subsoil. Septic tank absorption fields do not function properly because of the very slow permeability and the depth to rock. Septic tank absorption field trench lines should be placed on the contour and the size of the absorption area increased. Local road and street design can require that the base material be removed or covered with a more suitable material to reduce maintenance. If this soil is to be used for embankments, dikes, or levees, care should be taken to design the structure in regard to limitations of hardness to pack and a thin layer. The hardness to pack can be overcome by mixing with a more desirable soil, careful placement of material, and maintaining a high degree of compaction and moisture control during construction.

This San Simeon soil is in capability units IVe-3 (15), irrigated and nonirrigated.

201—San Simeon sandy loam, 15 to 30 percent slopes. This moderately deep, moderately well drained, moderately steep soil is on foothills. It formed in residual material weathered from sandstone. Areas are irregular in shape and range from 60 to 800 acres. The natural vegetation is mainly annual and perennial grasses and forbs with a few areas of brush or conifers. Elevation ranges from 20 to 500 feet. The average annual precipitation ranges from 18 to 25 inches, and the average annual air temperature is about 55 degrees F. The average frost-free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is grayish brown, brown, and light yellowish brown sandy loam about 24 inches thick. The subsoil is brown and strong brown, mottled clay to a depth of about 34 inches. This is directly underlain by soft sandstone. The profile is medium acid at the surface and becomes very strongly acid in the subsoil. Some areas of this soil have a loam surface layer.

Included in this map unit are a few small areas of Concepcion loam and Los Osos loam. In areas covered by a heavy canopy of trees, the air and soil temperatures are a few degrees cooler than the rest of this map unit.

Permeability of this San Simeon soil is very slow, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches. The shrink-swell potential of the subsoil is high.

Most areas of this soil are used as rangeland. In the Cambria area, areas of this soil are used for urban development and recreation.

This soil is poorly suited to use as rangeland. The clay subsoil restricts uniform water movement and root penetration. Because of the loamy surface layer and clay subsoil, this soil is subject to gully erosion. This increases the importance of maintaining a permanent vegetative cover. This soil is typically covered with Monterey pine and understory shrubs, such as live oak, California coffeeberry, and poison-oak. Other areas are dense brush without the pine overstory. The major forage is browse and small areas of understory grasses. The grasses are predominantly annuals with some perennials, such as purple needlegrass, wildryes, and fescues. Undesirable plants include chamise and coyotebush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

In some areas, community development is increasingly important. Building sites and most other engineering

uses can require special designs because of the moderately steep slope and the high shrink-swell potential, very slow permeability, low strength, and hardness to pack of the subsoil. Septic tank absorption fields do not function properly because of the moderately steep slope, depth to rock, and very slow permeability of the subsoil. Septic tank absorption field trench lines should be placed on the contour and the size of the absorption area increased. Local road and street design can require that the base material be removed or covered with a more suitable material to minimize maintenance. Where grading is necessary for building sites or roads, soil erosion can be controlled by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes.

This San Simeon soil is in capability subclass VIe (15), nonirrigated.

202—San Simeon sandy loam, 30 to 50 percent slopes. This moderately deep, moderately well drained, steep soil is on foothills. It formed in residual material weathered from sandstone. Areas are irregular in shape and range from 5 to 100 acres. The natural vegetation is mainly annual and perennial grasses and forbs with areas of brush or conifers. Elevation ranges from 20 to 500 feet. The average annual precipitation ranges from 18 to 25 inches, and the average annual air temperature is about 55 degrees F. The average frost-free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is grayish brown, brown, and light yellowish brown sandy loam about 24 inches thick. The subsoil is brown and strong brown, mottled clay to a depth of about 34 inches. This is directly underlain by soft sandstone. The profile is medium acid at the surface and becomes very strongly acid in the subsoil. Some areas of this soil have a loam surface layer. Other places have small areas with a gravelly layer above the sandstone.

Included in this map unit are a few small areas of Concepcion loam and Los Osos loam. In areas covered by a heavy canopy of trees, the air and soil temperatures are a few degrees cooler than the rest of this map unit.

Permeability of this San Simeon soil is very slow, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 20 to 40 inches. The shrink-swell potential of the subsoil is high.

Most areas of this soil are used as rangeland.

This soil is poorly suited to use as rangeland. The clay subsoil restricts uniform water movement and root penetration. Because of the loamy surface layer and clay subsoil, this soil is subject to gully erosion. This increases the importance of maintaining a permanent vegetative cover. This soil is typically covered with Monterey pine and understory shrubs, such as live oak, California coffeeberry, and poison-oak. Other areas are dense brush without the pine overstory. The major forage is browse and small areas of understory grasses. The grasses are predominantly annuals with some perennials, such as purple needlegrass, wildryes, and fescues. Undesirable plants include chamise and coyotebush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. This soil supports excellent stands of Monterey pine. A basal area of 290 square feet has been measured in stands of Monterey pine on this soil, averaging 19 inches in diameter at breast height. Because of the limited rooting depth, windthrow can be a problem on the more exposed, windy locations. Access roads need to have adequate erosion control measures to prevent accelerated erosion.

Most engineering uses can require special designs because of the steep slopes. Other soil characteristics, such as high shrink-swell potential, very slow permeability, low strength, and hardness to pack of the subsoil, need to be carefully considered in designing any buildings or roads and streets. Careful placement of material and maintaining a high degree of compaction and moisture control during construction are needed. Removal of base material or covering with a more suitable material can be necessary if designing roads and building footings. Septic tank absorption field trench lines should be placed on the contour and the size of the absorption area increased.

This San Simeon soil is in capability subclass VIe (15), nonirrigated.

203—Santa Lucia shaly clay loam, 30 to 50 percent slopes. This moderately deep, well drained, steep soil is on mountains. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 15 to 650 acres. The natural vegetation is mainly brush or annual grasses and forbs with scattered hardwoods. Elevation ranges from 180 to 2,500 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is dark gray shaly clay loam about 17 inches thick. The next layer is grayish brown very shaly clay loam to a depth of 36 inches. This is directly underlain by hard, fractured, acid shale. Some areas of this soil have slopes of less than 30 percent, more shaly fragments, or a shaly loam surface layer. Under dense canopies of woody vegetation, the soil and air temperatures may be cooler than is typical for this soil.

Included in this map unit are a few small areas of Calodo loam, Gazos clay loam, Lompico and McMullin loams, and Nacimiento silty clay loam. The major inclusion in this map unit is Lopez very shaly clay loam.

Permeability of this Santa Lucia soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is moderate or high. The effective rooting depth ranges from 20 to 40 inches. Coarse fragments commonly increase as depth increases and make up 30 to 70 percent by volume of the soil.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. Because of the shaly clay loam surface texture and steep slopes, the soil is subject to sheet erosion. Sheet erosion increases the concentration of shale fragments on the soil surface. The shale fragments hinder both natural reseeding and mechanical range seeding. The maintenance of an adequate plant cover helps to control soil erosion. Forage consists of annual grasses. Blue wildrye is a common perennial forage grass. Browse species occurring in dense stands include buckbrush and toyon, which also provide food and cover for many kinds of wildlife. Undesirable plants, which indicate soil disturbance, include black sage and California sagebrush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Remnant areas of hardwoods consist of live oak. The understory, where present, consists of such shrubs as poison-oak, birchleaf mountainmahogany, toyon, and elderberry. Dense stands of oak are in some areas. A net volume of 3,880 cubic feet per acre has been measured on these areas.

Most engineering practices require special design considerations because of the steep slopes. Erosion hazards caused by the construction of access roads can be reduced by minimum grading, runoff and sediment control structures, and the establishment of a permanent plant cover on side slopes. Foundation and footing design sometimes needs to be modified, or building site grading is needed to compensate for slope. Septic tank absorption field trench lines should be placed on the contour and the size of the absorption area increased.

This Santa Lucia soil is in capability subclass VIe (15), nonirrigated.

204—Santa Lucia shaly clay loam, 50 to 75 percent slopes. This moderately deep, well drained, very steep soil is on mountains. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 20 to 3,000 acres. The natural vegetation is mainly brush, annual grasses and forbs, or areas of hardwoods. Elevation ranges from 100 to 2,500 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is dark gray shaly clay loam about 17 inches thick. The next layer is grayish brown very shaly clay loam to a depth of 36 inches. This is directly underlain by hard, fractured, acid shale. Some areas of this soil have slopes of less than 50 percent, more shale fragments, or a shaly loam surface layer. Under dense canopies of woody vegetation, the air and soil temperatures may be cooler than is typical for this soil.

Included in this map unit are very small areas of Calodo loam, Gazos clay loam, and Nacimiento silty clay loam. The major inclusion in this map unit is Lopez very shaly clay loam.

Permeability of this Santa Lucia soil is moderate, and the available water capacity is very low or low. Surface runoff is very rapid, and the hazard of water erosion is high or very high. The effective rooting depth ranges from 20 to 40 inches. Coarse fragments commonly increase as depth increases and make up 30 to 70 percent by volume of the soil.

Most areas of this soil are used as rangeland. A few areas are used for recreation.

This soil is poorly suited to rangeland. Because of the shaly clay loam surface layer and very steep slopes, the soil is subject to sheet erosion. Sheet erosion increases the concentration of shale fragments on the soil surface. The shale fragments hinder natural reseeding and range seeding. If an area is cleared of overstory vegetation, the maintenance of adequate vegetative cover helps to control soil erosion. Some areas of this soil have been cleared for rangeland and are currently without the dense live oak canopy. These areas are moderately suited to range use. Woodland areas are densely overgrown with understory shrubs, such as poison-oak, birchleaf mountainmahogany, toyon, and elderberry. Forage production is minimal in areas of tree vegetation, although wildlife foods, such as mast and berries, are produced, and wildlife cover is plentiful. Ridgetops along the coast are often dominated by closed-cone pines with live oak and associated shrubs as understory. Dense stands of oak are in some areas. A net volume of 3,880 cubic feet per acre has been measured on these areas.

Most engineering practices require special design considerations because of the very steep slopes. Erosion hazards caused by the construction of access roads can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes. If septic tanks are used, the absorption field trench lines should be placed on the contour and the size of the absorption area increased. Foundation and footing designs sometimes need to be modified, or building site grading needs to be done to compensate for slope.

This Santa Lucia soil is in capability subclass VIIe (15), nonirrigated.

205—Santa Lucia very shaly clay loam, 5 to 9 percent slopes. This moderately deep, well drained, moderately sloping soil is on foothills and mountains. It

formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 15 to 90 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 100 to 1,500 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is dark gray very shaly clay loam about 36 inches thick. This is directly underlain by hard, fractured, acid shale. Some areas of this soil have slopes of more than 9 percent, less shale fragments, or a shaly loam surface layer. Some small areas are also more than 40 inches deep to rock. Under dense canopies of woody vegetation, the air and soil temperatures may be cooler than is typical for this soil.

Included in this map unit are a few small areas of Still gravelly loam and Zaca clay.

Permeability of this Santa Lucia soil is moderate, and the available water capacity is very low or low. Surface runoff is medium, and the hazard of water erosion is slight. The effective rooting depth ranges from 20 to 40 inches. Coarse fragments commonly increase as depth increases and make up 30 to 70 percent by volume of the soil.

Most areas of this soil are used for small grains and hay crops or as rangeland. One area within Montana de Oro State Park is used for recreation.

This soil is suited to dryfarming. However, yields are generally low relative to other dryfarmed areas because of the low water holding capacity. A cropping system that includes crop rotation, cover crops, fertilization, and crop residue use helps to improve soil tilth, texture, fertility, and water holding capacity. Farming on the contour or across the slope minimizes erosion.

This soil is moderately suited to rangeland. The very shaly clay loam surface layer is subject to sheet erosion. This increases the concentration of shale fragments on the soil surface. The shale fragments hinder natural reseeding and mechanical range seeding. The maintenance of an adequate plant cover helps to control soil erosion. Forage consists of annual grasses. Blue wildrye is a common perennial forage grass. Remnant areas of hardwoods consist of live oak. The understory, where present, consists of such shrubs as poison-oak, birchleaf mountainmahogany, toyon, and elderberry. Dense stands of oak are in some areas. A net volume of 3,880 cubic feet per acre has been measured on this soil.

Some areas of this soil are used for homesite development. Septic tank absorption fields, however, do not function properly because of the depth to rock. The size of the filter field sometimes needs to be increased. Preparation of areas to be landscaped is difficult if the numerous shale fragments need to be removed. Recreational development can be hindered by the presence of shale fragments. When irrigated, controlling the amount of water applied helps to prevent excessive runoff. Because of the slope and rooting depth, sprinkler or drip methods of irrigation are best suited.

This Santa Lucia soil is in capability unit IVe-4 (15), irrigated and nonirrigated.

206—Santa Lucia very shaly clay loam, 9 to 15 percent slopes. This moderately deep, well drained, strongly sloping soil is on foothills and mountains. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 15 to 150 acres. The natural vegetation is mainly brush or annual grasses and forbs with scattered hardwoods. Elevation ranges from 100 to 2,500 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is dark gray very shaly clay loam about 36 inches thick. This is directly underlain by hard, fractured, acid shale. Some areas of this soil have slopes of more than 15 percent, less shale fragments, or a shaly loam surface layer. Under dense canopies of woody vegetation, the soil and air temperatures may be cooler than is typical for this soil.

Included in this map unit are a few small areas of Diablo clay and Still gravelly sandy clay loam. The major inclusion in this map unit is Lopez very shaly clay loam.

Permeability of this Santa Lucia soil is moderate, and the available water capacity is very low or low. Surface runoff is medium, and the hazard of water erosion is slight or moderate. The effective rooting depth ranges from 20 to 40 inches. Coarse fragments commonly increase as depth increases and make up 30 to 70 percent by volume of the soil.

Most areas of this soil are used for small grains and hay crops or as rangeland. One area near Pismo Beach is used for urban development.

This soil is suited to dryfarming. However, yields are generally low relative to other dryfarmed areas because of the low water holding capacity. A cropping system that includes crop rotation, cover crops, fertilization, and crop residue use helps to improve soil tilth, texture, fertility, and water holding capacity. Farming on the contour or across the slope minimizes erosion. Structural measures, such as water diversions, grassed waterways, and controlled water outlets, are sometimes needed to inhibit rill and gully erosion.

This soil is moderately suited to rangeland. The very shaly clay loam surface layer is subject to sheet erosion. This increases the concentration of shale fragments on the soil surface. The shale fragments hinder natural reseeding and mechanical range seeding. The maintenance of an adequate plant cover helps to control soil erosion. Forage consists of annual grasses. Blue wildrye is a common perennial forage grass. Browse

species occurring in dense stands include buckbrush and toyon, which also provide food and cover for many kinds of wildlife. Undesirable plants, which indicate soil disturbance, include black sage and California sagebrush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained. Remnant areas of hardwoods consist of live oak. The understory, where present, consists of such shrubs as poison-oak, birchleaf mountainmahogany, toyon, and elderberry. Dense stands of oak are in some areas. A net volume of 3,880 cubic feet per acre has been measured on this soil.

Some areas of this soil are used for homesite development. Septic tank absorption fields do not function properly because of the depth to rock. The size of the absorption field may need to be increased. Preparation of areas to be landscaped is difficult if the numerous shale fragments need to be removed. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the slope and rooting depth, sprinkler or drip methods of irrigation are best suited.

This Santa Lucia soil is in capability unit IVe-4 (15), irrigated and nonirrigated.

207—Santa Lucia very shaly clay loam, 15 to 30 percent slopes. This moderately deep, well drained, moderately steep soil is on foothills and mountains. It formed in residual material weathered from sandstone or shale. Areas are irregular in shape and range from 20 to 1,200 acres. The natural vegetation is mainly brush or annual grasses and forbs with areas of hardwoods. Elevation ranges from 100 to 2,500 feet. The average annual precipitation ranges from 15 to 35 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is dark gray very shaly clay loam about 36 inches thick. This is directly underlain by hard, fractured, acid shale. Some areas of this soil have slopes of more than 30 percent and less shale fragments. Some small areas have a shaly loam surface layer. Under dense canopies of vegetation, the soil and air temperatures may be cooler than is typical for this soil.

Included in this map unit are a few small areas of Calodo loam, Diablo clay, Gazos clay loam, Nacimiento silty clay loam, and Still gravelly sandy clay loam. The major inclusion in this map unit is Lopez very shaly clay loam.

Permeability of this Santa Lucia soil is moderate, and the available water capacity is very low or low. Surface runoff is rapid, and the hazard of water erosion is moderate or high. The effective rooting depth ranges from 20 to 40 inches. Coarse fragments commonly increase as depth increases and make up 30 to 70 percent by volume of the soil.

Most areas of this soil are used as rangeland. A few small areas are used for small grains and hay crops or recreation.

This soil is not well suited to dryfarming because of the slope and low water holding capacity. When farmed, intensive management is required to control erosion. A crop rotation system, cover crops, fertilization, and crop residue use should be employed. Tillage should be restricted to the more gently sloping areas, and it should be done on the contour. Diversions should be constructed as required to reduce runoff. Controlled outlets and water courses planted to vegetation are necessary to prevent gully erosion. Gully plugs or drop structures are necessary in some areas to prevent channel cutting.

This soil is poorly suited to rangeland. The very shaly clay loam surface texture is subject to sheet erosion. Sheet erosion increases the concentration of shale fragments on the soil surface. The shale fragments hinder natural reseeding and mechanical range seeding. If an area is cleared of overstory vegetation, the maintenance of adequate vegetative cover helps to control soil erosion. Some areas of this soil have been cleared for rangeland and are currently without the dense live oak canopy. These areas are moderately suited to range use. Woodland areas are densely overgrown with understory shrubs, such as poison-oak, birchleaf mountainmahogany, toyon, and elderberry. Forage production is minimal, although wildlife foods, such as mast and berries, are produced, and wildlife cover is plentiful. Dense stands of oak are in some areas. A net volume of 3,880 cubic feet per acre has been measured on this soil.

Rural homesite development requires special design considerations because of the steep slopes and depth to rock. Erosion hazards created by building site preparation and road construction can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes. Septic tank absorption fields should be placed on the contour, and the absorption field size should be increased to compensate for the depth to rock and steep slope.

This Santa Lucia soil is in capability subclass VIe (15), nonirrigated.

208—Still gravelly loam, 9 to 15 percent slopes. This very deep, well drained, strongly sloping soil is on alluvial fans and marine terraces. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape or long and narrow and range from 5 to 80 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 16 to 22 inches, and the average annual air temperature is about

58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is very dark gray gravelly loam about 23 inches thick. This is underlain by grayish brown gravelly loam to a depth of 60 inches. Some areas of this soil have higher amounts of gravel. Near Ragged Point, the soil contains strata of finer material.

Included in this map unit are a few small areas of Lopez very shaly clay loam and Santa Lucia very shaly clay loam.

Permeability of this Still soil is moderately slow, and the available water capacity is moderate. Surface runoff is medium, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland. A few areas are used for urban purposes.

This soil is moderately suited to rangeland. The gravelly loam surface layer is subject to sheet erosion. Sheet erosion increases the concentration of gravel on the soil surface. The gravel content hinders natural and mechanical range seedings. The maintenance of adequate plant cover helps to control soil erosion. Because of the gravel content of the surface layer, this soil is droughty and has a relatively short period of quality forage. The major forage plants are annuals. Purple needlegrass, a perennial forage grass, is common nearer to the coast. Undesirable plants include coyotebush, English plantain, and fennel. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Some areas of this soil are used for homesite development. Septic tank absorption fields do not function properly because of the moderately slow permeability. This can be corrected by increasing the size of the absorption field. This soil has moderate limitations for local roads and streets and building sites because of the high shrink-swell potential, lack of sufficient strength, and slope. Subgrade or base material should be replaced or covered with suitable base material to minimize maintenance on local roads and streets and to prevent structural damage of the foundations and footings of buildings. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the slope, sprinkler or drip methods of irrigation are best suited.

This Still soil is in capability units IIIe-4 (14), irrigated and nonirrigated.

209—Still gravelly sandy clay loam, 0 to 2 percent slopes. This very deep, well drained, nearly level soil is on alluvial plains and marine terraces. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 5 to 250 acres. The natural vegetation is mainly perennial and annual grasses and forbs. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 16 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is very dark gray gravelly sandy clay loam about 40 inches thick. This is underlain by light brownish gray gravelly sand to a depth of 60 inches or more. A few areas of this soil are gravelly sandy loam throughout the profile, and some areas have higher amounts of gravel throughout.

Included in this map unit are a few small areas of Diablo clay and Chamise shaly loam.

Permeability of this Still soil is moderately slow, and the available water capacity is moderate. Surface runoff is slow, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for vegetables, hay crops, or small grains. Some areas are used for orchards.

This soil has few limitations for agriculture except for its gravelly texture, which can cause minor tilling problems. Minimum management practices, such as crop rotation or cover crops, fertilization, crop residue use, and proper tillage, help to maintain the soil fertility and tilth. Since this soil has a high water holding capacity, irrigation water should be managed to provide water replacement within the soil profile as needed to maintain optimum crop production. Furrow or sprinkler irrigation systems are best suited to row crop production, and sprinklers or drip systems are best for orchards. Vegetables, such as lettuce, cauliflower, carrots, and cabbage, and hay and grain crops, such as oats and barley, are well suited to this soil. Specialty crops, such as walnuts, kiwi, and lemons, do well in locations where they are climatically suited.

This soil is well suited to rangeland. However, the gravelly sandy clay loam surface layer is subject to sheet erosion. Sheet erosion increases the concentration of gravel on the surface. The gravel content hinders natural reseeding and mechanical range seeding. Maintenance of adequate plant cover helps to control soil erosion. Many areas of this soil have been cultivated and are without perennial cover. The major forage plants are annuals, including burclover. Purple needlegrass is a common perennial forage. California sycamore is common along drainageways. Understory vegetation includes elderberry, California coffeeberry, and California rose. Undesirable plants include cheeseweed, fennel, coyotebush, and California sagebrush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

A few areas of this soil are used for rural homesite development. Septic tank absorption fields do not function properly because of the moderately slow permeability of the upper 40 inches of this soil. This can

be corrected by digging absorption field trenches well below the moderately slow permeable layer and into the gravelly sand substratum. Pond reservoir areas are subject to seepage because of the rapidly permeable substratum. This can be corrected by sealing.

This Still soil is in capability units IIs-4 (14), irrigated and IIIs-4 (14), nonirrigated.

210—Still gravelly sandy clay loam, 2 to 9 percent slopes. This very deep, well drained, gently sloping and moderately sloping soil is on alluvial plains and marine terraces. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow and range from 5 to 250 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 16 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days, depending on location.

Typically, the surface layer is very dark grayish brown gravelly sandy clay loam about 23 inches thick. This is underlain by grayish brown gravelly loam to a depth of 60 inches or more. Some areas of this soil contain higher amounts of gravel. Near Ragged Point, some areas of this soil contain strata of finer material.

Included in this map unit are a few small areas of Diablo clay, Lopez very shaly clay loam, Nacimiento silty clay loam, and Santa Lucia very shaly clay loam.

Permeability of this Still soil is moderately slow, and the available water capacity is moderate or high. Surface runoff is slow or medium, and the hazard of water erosion is slight. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for hay or vegetable crops. One area within Montana de Oro State Park is used for recreation. Some other areas are used for urban development.

This soil has few limitations for row crops if properly leveled. Because of excessive slope, however, leveling is not possible in some locations. Minimum management practices, such as crop rotation or cover crops, fertilization, crop residue use, and proper tillage, help to maintain soil tilth and fertility and to prevent erosion. Because this soil has a high water holding capacity, irrigation water should be managed to provide water replacement within the soil profile as needed to maintain optimum crop production. Furrow or sprinkler methods of irrigation are well suited to this soil. Row crops commonly grown include lettuce, cabbage, and cauliflower. Oats is the most commonly grown hay crop, and it is usually dryfarmed. Dryfarmed tillage done across the slope or on the contour minimizes the potential for erosion.

This soil is well suited to rangeland. However, the gravelly sandy clay loam surface layer is subject to sheet erosion. Sheet erosion increases the concentration of gravel on the soil surface. The gravel content hinders natural reseeding and mechanical range seeding. Maintenance of adequate plant cover helps to control soil erosion. Many areas of this soil have been cultivated and are without perennial cover. The major forage plants are annuals, including burclover. Purple needlegrass is a common perennial forage. California sycamore is common along drainageways. Understory vegetation includes elderberry, California coffeeberry, and California rose. Undesirable plants include cheeseweed, fennel, coyotebush, and California sagebrush. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Some areas of this soil are used for urban development. Septic tank absorption fields do not function properly in this soil because of the moderately slow permeability. This can be corrected by increasing the size of the absorption field or by placing the absorption lines below the moderately slowly permeable layer. This soil has moderate limitations for local roads and streets and building sites because of shrink-swell potential and lack of sufficient strength. Subgrade or base material should be replaced or covered with suitable base material to minimize maintenance on local roads and streets and to prevent structural damage of the foundations and footings of buildings. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the slope, sprinkler or drip methods of irrigation are best suited.

This Still soil is in capability units IIe-4 (14), irrigated and IIIe-4 (14), nonirrigated.

211—Still gravelly sandy clay loam, 15 to 25 percent slopes. This very deep, well drained, moderately steep soil is on alluvial fans and marine terraces. It formed in alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 20 to 90 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 10 to 1,000 feet. The average annual precipitation ranges from 16 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 365 days.

Typically, the surface layer is very dark grayish brown gravelly sandy clay loam about 23 inches thick. This is underlain by grayish brown gravelly loam to a depth of 60 inches or more. Some areas of this soil have high amounts of gravel. Near Ragged Point, some areas of this soil contain strata of finer material.

Included in this map unit are a few small areas of Lopez very shaly clay loam and Santa Lucia very shaly clay loam.

Permeability of this Still soil is moderately slow, and the available water capacity is moderate or high. Surface

runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. Because of the gravelly sandy clay loam surface layer and moderately steep slopes, the soil is subject to sheet erosion. Sheet erosion increases the concentration of gravel on the soil surface. The gravel content hinders natural reseeding and mechanical range seeding. Maintenance of adequate plant cover helps to control soil erosion. Some areas of this soil have been cultivated and are without perennial cover. The major forage plants are annuals, including burclover. Purple needlegrass is a common perennial forage. On north slopes where higher moisture regimes occur, dense stands of oaks are common. Understory vegetation includes elderberry, California coffeeberry, and California rose. Undesirable plants include coyotebush, California sagebrush, and cocklebur.

Rural homesite development and most other engineering practices can require special design considerations because of the slope, moderately slow permeability, and moderate erosion hazard. Septic tank absorption lines should be installed on the contour. Absorption lines should be placed below the moderately slowly permeable layer. Increasing the size of the absorption area helps to compensate for the moderately slow permeability. Erosion hazards created by building site preparation and road construction can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes.

This Still soil is in capability unit IVe-4 (14), nonirrigated.

212—Suey silt loam, 2 to 9 percent slopes. This very deep, well drained, gently sloping and moderately sloping soil is on terraces and foothills. It formed in deposits of windblown silt. Areas are irregular in shape and range from 20 to 800 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 300 to 800 feet. The average annual precipitation ranges from 13 to 18 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is brown silt loam about 40 inches thick. The underlying material is brown silt loam to a depth of 60 inches or more. The profile is neutral at the surface and becomes moderately alkaline as depth increases. A few areas of this soil have a very fine sandy loam surface layer.

Included in this map unit are a few small areas of Calodo loam, Nacimiento silty clay loam, and Zaca clay. Also included is a soil that is similar to the Suey soil but has a heavy clay subsoil.

Permeability of this Suey soil is moderate, and the available water capacity is high. Surface runoff is slow or medium. The hazard of water erosion is slight or moderate, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for lemons, grapes, avocados, and sugar beets. A few areas are used for small grains and hay crops.

This soil has few limitations for orchards or vineyards. Minimum soil conservation practices should include a cover crop of volunteer or seeded annual grass, proper tillage, and irrigation water management. The cover crops effectively reduce the erosion hazards and help to maintain soil tilth and fertility. Equipment traffic should be restricted to the minimum needed for crop production in order to prevent soil compaction. Drip or sprinkler irrigation systems are well suited to these soils. The water holding capacity is high, so water applications should be closely monitored to prevent over-irrigation. Dryland farming should be done across the slope or on the contour. Grain and hay stubble and other residue left in place after harvest minimizes soil blowing.

This soil is well suited to rangeland. However, the silt loam surface layer is subject to sheet erosion and, in years of higher rainfall, gully erosion. The maintenance of an adequate plant cover is the best protection against these erosion hazards. Plant roots penetrate the silt loam surface layer easily. In years of normal rainfall, forage production is high. Many areas of this soil have been cultivated, removing perennial plants and often resulting in a poor composition of annual forage. The major forage plants are annuals, including burclover. Purple needlegrass and some bluegrass are locally abundant perennial forage grasses. Undesirable plants include coyotebush and fennel. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

This soil has few limitations for most engineering practices. If used for embankments, dikes, and levees, the hazard of seepage and piping can be corrected by mixing the soil with a more suitable material, careful placement of material, and maintaining a high degree of compaction and moisture control. Because the soil is subject to slight and moderate water erosion, care should be taken that, when irrigated, the appliation rate does not exceed the infiltration rate and cause runoff. Sprinkler or drip methods of irrigation are best suited. This soil is also subject to moderate soil blowing, and a permanent plant cover should be maintained at all times.

This Suey soil is in capability units IIIe-1 (15), irrigated and nonirrigated.

213—Suey silt loam, 9 to 15 percent slopes. This very deep, well drained, strongly sloping soil is on terraces and foothills. It formed in deposits of windblown

silt. Areas are irregular in shape and range from 20 to 80 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 300 to 800 feet. The average annual precipitation ranges from 13 to 18 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is brown silt loam about 40 inches thick. The underlying material is brown silt loam to a depth of 60 inches or more. The profile is neutral at the surface and becomes moderately alkaline as depth increases. A few areas of this soil have a very fine sandy loam surface layer.

Included in this map unit are a few small areas of Calodo loam, Nacimiento silty clay loam, and Zaca clay. Also included is a similar soil that has a heavy clay subsoil.

Permeability of this Suey soil is moderate, and the available water capacity is high. Surface runoff is medium. The hazards of water erosion and soil blowing are moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for lemons, grapes, and avocados, or as rangeland.

This soil is well suited to orchards and vineyards. However, intensive management is required to reduce the erosion hazards. Cover crops of volunteer or seeded annual grasses are required to prevent soil blowing and water erosion. Structural measures, such as diversions, grassed waterways, and controlled runoff water outlets, are sometimes required. Orchards should be planted on the contour with access roads for fruit harvest and maintenance at approximately every fourth tree row on the steeper slopes. Access roads can serve as water diversions if properly sloped and outletted. Drip or sprinkler irrigation systems are best suited to this soil. Irrigation water applications should be closely monitored in order to prevent over-irrigation.

This soil is well suited to rangeland. However, the silt loam surface layer is subject to sheet erosion and, in years of higher rainfall, gully erosion. The maintenance of an adequate plant cover is the best protection against these erosion hazards. Plant roots penetrate the silt loam surface layer easily. In years of normal rainfall, forage production is high. Many areas of this soil have been cultivated, removing perennial plants and often resulting in a poor composition of annual forage. The major forage plants are annuals, including burclover. Purple needlegrass and some bluegrass are locally abundant perennial forage grasses. Undesirable plants include coyotebush and fennel. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

If this soil is used for homesite development, special design considerations can be needed because of the strong slopes. Septic tank absorption field trench lines, if used, should be placed on the contour. Because of the low strength, road design can require that the subgrade be replaced or covered with more desirable material. The increased erosion hazard caused by building site preparation and road construction can be reduced by minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on side slopes. When irrigated, this soil is subject to moderate water erosion. Care should be taken that the application rate does not exceed the infiltration rate, causing runoff. Sprinkler or drip methods of irrigation are best suited. Because this soil is subject to moderate soil blowing, a permanent plant cover should be maintained at all times.

This Suey soil is in capability units IVe-1 (15), irrigated and nonirrigated.

214—Suey silt loam, 15 to 30 percent slopes. This very deep, well drained, moderately steep soil is on terraces and foothills. It formed in deposits of windblown silt. Areas are irregular in shape and range from 20 to 120 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 300 to 800 feet. The average annual precipitation ranges from 13 to 18 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is brown silt loam about 40 inches thick. The underlying material is brown silt loam to a depth of 60 inches or more. The profile is neutral at the surface and becomes moderately alkaline as depth increases. A few areas of this soil have a very fine sandy loam surface layer.

Included in this map unit are a few small areas of Calodo loam, Nacimiento silty clay loam, and Zaca clay.

Permeability of this Suey soil is moderate, and the available water capacity is high. Surface runoff is rapid. The hazard of water erosion is high, and the hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for small grains or as rangeland.

Since this soil is very deep and has a high water holding capacity, it is well suited to dryland farming. However, because of the excessive slope, farming activities should be restricted to the least hazardous slopes and tilling should be done on the contour. Ground cover is very important for control of soil blowing and water erosion. Structural measures, such as water diversion, grassed waterways, and controlled water outlets, are sometimes required. Drop structures, debris basins, gully plugs, or rock riprap may be necessary to stabilize or prevent erosion in watercourses.

This soil is well suited to rangeland. However, the silt loam surface layer is subject to sheet and gully erosion. The maintenance of adequate plant cover is the best

protection against these erosion hazards. Plant roots penetrate the silt loam surface layer easily and, in years of normal rainfall, forage production is high. The major forage plants are annuals, including annual legumes. Purple needlegrass and some bluegrass are locally abundant perennial forage grasses. Undesirable plants include foxtail barley and tarweed. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Homesite development and most other engineering practices require special design considerations because of the slope. Septic tank absorption fields do not function properly in this soil because of the slope and moderate permeability. Septic tank absorption field trench lines should be placed on the contour and the absorption lines lengthened. The increased erosion hazard caused by building site preparation and road construction can be reduced by minimum grading, installing runoff and sediment control structures, and establishing a permanent plant cover on side slopes. When irrigated, the silt loam surface layer is subject to moderate water erosion. Care should be taken so that the application rate does not exceed the infiltration rate and cause runoff. Sprinkler or drip methods of irrigation are best suited. This soil is subject to moderate soil blowing; therefore, a permanent plant cover should be maintained at all times.

This Suey soil is in capability subclasses VIe (15), irrigated and nonirrigated.

215—Suey silt loam, 30 to 50 percent slopes. This very deep, well drained, steep soil is on terraces and foothills. It formed in deposits of windblown silt. Areas are irregular in shape and range from 20 to 400 acres. The natural vegetation is mainly annual grasses and forbs. Elevation ranges from 300 to 800 feet. The average annual precipitation ranges from 13 to 18 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 330 to 365 days, depending on location.

Typically, the surface layer is brown silt loam about 40 inches thick. The underlying material is brown silt loam to a depth of 60 inches or more. The profile is neutral at the surface and becomes moderately alkaline as depth increases.

Included in this map unit are a few small areas of Calodo loam, Nacimiento silty clay loam, and Zaca clay.

Permeability of this Suey soil is moderate, and the available water capacity is high. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth is 60 inches or more.

Most areas of this soil are used as rangeland.

This soil is well suited to rangeland. However, the silt loam surface layer is subject to sheet and gully erosion. The maintenance of adequate plant cover is the best protection against these erosion hazards. Plant roots penetrate the silt loam surface layer easily and, in years of normal rainfall, forage production is high. The major forage plants are annuals, including annual legumes. Purple needlegrass and some bluegrass are locally abundant perennial forage grasses. Undesirable plants include foxtail barley and tarweed. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Most engineering practices require special design considerations because of the steep slopes. Septic tank absorption field trench lines, if used, should be placed on the contour. Because of the very high hazard of erosion, road design should include minimum grading and runoff and sediment control structures. Because this soil is also subject to moderate soil blowing, a permanent plant cover should be maintained at all times.

This Suey soil is in capability subclasses VIIe (15), irrigated and nonirrigated.

216—Tierra sandy loam, 2 to 9 percent slopes. This very deep, moderately well drained, gently sloping and moderately sloping soil is on dissected terraces and hills. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 20 to 140 acres. The natural vegetation is mainly annual grasses and forbs with some scattered hardwoods. Elevation ranges from 100 to 1,000 feet. The average annual precipitation ranges from 16 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is gray and light gray sandy loam about 9 inches thick. The subsurface layer is light gray sandy loam about 2 inches thick. The subsoil is gray, brown, and pale brown sandy clay to a depth of 42 inches. The underlying material to a depth of 60 inches is pale brown sandy clay loam. Small areas are a similar soil that has a gravelly or cobbly subsoil.

Included in this map unit are a few small areas of Briones loamy sand, Chamise shaly loam, Concepcion loam, and Diablo clay.

Permeability of this Tierra soil is very slow, and the available water capacity is low or moderate. Surface runoff is slow or medium. The hazard of soil blowing is moderate, and the hazard of water erosion is slight or moderate. The effective rooting depth is 60 inches or more, although the roots in the subsoil are limited to cracks in the clay. This soil has high shrink-swell potential in the subsoil.

Most areas of this soil are used as rangeland or for hay crops and small grains.

When dryfarmed, the most common crops are grain barley and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue

utilization, and proper tillage help to maintain soil tilth, structure, fertility, and water holding capacity. Tilled areas should be worked on the contour or across the slope if contour farming is not possible. Crop residue maintained on the soil surface helps to control soil blowing and water erosion. Structural measures, such as grassed waterways and water diversions, are sometimes necessary to control water erosion.

This soil is moderately suited to rangeland. The clay subsoil restricts uniform movement of water and plant roots. Because this characteristic increases the hazard of gully erosion, it is important to maintain a permanent vegetative cover. The sandy loam surface layer hinders revegetation efforts; rapid moisture and temperature changes retard seed germination. Once forage plants are established, with roots penetrating into the claypan, forage quality commonly remains high in the spring. In wet years, water ponds in swale areas and retards early plant growth. Forage plants are predominantly annuals with a fair amount of legumes. Purple needlegrass is common, although it is difficult to maintain without proper grazing management. Occasional California white oaks are common in areas away from the coast. Undesirable plants include foxtail barley, plantains, and verbenas. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Building sites, roads and streets, and most other engineering uses of this soil require special designs, or they are impractical because of the high shrink-swell potential, hardness to pack, low strength, and very slow permeability of the clay subsoil. If the soil is used for septic tank absorption fields, absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability. When constructing buildings or local roads and streets, the subgrade should be replaced or covered with a more suitable base material to minimize maintenance on roads and streets or prevent structural damage of foundations and footings because of low strength and hardness to pack of the subsoil. This soil is well suited to pond reservoir areas. However, if this soil is used for embankments, dikes, or levees, care should be taken to design the structure in regard to limitation of hardness to pack. This limitation can be overcome by mixing with more desirable soil. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of the very slow permeability, sprinkler or drip methods of irrigation are best suited to this soil. This soil is subject to moderate soil blowing. Therefore, a permanent plant cover should be maintained at all times.

This Tierra soil is in capability units IIIe-3 (15), irrigated and nonirrigated.

217—Tierra loam, 9 to 15 percent slopes. This very deep, moderately well drained, strongly sloping soil is on dissected terraces and hills. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 15 to 150 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 100 to 1,000 feet. The average annual precipitation ranges from 16 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is gray loam about 9 inches thick. The subsurface layer is light gray sandy loam about 2 inches thick. The subsoil is brown sandy clay to a depth of about 42 inches. The underlying material to a depth of 60 inches is pale brown sandy clay loam. Small areas of a similar soil have a gravelly or cobbly subsoil.

Included in this map unit are a few small areas of Briones loamy sand, Chamise shaly loam, and Diablo clay.

Permeability of this Tierra soil is very slow, and the available water capacity is low or moderate. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth is 60 inches or more, although roots in the subsoil are limited to cracks in the clay. This soil has high shrink-swell potential in the subsoil.

Most areas of this soil are used for hay crops and small grains or as rangeland.

When dryfarmed, the most common crops are grain barley and oat hay. Management practices that include crop rotation, cover crops, fertilization, crop residue utilization, and proper tillage help to maintain soil tilth, structure, fertility, and water holding capacity. Tilled areas should be worked on the contour or across the slope if contour farming is not possible. Stubble and crop residue left in place after harvest helps to control erosion. Structural measures, such as grassed waterways and water diversions, are sometimes necessary to control erosion.

This soil is moderately suited to rangeland. The clay subsoil restricts uniform movement of water and penetration of plant roots. This characteristic increases the hazard of gully erosion. It is important to maintain a permanent vegetative cover. Well established forage plants, with roots penetrating into the claypan, commonly produce quality forage in the spring. Forage plants are predominantly annuals, including burclover and other annual legumes. Purple needlegrass is common and is an important forage component. Occasional California white oaks are common in areas away from the coast. Undesirable plants include plantains, fiddleneck, and poison-hemlock. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Building sites, roads and streets, and most other engineering uses of this soil require special designs because of the high shrink-swell potential, hardness to pack, low strength, and very slow permeability of the clay subsoil. If the soil is used for septic tank absorption fields, absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability. When constructing local roads and streets or buildings, the subgrade should be replaced or covered with a more suitable base material to minimize maintenance of the roads and streets and prevent structural damage to foundations and footings because of the high shrink-swell potential, hardness to pack, and low strength of the subsoil. Slope limits the use of this soil for pond reservoir areas because it reduces the storage potential. If this soil is used for embankments, dikes, or levees, care should be taken to design the structure in regard to limitation of hardness to pack. This limitation can be overcome by mixing with more desirable soil. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of slope and very slow permeability, sprinkler or drip methods of irrigation are best suited to this soil.

This Tierra soil is in capability units IVe-3 (15), irrigated and nonirrigated.

218—Tierra loam, 15 to 30 percent slopes. This very deep, moderately well drained, moderately steep soil is on dissected terraces and hills. It formed in old alluvium weathered from sedimentary rocks. Areas are irregular in shape and range from 30 to 200 acres. The natural vegetation is mainly annual grasses and forbs with scattered hardwoods. Elevation ranges from 100 to 1,000 feet. The average annual precipitation ranges from 16 to 24 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 350 days, depending on location.

Typically, the surface layer is gray loam about 9 inches thick. The subsurface layer is light gray sandy loam about 2 inches thick. The subsoil is brown sandy clay to a depth of 42 inches. The underlying material to a depth of 60 inches is pale brown sandy clay loam. Small areas are a similar soil that has a gravelly or cobbly subsoil.

Included in this map unit are a few small areas of Briones loamy sand, Chamise shaly loam, and Diablo clay.

Permeability of this Tierra soil is very slow, and the available water capacity is low or moderate. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth is 60 inches or more, although the roots in the subsoil are limited mainly to cracks in the clay. This soil has high shrink-swell potential in the subsoil.

Most areas of this soil are used for hay crops and small grains or as rangeland.

This soil is not well suited to dryfarming because of the excessive slope and low water holding capacity. When farmed, intensive management is required to control erosion. A crop rotation system, cover crops, fertilization, and crop residue use should be employed. Restrict tillage to the more gently sloping areas and till on the contour. Diversions should be constructed as required to reduce runoff on farmed areas. Controlled outlets and grassed water courses are necessary to prevent gully erosion. Gully plugs or drop structures are necessary in some areas to prevent channel cutting.

This soil is moderately suited to rangeland. The clay subsoil restricts the uniform movement of water and penetration of plant roots. This creates a hazard of gully erosion, which increases the importance of maintaining a permanent vegetative cover. Well established forage plants, with roots penetrating into the claypan, can produce quality forage in the spring. Forage plants are predominantly annuals, including burclover and other legumes. Purple needlegrass is common and is an important forage component. Occasional California white oak are common in areas away from the coast. Undesirable plants include plantains, fiddleneck, and poison-hemlock. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Building sites, local roads and streets, and most other engineering uses of this soil require special designs because of the moderately steep slope or the high shrink-swell potential, very slow permeability, hardness to pack, and the low strength of the subsoil. The hazard of erosion caused by the steepness of slope and very slow permeability can be reduced by using minimum grading when constructing buildings or roads. When constructing local roads and streets or buildings, the subgrade should be replaced or covered with a more suitable base material to minimize maintenance of the roads and streets and to prevent structural damage to foundations and footings. Establishment of permanent plant cover on side slopes and development of sediment control structures also minimize erosion on this soil.

Septic tank absorption fields do not function properly on this soil beause of the very slow permeability and slope. Place absorption lines on the contour and below the very slowly permeable layer. Increasing the size of the absorption field helps to compensate for the very slow permeable layer. Slope limits the use of this soil for pond reservoir areas by reducing the storage potential. If this soil is used for embankments, dikes, or levees, care should be taken to design the structure in regard to limitation of hardness to pack. Hardness to pack can be overcome by mixing with more desirable soil. When irrigated, controlling the amount of water applied prevents excessive runoff. Because of slope and very

slow permeability, sprinkler or drip methods of irrigation are best suited to this soil.

This Tierra soil is in capability unit IVe-3 (15), nonirrigated.

219—Tujunga loamy sand, 0 to 2 percent slopes. This very deep, somewhat excessively drained, nearly level soil is on alluvial fans and flood plains. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow or irregular in shape and range from 5 to 1,000 acres. The natural vegetation is mainly annual grasses and forbs with some hardwoods. Elevation ranges from 0 to 1,000 feet. The average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 325 days, depending on location.

Typically, the surface layer is pale brown loamy sand about 11 inches thick. This is underlain by layers of very pale brown sand and loamy sand to a depth of 31 inches. Below this to a depth of 60 inches or more is pale brown gravelly sand. This soil is calcareous throughout. Some areas of this soil have a loam surface layer. Other areas have a dark surface layer that is less than 7 inches thick.

Included in this map unit are a few small areas of Camarillo loam, Mocho fine sandy loam, Mocho Variant fine sandy loam, and Psamments and Fluvents.

Permeability of this Tujunga soil is rapid, and the available water capacity is low. Surface runoff is slow. The hazard of water erosion is slight, and the hazard of soil blowing is high. The effective rooting depth is 60 inches or more. This soil is subject to occasional brief periods of flooding, where unprotected, from about December through March.

Most areas of this soil are used for vegetable and hay crops.

This soil is suited to intensive farming. However, a high degree of management is necessary for optimum production. Minimum requirements include a conservation cropping system, proper tillage, and irrigation water management. The cropping system should include crop rotation and cover crops, crop residue use, and fertilization. This helps to improve soil tilth and structure and increase the water holding capacity. Restrict tillage operations to minimum requirements for crop production. Irrigation water should be applied at rates appropriate to the water holding capacity. In general, this means reduced rates and increased frequencies. Crops with efficient root systems, such as sugar beets or carrots, are well suited to this soil. Dryland hay crop yields are sometimes affected by the relatively low water holding capacity. Structural measures, such as diversions and drainage ditches, can be necessary to prevent flooding.

This soil is moderately suited to rangeland. The loamy sand surface layer is subject to both channeling and soil deposition by runoff water from upslope areas. Because of the coarse texture, this soil is very droughty and produces forage for a short period. The major forage plants are annuals. Groves of live oak and such shrubs as California sagebrush and coyotebush provide a small amount of cover for livestock and wildlife. Some areas have been cultivated and do not have adequate vegetative cover. Undesirable plants include cocklebur and Russian-thistle. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

If this soil is used for urban development and other engineering practices, it should be protected from flooding. Embankments, dikes, and levees, if constructed from this material, are subject to seepage and piping. This can be corrected by mixing this soil with a more desirable material, careful placement of material, and maintaining a high degree of compaction and moisture control. Pond reservoir areas and sanitary landfill areas need to be sealed to prevent seepage. When irrigated, because of the droughtiness and fast intake rate of the loamy sand surface, sprinkler or drip methods of irrigation are best suited. Because this soil has a high soil blowing hazard, a good plant cover should be maintainted at all times.

This Tujunga soil is in capability units IIIe-4 (14), irrigated and IVe-4 (14), nonirrigated.

220—Tujunga loamy sand, frequently flooded, 2 to 9 percent slopes. This very deep, somewhat excessively drained, gently sloping and moderately sloping soil is on alluvial fans and flood plains. It formed in alluvium weathered from sedimentary rocks. Areas are long and narrow or irregular in shape and range from 45 to 175 acres. The natural vegetation is mainly annual grasses and forbs with hardwoods along drainageways. Elevation ranges from 0 to 1,000 feet. The average annual precipitation ranges from 12 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 275 to 325 days, depending on location.

Typically, the surface layer is pale brown loamy sand about 11 inches thick. This is underlain by layers of very pale brown sand and loamy sand to a depth of 31 inches. Below this to a depth of 60 inches or more is pale brown gravelly sand. This soil is calcareous throughout. Some areas of this soil have a loam surface layer.

Included in this map unit are a few small areas of Corralitos sand, Elder sandy loam, Marimel sandy clay loam, and Psamments and Fluvents.

Permeability of this Tujunga soil is rapid, and the available water capacity is low. Surface runoff is slow or medium. The hazard of water erosion is slight or moderate, and the hazard of soil blowing is high. The effective rooting depth is 60 inches or more. This soil is

subject to frequent, brief periods of flooding from about December through March.

Most areas of this soil are used as rangeland. A few areas are used for small grains and hay crops.

This soil is not well suited to dryland farming because of the low water holding capacity and the potential for crop losses from flooding. Surface drainage ditches and water diversions help to relieve the flooding problem in some areas. Green manure crops and crop residue utilization help to improve soil tilth, structure, and water holding capacity. Crops commonly grown on this soil include barley and oats.

This soil is poorly suited to rangeland. The loamy sand surface layer is subject to soil deposition. The areas of silt and sand deposition tend to be very droughty because of their low available water capacity. Annual forage production is very low. Ground water is usually available on this soil. Deep-rooted, water-loving plants, such as mule fat, coyotebush, willows, and California sycamore, are common. The major forage is browse. Clumps of deergrass and purple needlegrass are common perennial forage grasses. Many areas are considered unique plant and wildlife areas; grazing should be controlled to preserve these areas. Undesirable plants include poison oak, cocklebur, and poison-hemlock. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

If this soil is used for urban development and other engineering practices, it should be protected from flooding. Embankments, dikes, and levees, if constructed from this material, are subject to seepage and piping. This can be corrected by mixing this soil with a more desirable material, careful placement of material, and maintaining a high degree of compaction and moisture control. Pond reservoir areas and sanitary landfill areas need to be sealed to prevent seepage. Pond reservoir areas should be located on lesser slopes to minimize the loss of storage potential. Because of the slope, droughtiness, and fast intake rate of the loamy sand surface layer, sprinkler or drip methods of irrigation are best suited. This soil has a high soil blowing hazard; a good plant cover should be maintained at all times.

This Tujunga soil is in capability subclasses VIw (14), irrigated and nonirrigated.

221—Xererts-Xerolls-Urban land complex, 0 to 15 percent slopes. This complex consists of nearly level to strongly sloping soils and miscellaneous areas that are covered by urban structures. Areas of this complex are irregular in shape and range from 5 to 350 acres. The soil materials have been modified by earthmoving equipment or covered by urban structures so that much of their original shape and physical characteristics have been altered. Average annual precipitation ranges from 15 to 30 inches, and the average annual air temperature is about 58 degrees F.

The Xererts of this complex are Cropley or Diablo soils. These are both clay soils that shrink and swell appreciably on changes in moisture content. The Xerolls are mainly Concepcion, Los Osos, Marimel, and Salinas soils. The Los Osos soils have a slowly permeable clay subsoil and Concepcion soils have a very slowly permeable clay subsoil that shrink and swell with changes in moisture. The Marimel soils are poorly drained alluvial soils. The Salinas soils are well drained, silty clay loam alluvial soils.

Most areas of these soils are used for urban development.

When used for urban development, the shrink-swell potential of the Xererts soil and the Xerolls subsoil and the very slow and slow permeability of the Xerolls subsoil need to be considered in the design and building of foundations, concrete structures, and paved areas. These limitations can be minimized by backfilling, using blankets of crushed rock and sand beneath concrete structures, using vapor barriers, and diverting runoff away from structures. Replanting disturbed areas as soon as possible helps to control erosion. If the soils are used as septic tank absorption fields, the poorly drained, alluvial Xerolls should be avoided. The very slow and slow permeability of these soils can be overcome by increasing the size of the absorption field and backfilling the trench with sand and gravel. If the density of housing is moderate or high, a community sewage system should be considered.

The percentage of the various soils in this complex and the degree of urbanization vary from place to place.

This complex is not assigned to a capability subclass.

222—Xerorthents, eroded. This map unit consists of steep through extremely steep, shallow soils on soft sandstone or semiconsolidated sediments. Slopes are commonly over 50 percent but range from 30 to 100 percent. A typical area is east of Lopez Canyon Reservoir in the Phoenix Creek area. Elevation ranges from near sea level to 1,500 feet. Natural vegetation is sparse brush, occasional small oak trees, and a very sparse understory of grass and forbs. The average annual rainfall ranges from 14 to 20 inches, and the average annual air temperature is about 59 degrees F.

These soils are light colored loamy sand, sandy loam, and loam 10 to 30 inches deep to soft rock. They are severely eroded and produce large amounts of sediment. Included are areas of Pismo, Briones, and Gaviota soils.

When the soil surface is bare, runoff is very rapid, and the hazard of erosion is very high. Permeability is rapid, and the available water capacity is low or very low.

These areas have no agricultural value. They are best suited to wildlife habitat and watershed. A good vegetative cover should be maintained to help prevent

excessive runoff and erosion. These areas should also be protected from fire and grazing.

These Xerorthents are in capability subclass VIIIe (15), nonirrigated.

223—Xerorthents, escarpment. This map unit consists of moderately steep and steep, relatively smooth, descending slopes at the ends of terraces. Slopes range from 20 to 50 percent and average about 40 percent. Areas are long and narrow in shape. Typically, characteristics of the soil material vary considerably within a short distance. The soils are fairly well stabilized. The vegetative cover is annual grasses and shrubs. The average annual rainfall ranges from 14 to 20 inches, and the mean annual air temperature is about 59 degrees F.

Soil material is variable, but generally it is light colored loam, sandy loam, or loamy sand 24 to 48 inches deep. The available water holding capacity is low to moderate.

When the soil surface is bare, runoff is rapid, and the hazard of erosion is high. Some areas have deep gullies. Areas too small to delineate are shown by a special escarpment symbol on the soil map.

Areas of this map unit can be used for grazing. Livestock grazing should be managed to protect the soil from excessive erosion. Erosion can be controlled by maintaining adequate plant cover on the soil surface.

These Xerothents are in capability subclass VIIe (15), nonirrigated.

224—Zaca clay, 9 to 15 percent slopes. This deep, well drained, strongly sloping or rolling soil is on low lying foothills. It formed in residual material weathered from calcareous sandstone, mudstone, or shale. Areas are irregular in shape or long and narrow and range from 45 to 1,050 acres. The natural vegetation is mainly annual grasses and forbs with a few areas of hardwoods along drainageways. Elevation ranges from 200 to 1,500 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 325 days, depending on location.

Typically, the surface layer is very dark gray clay about 36 inches thick. The underlying material is very dark grayish brown and yellowish brown silty clay to a depth of about 54 inches. Soft, fractured, calcareous mudstone is at a depth of about 54 inches. The profile is moderately alkaline and calcareous throughout. Some areas have a silty clay surface layer.

Included in this map unit are small areas of Cropley clay, soils on lesser slopes, areas of soils similar to Zaca soil but moderately deep and having a clay loam surface layer, and Diablo clay. In the Nipomo Valley, there are minor areas of Santa Lucia shaly clay loam.

Permeability of this Zaca soil is slow, and the available water capacity is high. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 40 to 60 inches.

Most areas of this soil are used for small grains and hay crops or as rangeland. A few areas are used for lemons and avocados.

This soil is suited to dryland farming on the more gentle slopes. Orchard plantings can be adapted to these soils if a high degree of management is utilized. Avocado orchards, in particular, should be well planned and managed because there is a high potential hazard for avocado root rot. Cover crops are needed in orchards to prevent soil erosion and to improve soil tilth and structure. Structural measures, such as runoff water diversions and controlled outlets, can be required. This soil is highly susceptible to compaction and is difficult to till when excessively wet or dry. Tillage operations should be timed to periods when soil moisture is slightly below the field moisture capacity. Drip irrigation systems are best suited to this soil. Irrigation frequencies and application rates should be closely monitored to provide minimum requirements for optimum crop production. Dryland farming should be on the contour or across the slope to minimize the erosion hazard.

This soil is well suited to rangeland. However, the clay texture increases the hazard of surface compaction. This can be reduced by grazing when the surface layer is moderately dry. The high available water capacity promotes a relatively long, slow growing forage season. Erosion can be controlled by maintaining adequate plant residue on the soil surface. This soil has a significant amount of lime, which causes a rapid tieup of phosphorus. This tends to affect the legume and grass composition. This soil is typically under annual grasses. Purple needlegrass is common in many areas. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

If this soil is used for homesite development, foundations and footings can require special design because of the high shrink-swell potential and low strength. Septic tank absorption fields do not function properly because of the slow permeability and depth to rock. Absorption lines should be installed on the contour. The use of sandy backfill for the trench and long absorption lines helps to compensate for the slow permeability and low strength. Road design can require that the subgrade be replaced or covered with a more suitable material to minimize maintenance. Pond reservoir storage potential is decreased because of the slope. If this soil is used for embankments, dikes, or levees, careful placement of material, mixing the soil with a more desirable material, and maintaining a high degree of compaction and moisture control can be required. When irrigated, controlling the amount of water applied

prevents excessive runoff. Because of slope, slow intake, and slow permeability, sprinkler or drip methods of irrigation are best suited to this soil.

This Zaca soil is in capability units IIIe-5 (15), irrigated and nonirrigated.

225—Zaca clay, 15 to 30 percent slopes. This deep, well drained, moderately steep soil is on foothills and mountains. It formed in residual material weathered from calcareous sandstone, mudstone, or shale. Areas are irregular in shape and range from 10 to 750 acres. The natural vegetation is mainly annual grasses and forbs with a few areas of hardwoods along drainageways. Elevation ranges from 200 to 2,000 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 350 days, depending on location.

Typically, the surface layer is very dark gray clay about 36 inches thick. The underlying material is very dark grayish brown and yellowish brown silty clay to a depth of about 54 inches. Soft, fractured, calcareous mudstone is at a depth of about 54 inches. The profile is moderately alkaline and calcareous throughout. Some areas have a silty clay surface layer.

Included in this map unit are small areas of Diablo clay and Nacimiento silty clay loam. Also included are areas of soils that are similar to Zaca soil but are moderately deep and have a clay loam surface layer. Near Orcutt Road and Corral de Piedra Creek are similar soils that differ by having up to 30 percent gravel content.

Permeability of this Zaca soil is slow, and the available water capacity is high. Surface runoff is rapid, and the hazard of water erosion is moderate. The effective rooting depth ranges from 40 to 60 inches. This soil is subject to slippage when wet.

Most areas of this soil are used as rangeland. A few areas are used for lemons, avocados, and small grains.

This soil is suited to dryland farming on the more gentle slopes. Orchard plantings can be adapted to this soil if a high degree of management is utilized. Avocado orchards, in particular, should be well planned and managed because there is a high potential hazard for avocado root rot. Cover crops are needed in orchards to prevent soil erosion and to improve soil tilth and structure. Structural measures, such as runoff water diversions and controlled outlets, can be required. This soil is highly susceptible to compaction and is difficult to till when excessively wet or dry. Tillage operations should be timed to periods when soil moisture is slightly below the field moisture capacity. Drip irrigation systems are best suited to this soil. Irrigation frequencies and application rates should be closely monitored to provide minimum requirements for optimum crop production. Dryland farming should be on the contour or across the slope to minimize the erosion hazard.

This soil is well suited to rangeland. The clay texture, however, increases the hazard of surface compaction. This can be reduced by grazing when the surface layer is moderately dry. The high available water capacity promotes a relatively long, slow growing forage season. Erosion can be controlled by maintaining adequate plant residue on the soil surface. This soil has a significant amount of lime, which causes a rapid tieup of phosphorus. This tends to affect the legume and grass composition. This soil is typically under annual grasses. Purple needlegrass is common in many areas. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

If this soil is used for homesite development, special design considerations are required because of the moderately steep slopes, high shrink-swell potential, and low strength. Septic tank absorption fields do not function properly because of the slope, slow permeability, and depth to rock. Absorption lines should be installed on the contour. The use of sandy backfill for the trench and long absorption lines helps to compensate for the slow permeability and depth to rock. Road design can require that the subgrade be replaced or covered with a more suitable material to minimize maintenance. Erosion hazards created by building site preparation and road construction can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes.

This Zaca soil is in capability unit IVe-5 (15), nonirrigated.

226—Zaca clay, 30 to 50 percent slopes. This deep, well drained, steep soil is on foothills and mountains. It formed in residual material weathered from calcareous sandstone, mudstone, or shale. Areas are irregular in shape or long and narrow and range from 25 to 100 acres. The natural vegetation is mainly annual grasses and forbs with a few areas of hardwoods along drainageways. Elevation ranges from 200 to 2,000 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 325 days, depending on location.

Typically, the surface layer is very dark gray clay about 36 inches thick. The underlying material is very dark grayish brown and yellowish brown silty clay to a depth of about 54 inches. Soft, fractured, calcareous mudstone is at a depth of about 54 inches. The profile is moderately alkaline and calcareous throughout. Some areas have a silty clay surface layer.

Included in this map unit are small areas of Diablo clay and Nacimiento silty clay loam. Also included are areas

of soils that are similar to Zaca soil but are moderately deep and have a clay loam surface layer. Included in the area of Highway 46 are soils that receive about 35 inches of precipitation annually.

Permeability of this Zaca soil is slow, and the available water capacity is high. Surface runoff is rapid, and the hazard of water erosion is high. The effective rooting depth ranges from 40 to 60 inches. This soil is subject to slippage when wet.

Most areas of this soil are used as rangeland.

This soil is well suited to rangeland. The clay texture, however, increases the hazard of surface compaction. This can be reduced by grazing when the surface layer is moderately dry. The high available water capacity promotes a relatively long, slow growing forage season. Erosion can be controlled by maintaining adequate plant residue on the soil surface. This soil has a significant amount of lime, which causes a rapid tieup of phosphorus. This tends to affect the legume and grass composition. This soil is typically under annual grasses. Purple needlegrass is common in many areas. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

If this soil is used for homesite development, special design considerations are required because of the steep slopes, high shrink-swell potential, and low strength. Septic tank absorption fields do not function properly because of the slope, slow permeability, and depth to rock. Absorption lines should be installed on the contour. The use of sandy backfill for the trench and long absorption lines helps to compensate for the slow permeability and depth to rock. Road design can require that the subgrade be replaced or covered with a more suitable material. Erosion hazards created by building site preparation and road construction can be reduced by minimum grading, using runoff and sediment control structures, and establishing a permanent plant cover on side slopes.

This Zaca soil is in capability subclass VIe (15), nonirrigated.

227—Zaca clay, 50 to 75 percent slopes. This deep, well drained, very steep soil is on foothills and mountains. It formed in residual material weathered from calcareous sandstone, mudstone, or shale. Areas are irregular in shape and range from 20 to 120 acres. The natural vegetation is mainly annual grasses and forbs or dense stands of hardwoods. Elevation ranges from 200 to 2,000 feet. The average annual precipitation ranges from 15 to 22 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season ranges from 250 to 325 days, depending on location.

Typically, the surface layer is very dark gray clay about 36 inches thick. The underlying material is very dark grayish brown and yellowish brown silty clay to a depth of about 54 inches. Soft, fractured, calcareous mudstone is at a depth of about 54 inches. The profile is moderately alkaline and calcareous throughout.

Included in this map unit are small areas of Diablo clay and Nacimiento silty clay loam.

Permeability of this Zaca soil is slow, and the available water capacity is high. Surface runoff is very rapid, and the hazard of water erosion is very high. The effective rooting depth ranges from 40 to 60 inches. This soil is subject to slippage when wet.

Most areas of this soil are used as rangeland.

This soil is moderately suited to rangeland. The very steep slopes increase the hazard of erosion and increase the importance of maintaining a good plant cover. The clay surface layer is subject to surface compaction. This can be reduced by grazing when the surface layer is moderately dry. The high available water capacity influences a rather long, slow growing forage season. This soil has a significant amount of lime, which causes a rapid tieup of phosphorus. This tends to affect the legume and grass composition. This soil is typically under annual grasses. Purple needlegrass is common in many areas. Undesirable plants include milkthistle, poison-hemlock, cheeseweed, and mustard. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred plants increases. Livestock grazing should be managed so that the desired balance of plant species is maintained.

Most engineering practices require special design considerations because of the very steep slopes. All grading for access roads should be kept to a minimum. Runoff and sediment control structures should be installed, and a permanent plant cover should be established.

This Zaca soil is in capability subclass VIIe (15), nonirrigated.

prime farmland

Prime farmland, as defined by the United States Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It must either be used for producing food or fiber or be available for these uses. It has the soil quality, length of growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is managed properly. Prime farmland produces the highest yields with minimal investment of energy and economic resources, and farming it results in the least disturbance of the environment.

Prime farmland commonly has an adequate and dependable supply of moisture from precipitation or irrigation. It also has a favorable temperature and length of growing season and an acceptable soil reaction. It

has few if any rock fragments and is permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods and is not flooded during the growing season. The slope is no more than 6 percent. Soils that are limited by a hazard of flooding can qualify for prime farmland if this limitation is overcome by such practices as flood control. Onsite investigation is needed to determine the extent of this limitation.

About 55,770 acres, or nearly 10 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The following map units meet the soil requirements for prime farmland when irrigated. This list does not constitute a recommendation for a particular land use.

111 Camarillo sandy loam
112 Camarillo loam, drained
113 Capistrano sandy loam, undulating
114 Capistrano sandy loam, rolling
127 Cropley clay, 0 to 2 percent slopes
128 Cropley clay, 2 to 9 percent slopes
129 Diablo clay, 5 to 9 percent slopes
135 Elder sandy loam, 2 to 5 percent slopes
136 Elder sandy loam, 5 to 9 percent slopes
138 Elder sandy loam, occasionally flooded, 0 to 2 percent slopes
139 Elder sandy loam, occasionally flooded, 2 to 9 percent slopes
140 Garey sandy loam, 2 to 9 percent slopes
169 Marimel sandy clay loam, occasionally flooded
170 Marimel silty clay loam, drained
173 Mocho fine sandy loam
174 Mocho loam
175 Mocho silty clay loam
176 Mocho Variant fine sandy loam
186 Perkins fine sandy loam, 2 to 9 percent slopes
196 Salinas loam, 0 to 2 percent slopes
197 Salinas silty clay loam, 0 to 2 percent slopes
198 Salinas silty clay loam, 2 to 9 percent slopes
209 Still gravelly sandy clay loam, 0 to 2 percent slopes
210 Still gravelly sandy clay loam, 2 to 9 percent slopes
219 Tujunga loamy sand, 0 to 2 percent slopes

use and management of the soils

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

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

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the 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 in harmony with the natural soil.

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 and pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service and the Storie index used by the University of California Agricultural Experiment Station are explained; and the estimated yields of some of the main crops are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

major soil management concerns for crops and pasture

This section was prepared by Gerald Czarnecki, soil conservationist, and Clarence U. Finch, conservation agronomist, Soil Conservation Service

The paragraphs that follow briefly discuss the chief management practices for all soils of the San Luis Obispo County, Coastal Part survey area that are suitable for crops and pasture. The major concerns when farming the soils are maintaining or improving the production capacity and preventing erosion. Needed management practices include, but are not limited to, a conservation cropping system, crop residue use, minimum tillage, irrigation water management, cover crops, erosion control, excess water removal, pasture management, and chiseling or subsoiling. Technical assistance on planning and application practices suitable for the soil on a particular farm can be obtained from local representatives of the Soil Conservation Service and the California Cooperative Extension Service.

A conservation cropping system consists of growing crops in combination with needed cultural and management measures. If soil improving crops and practices more than offset the soil depleting crops and deteriorating practices, then it is a good conservation cropping system. Conservation cropping systems are necessary on all tilled soils in the survey area.

Soil improving practices in a conservation cropping system include using rotations that contain grasses and legumes and returning crop residue to the soil. Other practices are using green manure crops of grasses and legumes, proper tillage, adequate fertilization, weed and pest controls, and all other good soil culture or management practices.

Many diverse cropping systems are used in the survey area. Several combinations are used for individual crops. A typical example is celery, broccoli, lettuce, and cauliflower grown in rotation. This rotation system normally results in the production of approximately 2-1/2 crops per year. All crop residue and unharvested crops

are returned to the soil. Proper tillage practices are adhered to, and the correct amounts and types of fertilizer are employed. Pests and weeds are controlled with chemical applications. Occasionally, subsoiling is employed to break up tillage pans, thereby improving soil tilth. This rotational system could be improved upon by growing a grass cover crop periodically. The cover crop would improve soil structure, which would enhance water availability, improve air movement, and increase root penetration.

Crop residue use is the return of crop residue to the soil. Residue returned to the soil helps to maintain soil tilth, organic matter content, and fertility and helps to control erosion. On sloping lands, residue should be left on or near the soil surface during critical erosion periods.

Minimum tillage is using the minimum number of operations necessary to control weeds, incorporate crop residue, obtain favorable air and water movement in the soil, and prepare an adequate seedbed. Tillage operations break down soil structure, reduce organic matter content, and generally create a plowpan. These conditions increase the hazards of soil erosion, and the plowpan limits permeability and restricts root penetration. Varying the depth of tillage operations will delay the development of the plowpan, and infrequent shallow chiseling will help to break up the pan. Combining tillage operations to reduce the number of trips over a field, and delaying tillage while soils are wet are other important factors in maintaining soil tilth and preventing compaction.

Irrigation water management is achieved by controlling the rate, amount, and timing of irrigation water application to soils to supply crop needs in a planned and efficient manner. This utilizes the available irrigation water and supplies moisture for desired crop response to minimize soil erosion and plant nutrient loss. Also, it controls undesirable water loss and protects water quality. Irrigation methods used in the survey area include furrow, border, sprinkler, and drip systems. Furrow and border irrigation should be limited to slopes of 3 percent or less (fig. 18). Sprinkler irrigation is adapted to all tillable soils of the area. Drip irrigation is suitable for strawberries, orchards, and vineyards. Irrigation water should be applied at a rate and amount to meet crop needs and soil characteristics without excess runoff or deep percolation.

Cover crops are necessary in orchards and vineyards and on other soils left fallow. Cover crops provide protection from erosion and maintain or improve water penetration, soil tilth, and fertility. Cover crops can be volunteer native annual plants or seeded plants, and they can be grown under irrigated or nonirrigated conditions. Examples of plants recommended for seeding as cover crops are such grasses as Blando brome, Zorro fescue, Wimmera 62 ryegrass, and annual bluegrass and such legumes as Lana vetch, rose or crimson clover, and burclover. Many other plant varieties are used, including combinations of grasses and legumes.

Erosion control is generally needed on sloping soils. As the steepness of the slope increases, erosion hazards increase. Erosion can be recognized by the accumulation of soil materials at the base of slopes, in drainageways, and against fence lines, or as rills and gullies on the slope.

Many practices are used to control erosion. Good land leveling or smoothing, selection of the best method of irrigation, and control of irrigation water help to prevent erosion on irrigated soils. Cover crops, crop residue utilization, the use of vegetative cover in rotation, proper tillage, and cross-slope farming are some management practices used to control erosion.

Structural measures may be needed to control erosion, either individually or in combination. Such structures as diversions, grassed waterways, grade stabilization structures, water retention structures, or streambank stabilization may be needed.

Excess water removal may be necessary because of an accumulation of excess water, either from rainfall or irrigation, in low lying areas, swales, or at the lower end of irrigated fields. Excess water results in decreased crop production and may provide a habitat for weeds and mosquitoes. Excess water may be controlled by shaping and grading, proper land leveling, construction of open drainage ditches, tile drains, the use of irrigation tailwater recovery systems, and proper management of irrigation water.

Pasture management is needed for irrigated pastures to prevent soil deterioration, provide for maximum production, maintain a desirable plant community, and extend the life of the pasture. Practices necessary in a pasture management program include irrigation water management, rotation grazing using a minimum of three fields, fertilization, harrowing or dragging to scatter droppings, and clipping as necessary to maintain uniform growth. Grazing should start when plants are 8 to 10 inches high. Remove livestock when a minimum of 3 to 4 inches of stubble remains.

The selection of an adaptable plant mixture when establishing a pasture is important. For most soils in the survey area, mixtures containing Akaroa orchardgrass or Goars fescue, with birdsfoot trefoil, narrowleaf trefoil, alfalfa, or rose clover are well adapted. With proper pasture management, these species produce an abundance of high quality forage.

Chiseling or subsoiling is a method for increasing the effective rooting depth of soils that have a plowpan or hardpan. Chiseling the plowpan and deep ripping the hardpan will enhance permeability and internal drainage, help to prevent a perched water table, and allow deeper root penetration. Chiseling also temporarily benefits soils with a heavy clay subsoil. However, the heavy clay subsoil will eventually return to its original position. The

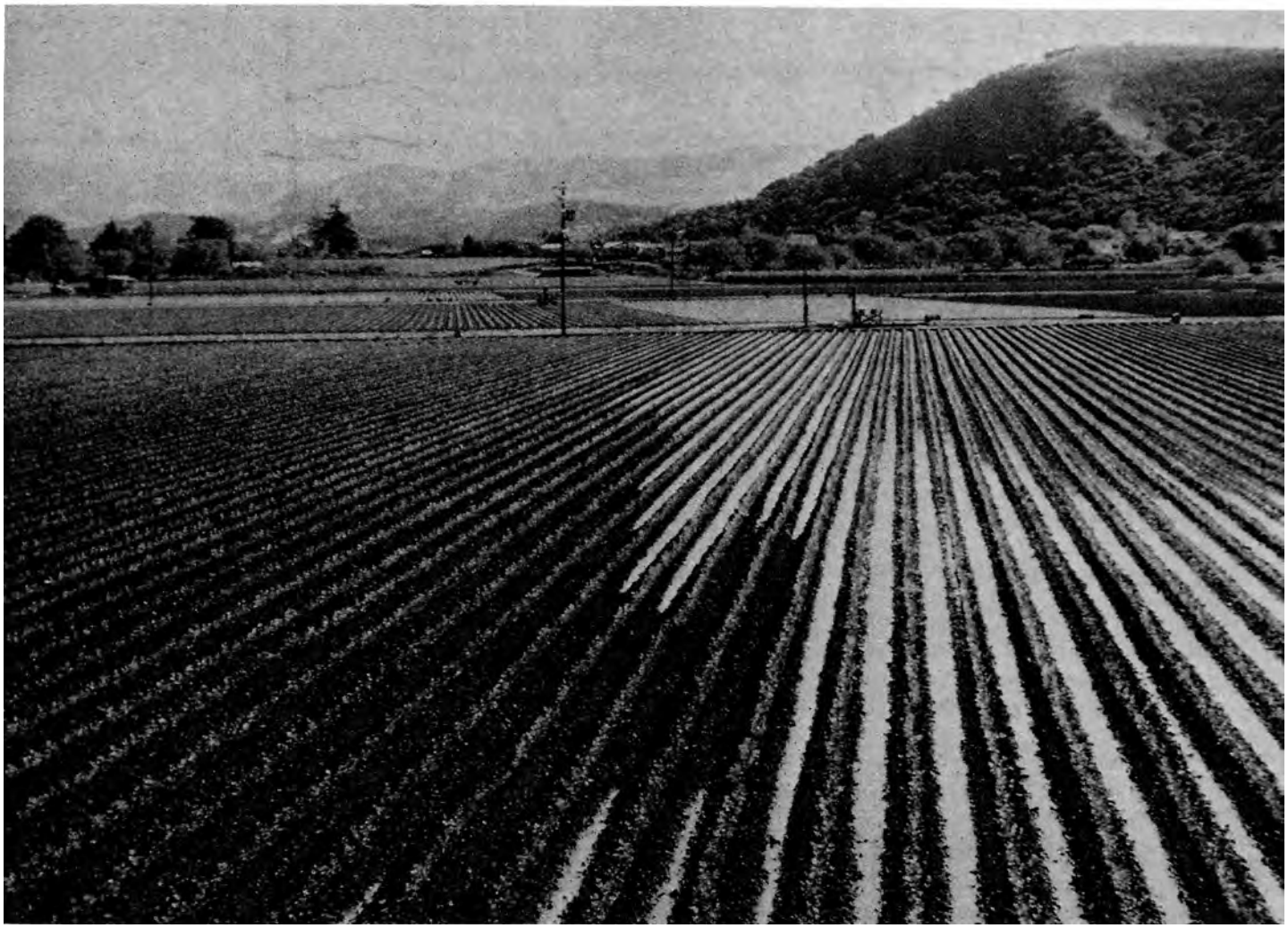

Figure 18.—Furrow irrigation is possible on the finer textured soils, such as Salinas or Mocho soils.

depth of ripping should be based on the depth of the hardpan of a given soil.

crops and pasture plants best suited to the soils

Where climate and topography are similar, crops that can be grown are related closely to the kind of soil. Crops suited to soils of the survey area are listed and discussed under three broad categories: fruit, nut, and berry crops; vegetable crops; and field crops. Suitability of crops for each soil is presented in the section "Detailed soil map units."

Fruit, nut, and berry crops suited to the soils in the survey area include walnuts, lemons, avocados, grapes, and strawberries. Walnuts are generally grown on deep, well drained soils in the Arroyo Grande and Huasna areas. Lemon trees are in the foothill areas near Santa Maria and in the Nipomo area on sites that are relatively frost free. Avocados are increasing in importance. Several mature avocado orchards are in production in the hills near San Luis Obispo. Newer plantings occur throughout the survey area on well drained soils where climatic conditions are suitable. Most of the grape industry is located near Santa Maria; however, soils and climate would permit expansion of this enterprise. Strawberries require a high degree of management, and they are currently grown on relatively small acreages in the Nipomo and Arroyo Grande areas.

Vegetable crops suited to the soils and climate in the survey area include almost all irrigated vegetable crops that are grown in California. The vegetable crops of greatest economic importance include broccoli, carrots, cauliflower, celery (fig. 19), lettuce (fig. 20), peas, peppers, and potatoes. These are grown on the alluvial plains, flood plains, and terraced soils along the coastal

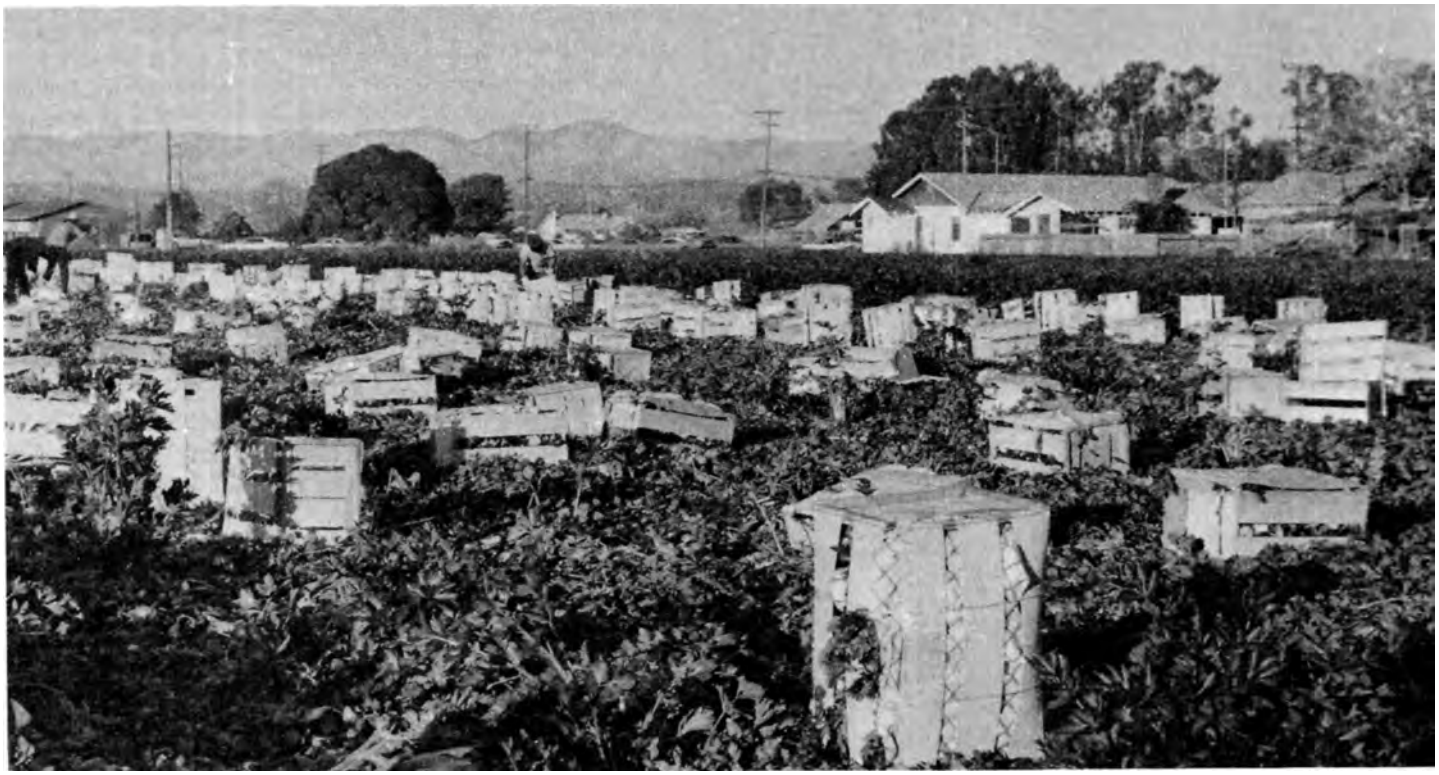

Figure 19.—Celery being harvested and packaged

Figure 20.—Lettuce is a common crop on the Mocho soils in the Arroyo Grande Valley

area from Morro Bay south to the county line and on many of the inland valleys and upland areas that have suitable soils and water supplies.

Field crops grown under irrigation include alfalfa hay, grain and silage corn, and sugar beets. Grain hay, small grains, and beans are the primary dryfarmed field crops. These crops are grown on a variety of soils throughout the survey area. Yields are best on moderately deep to deep soils that have a high water holding capacity. The predominant grain crop is barley. Small white, pink, garbanzo, and lima beans are grown; however, the garbanzos are most common. Oats are the main crop grown for hay.

soil blowing

Many coarse textured soils of the area are very susceptible to soil blowing. Difficulty may be encountered during land leveling for irrigation and in preparation for planting and establishing the crop. On dryfarmed areas, soil blowing often damages the plants by abrasion when they are young. Irrigated soil that is susceptible to soil blowing should be used for crops that provide protection, such as orchards and vineyards or pasture. If possible, cultivation should be done during the months when the possibility of soil blowing damage is the least. Full use should be made of crop residue, cover crops, and minimum tillage. Ordinarily, coarse textured soils that are erodible by the wind are too droughty for dryland cultivation. However, if they are cultivated, wind erosion can be partially controlled by leaving stubble and crop residue on the surface, keeping the surface cloddy, using subsurface tillage, cultivating in alternate strips, and using windbreak plantings. Stripcropping at a right angle to the prevailing wind also aids in reducing soil blowing damage.

Field, farmstead, and feedlot windbreaks used with other tillage practices are effective in reducing soil blowing. Tree and shrub plantings provide additional benefits, such as reduced home heating, improved irrigation efficiency, beautification, and improved wildlife habitat.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

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

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

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

Crops other than those shown in table 3 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. 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 grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider 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 and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs.

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

Class I soils have slight 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 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 limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

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

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6. The numbers used to designate units within the subclass are:

0.—A problem or limitation is caused by stony, cobbly, or gravelly material in the substratum.
1.—A problem or limitation is caused by slope or by actual or potential erosion hazard.
2.—A problem or limitation of wetness is caused by poor drainage or flooding.
3.—A problem or limitation of slow or very slow permeability of the subsoil or substratum is caused by a clayey subsoil or a substratum that is semiconsolidated.
4.—A problem or limitation is caused by sandy or gravelly soils that have a low available water capacity.
5.—A problem or limitation is caused by a fine textured or very fine textured surface layer.
6.—A problem or limitation is caused by salt or alkali.
7.—A problem or limitation is caused by rocks, stones, or cobblestones.
8.—A problem or limitation exists in the root zone, which generally is less than 40 inches thick over massive bedrock and lacks sufficient moisture for plants.
9.—A problem or limitation is caused by low or very low fertility, acidity, or toxicity that cannot be corrected by adding normal amounts of fertilizer, lime, or other amendments.

No unit designations are shown for class I soils since soil characteristics are similar for all soils in this class. Unit designations are deleted from soils in classes V through VIII because these soils are normally not intensively managed for cropland.

The capability classification of each map unit is given in the section "Detailed soil map units."

land resource areas

Certain characteristics, such as climate, landforms, crops, and problems of soil and water management, are similar throughout fairly large geographic areas. Accordingly, practices and specifications for use and management of soils are assembled in resource guides for similar areas. Each area is identified by a number and a name. For example, Land Resource Area 14 identifies the Central California Coastal Valleys, including Lompoc, Los Alamos, Santa Maria, Arroyo Grande, Salinas, Santa Clara, and Sonoma Valleys and many other small coastal valleys. Many factors involving use and management of soils and water are basically similar in all of these valleys, and certain general specifications are the same for each area.

California has 16 land resource areas. Three land resource areas are in this survey area. Land Resource Area 14 identifies the Central California Coastal Valleys; 15 identifies the Central California Coast Range; and 20 identifies the Southern California Mountains.

Land Resource Area 20 is mainly in the Los Padres National Forest. Fringes of it are in this survey area. These fringes are similar to Land Resource Area 15. For the purposes of this survey, the fringes are considered part of Land Resource Area 15. No description is given for Land Resource Area 20.

The resource areas of this survey area are described in the following paragraphs. Capability units in two or more resource areas can be similar and can have the same capability unit symbol, but the management needs differ. These management differences result from differences in climate, vegetation, availability and quality of irrigation water, and kinds of crops that can be grown. For this reason, capability class, subclass, and unit symbols at the end of each mapping unit description are followed by (14) or (15) to identify the resource area.

Land Resource Area 14. This resource area consists of the Santa Maria Valley, Arroyo Grande Valley, upper Huasna Valley, and other small valleys and the fringes of terraces and low rounded hills along these valleys. Elevation ranges from sea level to about 2,000 feet. The

climate is characterized by cool to warm summers and cool, rainy winters. The frost-free season is 275 to 365 days. Coastal fog and winds have a marked effect on the climate, moderating the temperature.

It is assumed that in this area irrigation water is generally available for all irrigable soils and that the length of growing season does not affect placement of soils in the capability grouping. It is also assumed that a high water table is not an extensive problem, although it may affect the choice of crops or prevent farming in small areas.

Drainage is needed to improve crop production in some areas or to bring other areas into production. The hazard of flooding is not generally considered a permanent soil limitation in the capability classification. However, extensive flood-control measures are needed in many areas.

Land Resource Area 15. This resource area consists of hills and mountains that are adjacent to the valleys and alluvial fans of resource area 14. All soils not in resource area 14 have been placed into resource area 15 in this survey area.

These soils are generally not irrigated and are used mainly for range. Small areas are used for dryfarmed grain, beans, and hay. The summers are generally warm and dry, and the winters are cool and moist. Annual precipitation ranges from 13 to 45 inches. The frost-free season is from 250 to 365 days. Elevation ranges from about 50 to 3,000 feet.

Storie index

This section was prepared by Eugene L. Begg, lecturer and soil specialist, University of California, Davis

The soils of the San Luis Obispo County, Coastal Part survey area are rated according to the Storie Index (*8,9,10*). This index expresses numerically the relative degree of suitability of a soil for general intensive agriculture. The rating is based on soil characteristics only and is obtained by evaluating such factors as soil depth, surface texture, subsoil conditions, drainage, salinity, erosion, and relief. Other factors, such as availability of water for irrigation, climate, and distance to markets, might determine the desirability of growing specific crops in a given locality, but these are not considered. The index should not be considered a direct index of land valuation. However, where economic factors are known to the user, the Storie index provides additional objective information for comparison of land values. The Storie index rating of each map unit, and the rating of the factors considered, are given in table 4.

Four factors that represent the inherent characteristics and qualities of the soils are considered in the index rating. The most favorable or ideal conditions with respect to each factor are rated 100 percent. Decreasing values assigned to less desirable conditions. The factors are—

- Factor A, *Profile characteristics and soil depth.* This factor expresses the relative suitability of the soil profile for the growth of plant roots. Soils that have deep, permeable profiles are rated 100 percent; those that have a dense claypan layer or a hardpan or are shallow to bedrock are rated lower. The rating depends upon the extent to which water movement and root development are limited.
- Factor B, *Texture of the surface layer.* This factor rates the texture of the surface layer as an indicator of water holding capacity, ease of tillage, and seedbed preparation. The moderately coarse and medium textures—fine sandy loam, loam, and silt loam—are the most ideal and are rated 100 percent. The coarser and finer textures, such as sands and clays, are rated less than 100 percent.
- Factor C, *Slope.* This factor is an expression of the ease of irrigation, amount of runoff, and susceptibility to erosion. It is particularly important if a soil is irrigated. Smooth, nearly level or very gently sloping soils are rated 100 percent. As the slope gradient increases, the rating for this factor decreases.
- Factor X, *Other conditions.* Conditions other than the soil profile, surface texture, and slope are considered in Factor X. In this survey area, the X factors are drainage, flooding, erosion, general fertility level of the soil, salinity, and toxicity. If more than one limitation exists, each is evaluated separately and the values for each are multipled to obtain the rating for Factor X.

The index rating for a soil is obtained by multiplying the percentage ratings assigned to A, B, C, and X. Thus, any one factor may dominate or control the overall rating. For example, consider a soil such as Camarillo sandy loam. It has a deep, permeable profile that justifies a rating of 100 percent for factor A; a sandy loam surface layer that warrants a 95 percent rating for factor B; and a smooth, nearly level surface that justifies 100 percent for factor C. A seasonal high water table (poor drainage) and potential flooding, however, justify a rating of 70 times 90, or 63 percent for factor X. The overall index rating for this soil is 60. The seasonal high water table and flooding limit the selection and rooting depth of crops and justifies the relatively low rating of the soil. If the soil can be drained and protected from flooding, the Storie index can be revised by assigning appropriate higher values to the X factors.

Ratings for each map unit are for the dominant soil of the unit and do not take into account smaller inclusions of other soils or land types. For soil complexes, the map units are rated to reflect the proportions of the dominant soils present in the unit.

The soils are placed in grades according to their suitability for general intensive agricultural use as

indicated by their Storie index ratings. The six grades and their range in index ratings are—

	Index rating
Grade 1 (excellent)	80 to 100
Grade 2 (good)	60 to 80
Grade 3 (fair)	40 to 60
Grade 4 (poor)	20 to 40
Grade 5 (very poor)	10 to 20
Grade 6 (nonagricultural)	Less than 10

Soils of Grade 1 have very minor or no limitations that restrict their use for general agricultural use. Grade 2 soils are suitable for most crops, but they have minor limitations that narrow the choice of crops and may require some special management practices. Grade 3 soils are suited to fewer crops or to special crops and require careful management. Grade 4 soils are limited to a narrow range of crops; if used for intensive agriculture, they require special management. Grade 5 soils generally are not suited to cultivated crops, but can be used for pasture and range. Grade 6 consists of soils and land types that are not suited to agricultural use.

rangeland

This section was prepared by Dick R McCleery, range conservationist, Soil Conservation Service

Rangeland is the major use of approximately 80 percent of the soils in this survey area. The principal livestock type is cattle. Historically, dairies were the major livestock industry of this coastal region. In recent years, much of the prime dairyland has been converted into high yield cropland or urban land. The cow-calf or stocker operation is currently the main livestock industry. The emphasis on range beef production has brought into use some of the steeper, marginal soils.

Rangeland and farmland uses are interdependent and economically support each other. Field crops, such as alfalfa hay, grain hay, and irrigated pasture, are important supplements to the natural range forage. Grain, silage, and hay are extensively fed in feedlots to finish range-fed livestock. On a major portion of the dry cropland, livestock graze on the stubble remaining after the crops are harvested.

Soils strongly influence the natural vegetation. The deep and moderately deep soils are generally along the coast, directly exposed to the prevailing ocean breezes. These soils are often fine textured and are grasslands of very high production. The narrow drainageways leading from the coastal mountain ranges and the slopes away from the ocean tend to have a large percentage of tree cover. A dense live oak woodland is especially common on the sandy and coarse textured soils influenced by the cool ocean climate. These coarse textured soils in areas of relatively high rainfall often support stands predominantly of bishop pine. These unique conifer types are generally located north or northwest of mountainous areas. The shallow upland soils are predominantly brush covered. The dominant brush type changes from coast sagebrush and coyotebush to chamise and buckbrush as direct coastal influence diminishes. The larger valleys away from the coast, such as in the Huasna area, tend to support an open, blue oak woodland-grass vegetation.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 5 shows, for each soil, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as or are suited to rangeland are listed. Explanation of the column headings in table 5 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from characteristic natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the characteristic plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre reduced to a common percent of air-dry moisture.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the characteristic plant community.

The objective in range management is to control grazing in order to provide for adequate residue to

protect the soil from erosion and ensure that the plants produced are palatable and nutritious forage. Such management generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of water erosion and soil blowing. Sometimes, however, a plant community somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

range management concerns

The range manager is first concerned with the primary forage types to be managed. In this survey area, the principal forage producers are annuals. Some of the range sites in this area have potential for dominant perennial grass forage. Perhaps the major disadvantage of the annuals is that they are short-lived. Their shallow root systems enable them to keep green only while the root zone contains available water. They start growth upon arrival of winter rains. Growth is slow during cool winter temperatures, becoming rapid with warmer spring temperatures. Drought follows shortly. Usually by May the plants have begun to mature and soon are dead. The dried material cures poorly and leaches rapidly. Protein deficiencies become serious in midsummer, and normal animal weight gains can be expected thereafter only through careful supplementing. Consequently, the primary grazing season is in winter and spring, although in many operations grazing is yearlong.

The annual cover is dominated by wild oats (*Avena fatua*) and several species of brome, chiefly soft chess (*Bromus mollis*), red brome (*B. rubens*), and ripgut brome (*B. rigidus*). Other important annual grasses are mouse barley (*Hordeum leporinum*), Mediterranean barley (*H. gussonianum*), little barley (*H. pusillum*), foxtail fescue (*Festuca megalura*) and rattail fescue (*F. myuros*). Forbs are of secondary importance in this type, though the number of forbs is large. From a grazing viewpoint, burclover (*Medicago hispida*) and redstem, whitestem, and broadleaf filarees (*Erodium cicutarium, E. moschatum,* and *E. botrys*) are important constituents and furnish abundant forage.

Perennial grasses and browse become increasingly important late in summer and early in fall. Perennial grasses generally cure well and green up rapidly with summer or fall rains. Perennial browse is relatively nutritious throughout the year. Bunch grasses, such as pine bluegrass (*Poa scabrella*), purple needlegrass (*Stipa pulchra*), and mission veldtgrass (*Ehrharta calycina*), are common, and in some areas are abundant. Many common shrubs, such as buckbrush (*Ceanothus cuneatus*) and California coffeeberry (*Rhamnus californica*), provide important browse for both livestock and wildlife when the new growth or resprouts are within reach of foraging animals. These, and other shrubs, often grow in dense stands, commonly known as chaparral. Perennial browse and grass plants provide limited forage when allowed to grow rank and coarse or when overutilized. These extreme conditions are common and produce plants of low vigor and production. Rangeland of this area can be managed to increase perennial as well as annual forage.

The greatest opportunities for livestock operators in this survey area to increase the efficiency of their ranches are through grazing management and range improvement. By improving their present rangeland, livestock managers can economically increase their production. Technical assistance on planning and applying practices suitable for the soil on a particular ranch can be obtained from local representatives of the Soil Conservation Service and the University of California Agricultural Extension Service

Proper grazing use on rangeland can limit soil erosion. Heavy grazing increases soil erosion, delays grazing readiness, and generally decreases the length of the primary grazing season. On the other hand, underutilizing range is an excellent method for bringing previously overused or disturbed range back to its potential. Excessive amounts of mature annual vegetation can create extreme wildfire hazards. Proper grazing use will leave enough plant residue, approximately 70 percent ground cover in October, to protect from soil erosion. This amount promotes a desirable balance of grasses and forbs in the following season's forage crop The plant residue or mulch allows more water to soak into the ground. Also, it insulates the soil surface and seedlings from extremes of temperature, promoting an earlier grazing readiness. In addition, the livestock will receive more nutritious feed when the young growth is grazed with the dry plant residue from the previous year.

Planned grazing systems are most important for achieving uniform levels of grazing use. Proper salting, nutrient supplements, adequate water, alternating grazing areas, and adjusting grazing use and intensity to plant growth and maturity allows maximum utilization of range forage.

Grazing systems should be keyed to growth in winter and early in spring rather than growth late in spring and in summer. The winter annuals tend to be highly preferred forage; summer annuals are generally unpalatable. Summer annuals tend to have thorns and spines, such as Russian-thistle (*Salsola* spp.) and milkthistle (*Silybum* spp.); to be high in aromatic oils, such as bluecurls (*Trichostema* spp.) and tarweed (*Hemizonia* spp.); or to contain toxic compounds, such as in locoweed (*Astragalus* spp.) and jimsonweed (*Datura* spp.). When the annual range is excessively grazed or burned, the soil fertility and the density and vigor of winter annuals are reduced. This allows for increases of summer annuals. In years that have low rainfall or are cold, growth of the winter annuals may be retarded, allowing for an increase of summer annuals

Livestock distribution is an increasing management problem as slope increases. At slopes of more than 50

percent, management is critical to obtain proper levels of utilization without overutilizing the lower slopes. To obtain uniform livestock distribution, place water facilities on benches, ridges, and other remote areas; supplement with salt, trace minerals, and nutrients on the slopes and ridges; construct livestock trails and roads (these can often double as firebreaks and access roads); fertilize to increase palatability of forage in remote areas; and construct fences that allow pastures containing extreme slopes to be grazed only when water is available and forage quality is highest.

Range seeding is a means to increase rangeland carrying capacity by converting brushland or poor grainland and rangeland to improved varieties of grasses and legumes. Annual legumes, such as sub and rose clovers, barrel medics, lana vetch, and trefoils, are popular because of their adaptability to dryland conditions and their nitrogen-fixing ability.

Range fertilization has the potential to increase beef production by two or three times while lengthening the grazing season by as much as six weeks. This will vary according to the soil and rainfall. Whenever a range seeding program is planned, fertilization should also be considered.

Weed control on rangeland is a major consideration, especially when previously intensely managed areas are abandoned. Abandoned cropland and high use areas, such as around livestock water, often remain dominated for years by a few weedy species. Weeds in this area include milkthistle, cheeseweed (*Malva parviflora*), and fennel (*Foeniculum vulgare*). Several seasons of intensive livestock management can usually control most weeds. Often, range fertilization will bring weeds under control. When a more rapid control is needed, one of the several selective herbicides that are available for range use should be considered.

Brush management is an important practice in much of the rough terrain areas. Many areas are now covered with dense brush stands, although potential plant communities indicate open grass or oak-grass woodland communities. Range and watershed characteristics of these areas can be improved through converting by mechanical, chemical, or control burning treatments. Range seeding is a recommended follow-up to provide a stable and productive vegetative cover.

The steep and shallower areas are unstable, and soils erode easily following disturbance. Wildfires are common, and properly engineered fuel breaks and access roads are necessary to prevent gully erosion. Brush management on these areas is actually fuel management, preventing extremely hot wildfires. The disturbance or rejuvenation of old growth brush fields, through the use of relatively cool controlled burns, will reduce wildfire fuels and increase watershed protection and esthetic values of the area. Following a cool burn, an area can provide a combination of grass, browse, and cover suitable for most forms of wildlife. Although difficult to utilize, livestock forage is generally available for three or four years after a burn.

recreation

Demand for recreation facilities within the survey area will increase as population increases and leisure time increases. Some of this increased demand will need to be met by private recreational development.

Much of this increased demand will be for water-oriented recreation at beaches and reservoirs. Travelers will require overnight facilities, such as motels and camping areas. Private recreation facilities can be developed as a supplemental enterprise to farming or ranching. Where game and fish production permits, income can be derived from hunting and fishing clubs.

The soils of the survey area are rated in table 6 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 6, 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 6 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9 and interpretations for dwellings without basements and for local roads and streets in table 8.

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

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

This section was prepared by Glenn Wilcox, area biologist, Soil Conservation Service.

Wildlife and fish are important resources within the survey area. Fish and wildlife provide numerous opportunities for recreation and improve the quality of the environment. Wildlife related activities, such as nature study, birdwatching, hunting, and fishing, affect the area's economy. Many types of wildlife help to control weed, insect, and animal pests.

Warmwater fish, including largemouth bass, catfish, and sunfish, inhabit the lakes and ponds of the survey area. Trout and steelhead are in the rivers. Trout can be stocked in some lakes and ponds, where water temperatures permit.

Such animals as the badger and coyote are useful rodent predators, as are golden eagles and red-tailed hawks. Doves, quail, and small birds, such as sparrows and finches, eat a variety of seeds, many of which are considered rangeland or cropland weeds. Woodpeckers and swallows eat insects that can be harmful to crops and trees.

Man's activities have varied effects on wildlife populations. Many wildlife species, such as house sparrows, blackbirds, and ground squirrels, can tolerate man's activities and thrive in close association with man. In contrast, man and his activities have contributed to the decline of some species, such as the Morro Bay kangaroo rat and the American peregrine falcon.

Several wildlife species listed as endangered occur within the survey area (*3*). The Morro Bay kangaroo rat occurs in a very limited area near Morro Bay. Additional wildlife on the endangered list include the southern bald eagle, California condor, California brown pelican, California least tern, and the American peregrine falcon. The Soil Conservation Service believes that critical habitat for these endangered species needs to be preserved.

Important game species, such as California mule deer, black-tailed deer, feral pig, turkey, California quail, band-tailed pigeon, and mourning dove, occur within the soil survey area and support much hunting. The feral pig is a prized game animal, but it can cause severe crop and range damage. Other wildlife, such as ground squirrels and starlings, also cause crop damage and may require control.

Wildlife are dependent on suitable habitat. Riparian or stream-associated vegetation provides some of the most valuable wildlife habitat within the survey area. It is a concentration point for a great variety of game and nongame species. It makes the more open grassland and rangeland suitable as wildlife feeding areas by providing the necessary cover. Riparian vegetation should be maintained or enhanced wherever possible.

Wildlife populations can be influenced by habitat manipulation. Reducing critical habitat of undesirable species or supplying needed habitat elements for desirable species can affect the numbers of wildlife in an area. Vegetation and water are important elements of wildlife habitat. Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the development of water impoundments.

In table 7, 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 of soils with this rating, 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 flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, safflower, wheat, oats, sunflower, and barley. Irrigation may be necessary for corn and sunflower, and irrigation can increase the production of small grains in dry areas.

Grasses and legumes are domestic 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, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are tall fescue, hardinggrass, soft chess, clover, trefoil, Lana vetch, and alfalfa. Irrigation may increase the production of the perennial grasses.

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 flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are mustards, filaree, turkeymullein, fescues, fiddleneck, and annual clovers.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oaks, cottonwood, willow, sycamore, madrone, coffeeberry, poison-oak, laurel, blackberry, and toyon. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, pyracantha, and toyon.

Coniferous plants furnish browse, seeds, and cones. 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 Monterey pine, Coulter pine, Digger pine, bishop pine, and cypress.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, ceanothus, snowberry, coffeeberry, and chamise.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. 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, pickleweed, watergrass, saltgrass, cattail, rushes, sedges, and tules.

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. The wildlife attracted to these areas include California quail, dove, meadowlark, sparrows, ground squirrel, and hawks.

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, scrub jay, owls, hawks, woodpeckers, gray squirrels, gray fox, raccoon, deer, and coyote.

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

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include coyote, bobcat, deer, California quail, meadowlark, and mourning dove.

engineering

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

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

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

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

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

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

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

building site development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, 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 the depth to the water table.

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

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, 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, a high water table, depth to bedrock or to a cemented pan, 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 9 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan 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 effectively filter the effluent. 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 9 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, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

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

The ratings in table 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high 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 type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of 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, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

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

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

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 10, 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. Coarse 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 water table at or near the surface.

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

water management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect 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 even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

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

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, 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 or to a cemented pan. 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 reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, 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.

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

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

engineering index properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

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

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 oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

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

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

physical and chemical properties

Table 13 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

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

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

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

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

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

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

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

In table 13, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

soil and water features

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

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

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 14 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

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

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 14 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 14.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is

penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

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.

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

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

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

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*13*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 15, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

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

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 Xeroll (*Xer*, meaning dry, plus *oll*, from Mollisol).

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 Argixerolls (*Arg*, meaning argillic horizon (white clay), plus *xeroll*, the suborder of the Mollisols that have a xeric 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 Argixerolls.

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

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

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 (*12*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*13*). Unless otherwise stated, colors in the descriptions are for dry 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."

Arnold series

The Arnold series consists of deep, somewhat excessively drained, rapidly permeable soils that formed in residual material weathered from soft sandstone. These soils are on foothills and mountains. Slope ranges from 5 to 50 percent. The mean annual precipitation ranges from 15 to 22 inches, and the mean annual air temperature is about 58 degrees F.

Arnold soils are similar to Baywood, Briones, Corralitos, Tujunga, and Oceano soils. They are commonly adjacent to Briones, Corralitos, Gaviota,

Pismo, and Tierra soils. Baywood soils are on old stabilized sand dunes, have a mollic epipedon, and are very deep. Briones soils are moderately deep to a paralithic contact. Corralitos and Tujunga soils are stratified in alluvium; Tujunga soils are also calcareous. Oceano soils are on old stabilized sand dunes, have lamellae that contain at least 3 percent more clay than the overlying horizon, and are very deep. Gaviota soils are shallow to a lithic contact and have a loamy control section. Pismo soils are shallow to a paralithic contact. Tierra soils are finer textured and have an argillic hozizon.

Typical pedon of the Arnold series in an area of Arnold loamy sand, 5 to 15 percent slopes, 1,010 yards south and 1,585 yards east of the intersection of State Highway 227 and Corbett Canyon Road, T. 31 S., R. 13 E., Mount Diablo base line and meridian, Arroyo Grande Quadrangle:

O1—1/2 inch to 0; partial cover of twigs and leaves.

A11—0 to 2 inches; light brownish gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; weak coarse and very coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; slightly acid; abrupt smooth boundary.

A12—2 to 16 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine and few fine interstitial and tubular pores; strongly acid; gradual smooth boundary.

A13—16 to 33 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine and common fine interstitial and tubular pores; medium acid; gradual smooth boundary.

C1—33 to 42 inches; light brownish gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine, common fine, and few medium interstitial and tubular pores; common, 1/4- to 3/4-inch thick, discontinuous grayish brown (10YR 5/2) lamellae that are hard when dry and have thin clay bridges between sand grains; medium acid; clear wavy boundary.

C2—42 to 52 inches; light gray (10YR 7/1) loamy sand, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial and tubular pores; few, 1/8-inch thick, discontinuous light brownish gray (10YR 6/2) lamellae that have thin clay bridges between sand grains; medium acid; clear wavy boundary.

C3—52 to 59 inches; white (10YR 8/2) loamy sand, pale brown (10YR 6/3) moist; massive; hard, very friable, nonsticky and nonplastic; medium acid; abrupt smooth boundary.

C4r—59 inches; light gray (10YR 7/2) soft sandstone crushing easily to loamy sand, light yellowish brown (10YR 6/4) moist; very few very fine roots in vertical fractures; fractures are less than 12 inches apart and less than 1 millimeter wide; iron stains and clay films line fractures; directly overlying the paralithic contact is a continuous, 1/4- to 1-inch thick, very dark gray (10YR 3/1) silty clay band; medium acid.

Depth to a paralithic contact ranges from 40 to 60 inches. Base saturation is assumed to be 60 percent or more within a depth of 30 inches. The soil is sand or loamy sand throughout and slightly acid through strongly acid.

Thickness of the A horizon ranges from 20 to 33 inches. The A horizon is gray, grayish brown, light brownish gray, or pale brown (10YR 5/1, 5/2, 6/1, 6/2, 6/3). Organic carbon content is assumed to range from 0.2 to 0.6 percent. The C horizon has hue of 10YR, value of 6 through 8, and chroma of 1 through 3. In most pedons, an accumulation of very dark gray sandy clay, clay, or silty clay is directly over the paralithic contact or in fractures of the parent material and ranges from a thin film to 2 inches in thickness.

The Arnold soils in this survey have lamellae in the control section. This is outside the range defined for the series. However, this difference does not significantly affect the use and management of the soil.

Baywood series

The Baywood series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in eolian deposits. These soils are on stabilized sand dunes near the coast. Slope ranges from 2 to 30 percent. The mean annual precipitation ranges from 15 to 20 inches, and the mean annual air temperature is about 58 degrees F.

Baywood soils are similar to Arnold, Briones, Corralitos, Tujunga, and Oceano soils. They are commonly adjacent to Dune land and Lopez, Los Osos, and Santa Lucia soils. Arnold and Briones soils have an ochric epipedon and a paralithic contact within a depth of 60 inches. Corralitos and Tujunga soils are stratified in alluvium; Tujunga soils are also calcareous. Oceano soils have an ochric epipedon and lamellae that contain at least 3 percent more clay than the overlying horizon. Lopez soils are shallow and are shaly clay loam throughout. Los Osos soils are moderately deep to a paralithic contact and have an argillic horizon. Santa Lucia soils are moderately deep and have a very cobbly clay loam control section.

Typical pedon of the Baywood series in an area of Baywood fine sand, 2 to 9 percent slopes, in the community of Los Osos, about 1,760 feet south of Los Osos Valley Road on Broderson Avenue, and 50 feet east of Broderson Avenue, Morro Bay South Quadrangle:

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sand, very dark brown (10YR 2/2) moist; weak coarse granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; slightly acid; clear smooth boundary.

A12—5 to 13 inches; very dark grayish brown (10YR 3/2) fine sand, very dark brown (10YR 2/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; medium acid; diffuse smooth boundary.

A13—13 to 36 inches; dark brown (10YR 3/3) fine sand, very dark brown (10YR 2/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; many very fine interstitial pores; medium acid; gradual wavy boundary.

C1—36 to 55 inches; dark grayish brown (10YR 4/2) fine sand, very dark grayish brown (10YR 3/2) moist; indistinct blotches, 2 to 5 inches across, that are more reddish (7.5YR 4/2 dry and 5YR 3/2 moist) make up 1/5 of the horizon; massive; soft, very friable; few fine, very fine, and medium roots; many very fine interstitial pores; medium acid; gradual wavy boundary.

C2—55 to 76 inches; dark grayish brown (10YR 4/2) fine sand, dark brown (10YR 3/3) moist; distinct irregular blotches that are lighter in color (10YR 5/3 dry and 10YR 4/3 moist) make up about 1/2 of the horizon; massive; soft, very friable; few fine and very fine roots; many very fine interstitial pores; medium acid; gradual wavy boundary.

C3—76 to 90 inches; brown (10YR 5/3) fine sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable; many very fine interstitial pores; strongly acid.

The content of organic matter is more than 1 percent to a depth of 13 inches. Below this depth it decreases to less than 0.5 percent. The profile is sand or fine sand throughout. Reaction ranges from strongly acid through neutral.

Thickness of the A horizon ranges from 12 to 36 inches. The A horizon is very dark grayish brown, dark grayish brown, dark brown, or brown (10YR 3/2, 3/3, 4/2, 4/3). Some pedons have a B horizon, few faint lamellae, or small dark reddish brown concretions. The C horizon has value of 4, 5, or 6 and chroma of 2 or 3.

Briones series

The Briones series consists of moderately deep, somewhat excessively drained, rapidly permeable soils that formed in residual material weathered from soft sandstone. These soils are on foothills and mountains. Slope ranges from 15 to 50 percent. The mean annual precipitation ranges from 15 to 20 inches, and the mean annual air temperature is about 59 degrees F.

Briones soils are similar to Arnold, Baywood, Corralitos, Oceano, Pismo, and Tujunga soils. They are commonly adjacent to Arnold, Corralitos, Gaviota, Pismo, and Tierra soils. Arnold soils are deep. Baywood soils are on old stabilized sand dunes, have a mollic epipedon, and are very deep. Corralitos and Tujunga soils are stratified in alluvium; Tujunga soils are also calcareous. Gaviota soils are shallow to a lithic contact and have a loamy control section. Oceano soils are on old stabilized sand dunes, have lamellae that contain at least 3 percent more clay than the overlying horizon, and are very deep. Pismo soils are shallow over weathered bedrock. Tierra soils are very deep and have an argillic horizon.

Typical pedon of the Briones series in an area of Briones loamy sand, 15 to 50 percent slopes, about 800 feet northwest of the intersection of Huasna Road and County Road 32, T. 32 S., R. 13 E., Mount Diablo base line and meridian, Arroyo Grande N. E. Quadrangle:

A11—0 to 8 inches; gray (10YR 6/1) loamy sand, very dark gray (10YR 3/1) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial and common very fine tubular pores; medium acid; gradual wavy boundary.

A12—8 to 26 inches; gray (10YR 6/1) loamy sand, very dark gray (10YR 3/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial and tubular pores; slightly acid; clear irregular boundary.

C1—26 to 32 inches; very pale brown (10YR 7/3) loamy sand, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many very fine interstitial pores and common very fine tubular pores; few faint discontinuous lamellae, about 1/8-inch thick, that have clay bridging sand grains; medium acid; abrupt wavy boundary.

C2r—32 inches; very pale brown (10YR 7/4) sandstone crushing easily to loamy sand, light yellowish brown (10YR 6/4) moist; few very fine roots in vertical fractures less than 12 inches apart and less than 1 millimeter wide; iron stains and clay films coat fracture faces; directly overlying the paralithic contact is a continuous, 1/8- to 3/4-inch thick, very dark brown (10YR 2/2) silty clay band; very strongly acid.

Depth to a paralithic contact ranges from 20 to 40 inches. The soil is medium acid or slightly acid sand or loamy sand throughout.

The A horizon is gray, grayish brown, light gray, or light brownish gray (10YR 5/1, 5/2, 6/1, 6/2). Organic carbon content is assumed to range from 0.2 to 0.6 percent. The C horizon has chroma of 2 through 4. In most pedons, an accumulation of very dark brown sandy clay, clay, or silty clay is directly over the paralithic contact or in fractures of the parent rock and ranges from a thin film to 2 inches in thickness.

Briones soils in this survey area have lamellae in the C horizon. This is outside the range defined for the series. This difference, however, does not significantly affect the use and management of the soil.

Calodo series

The Calodo series consists of shallow, well drained soils that formed in residual material weathered from calcareous sandstone, limestone, or shale. Permeability is moderately slow. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 16 to 22 inches, and the mean annual air temperature is about 58 degrees F. Calodo soils in this survey area are mapped only in a complex with Nacimiento soils.

Calodo soils are similar to Gaviota, Lodo, Lopez, and Nacimiento soils. They are commonly adjacent to Diablo, Lodo, Los Osos, Nacimiento, and Zaca soils. Diablo soils have a fine textural control section and intersecting slickensides and are deep to a paralithic contact. Gaviota soils are sandy loam throughout, have an ochric epipedon, and are noncalcareous. Lodo soils are noncalcareous. Lopez soils are skeletal. Los Osos soils have an argillic horizon and are moderately deep to a paralithic contact. Nacimiento and Zaca soils are moderately deep; Zaca soils also have nonintersecting slickensides.

Typical pedon of the Calodo series in an area of Nacimiento-Calodo complex, 50 to 75 percent slopes, about 5,500 feet south and 1,500 feet west of the northeast corner of sec. 18, T. 31 S., R. 11 E., Mount Diablo base line and meridian, Port San Luis Quadrangle:

A1—0 to 16 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; strongly effervescent with disseminated lime and violently effervescent with lime segregated in soft masses in the lower part; moderately alkaline; abrupt irregular boundary.

Cr—16 inches; limestone, white (10YR 8/2) moist; many very fine roots line fracture faces that are less than 4 inches apart and less than 1 millimeter wide.

Thickness of the solum and depth to a paralithic contact range from 10 to 20 inches. The A horizon is dark gray, dark grayish brown, gray, grayish brown, or dark brown (10YR 4/1, 4/2, 4/3, 5/1, 5/2). The profile is up to 10 percent gravel by volume.

Camarillo series

The Camarillo series consists of very deep, somewhat poorly drained, moderately permeable soils that formed in alluvium weathered from sedimentary rocks. These soils are on alluvial fans and flood plains. Slope is 0 to 2 percent. The mean annual precipitation ranges from 16 to 20 inches, and the mean annual air temperature is about 59 degrees F.

Camarillo soils are similar and commonly adjacent to Corralitos, Marimel, and Tujunga soils. Corralitos and Tujunga soils are sandy throughout and are somewhat excessively drained. Marimel soils have a thick mollic epipedon.

Typical pedon of the Camarillo series in an area of Camarillo loam, drained, about 2.7 miles west and 500 feet north of the intersection of California Highway 1 and Oso Flaco Road, Oceano Quadrangle:

Ap—0 to 12 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; very hard, friable, sticky and plastic; many very fine roots; many very fine interstitial pores; strongly effervescent, disseminated lime; moderately alkaline; clear smooth boundary.

C1—12 to 24 inches; pale brown (10YR 6/3) silty clay loam, yellowish brown (10YR 5/4) moist; weak medium granular structure; hard, friable, sticky and plastic; many very fine roots; many very fine interstitial and tubular pores; strongly effervescent, disseminated lime; moderately alkaline; gradual smooth boundary.

C2—24 to 34 inches; yellowish brown (10YR 5/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; few fine prominent mottles, reddish brown (5YR 4/4) moist; massive; hard, friable, sticky and plastic; common very fine roots; many very fine interstitial and many very fine and fine tubular pores; many small pockets and seams of partly decomposed organic matter; strongly effervescent, disseminated lime; moderately alkaline; abrupt smooth boundary.

IIC3—34 to 48 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; few fine prominent mottles, reddish brown (5YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine interstitial and tubular pores; few small pockets of black, partly decomposed organic matter; strongly effervescent, disseminated lime; moderately alkaline; clear smooth boundary.

IIIC4—48 to 53 inches; light yellowish brown (10YR 6/4) silty clay loam, yellowish brown (10YR 5/6) moist; common fine prominent mottles, reddish brown and dark reddish brown (5YR 4/4, 3/4) moist; massive; hard, friable, sticky and plastic; few very fine roots; many very fine interstitial and common very fine tubular pores; many pockets of black, partly decomposed organic matter; strongly effervescent, disseminated lime; moderately alkaline; abrupt smooth boundary.

IVC5—53 to 84 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) moist; many medium prominent mottles, reddish brown (5YR 4/4) moist; many pockets and strata of very dark brown muck and peat; massive; slightly hard, very friable, nonsticky and slightly plastic; few very fine roots; many very fine interstitial pores; strongly effervescent, disseminated lime; moderately alkaline.

Thickness of the A horizon ranges from 9 to 37 inches. The A horizon is pale brown, light brownish gray, or brown (10YR 6/3, 6/2, 5/3) loam or sandy loam. The C horizon is light gray, light yellowish brown, pale brown, or yellowish brown (10YR 7/2, 6/4, 6/3, 5/4) loam, silty clay loam, fine sandy loam, or loamy fine sand. It averages 25 to 30 percent clay and is more than 15 percent coarser than very fine sand in the 10- to 40-inch control section. Organic carbon content decreases irregularly as depth increases. Reddish brown or dark reddish brown mottles are below a depth of 20 inches. The high water table ranges from 2.0 to 3.5 feet in the nondrained phase and from 5.0 to 6.0 feet in the drained phase during the winter and spring.

Capistrano series

The Capistrano series consists of very deep, well drained soils that formed in eolian deposits. Permeability is moderately rapid. These soils are on stabilized dune material near the coast. Slope is 2 to 9 percent. The mean annual precipitation ranges from 20 to 24 inches, and the mean annual air temperature is about 56 degrees F.

Capistrano soils are similar to Baywood, Garey, and Oceano soils. They are commonly adjacent to Concepcion, Los Osos, Marimel, and San Simeon soils. Baywood soils are sandy. Concepcion and San Simeon soils formed on marine terraces and have a fine textured argillic horizon. Garey soils have less than 1 percent organic matter, and lamellae constitute an argillic horizon. Los Osos soils have an argillic horizon and are moderately deep to a paralithic contact. Marimel soils formed in alluvium and have fine-loamy texture. Oceano soils are loamy sand throughout and have lamellae.

Typical pedon of the Capistrano series in an area of Capistrano sandy loam, rolling, on the Hearst Ranch, about 5,400 feet north and 300 feet east of Piedras Blancas Lighthouse, Piedras Blancas Quadrangle:

A11—0 to 16 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many fine interstitial and few fine tubular pores; slightly acid; diffuse wavy boundary.

A12—16 to 37 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many fine interstitial and few fine tubular pores; slightly acid; diffuse wavy boundary.

C—37 to 60 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine tubular pores; neutral.

Thickness of the A horizon ranges from 23 to 37 inches. The A horizon is brown, dark brown, or dark grayish brown (7.5YR 4/2; 10YR 4/2). It is medium acid or slightly acid. The C horizon is brown or dark brown (7.5YR 5/4, 4/2). It is slightly acid or neutral. The organic matter content is 1.5 to 2.5 percent in the upper 10 inches and decreases to less than 1 percent at a depth of 18 to 20 inches.

Chamise series

The Chamise series consists of very deep, well drained soils that formed in old alluvium weathered from sedimentary rocks. Permeability is very slow. These soils are on foothills and dissected terraces. Slope ranges from 5 to 30 percent. The mean annual precipitation ranges from 15 to 20 inches, and the mean annual air temperature is about 58 degrees F.

Chamise soils are similar to Lopez, Perkins, Santa Lucia, and Tierra soils. They are commonly adjacent to Arnold, Diablo, Salinas, and Zaca soils. Lopez soils have a loamy-skeletal control section and are shallow to a lithic contact. Santa Lucia soils do not have an argillic horizon. Perkins and Tierra soils are not skeletal. Arnold soils have an ochric epipedon, are sandy, and are deep to a paralithic contact. Diablo soils are fine textured throughout, have intersecting slickensides, and are deep to a paralithic contact. Salinas soils are fine loamy and alluvial. Zaca soils are fine textured and calcareous throughout.

Typical pedon of the Chamise series in an area of Chamise shaly sandy clay loam, 5 to 9 percent slopes, about 2,600 feet west of the southwest corner of sec. 25, T. 32 S., R. 13 E., Mount Diablo base line and meridian, Oceano Quadrangle:

A1—0 to 12 inches; gray (10YR 5/1) shaly sandy clay loam, very dark gray (10YR 3/1) moist; moderate very fine and fine angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; medium acid; abrupt wavy boundary.

B2t—12 to 22 inches; pale brown (10YR 6/3) weakly cemented very shaly clay, brown (10YR 4/3) moist; brown (10YR 4/2) clay films, very dark brown (10YR 2/2) moist; massive; extremely hard, firm, sticky and very plastic; common very fine roots in the upper 2 inches; few fine tubular pores; common thick clay films lining pores and coating shale fragments; very strongly acid; clear wavy boundary.

C—22 to 60 inches; very pale brown (10YR 7/3) shaly sandy clay loam, yellowish brown (10YR 5/4) moist; massive; very hard, firm, sticky and plastic; few very fine pores; very strongly acid.

Thickness of the solum ranges from 17 to 60 inches. Thickness of the A horizon ranges from 7 to 30 inches. The A horizon is gray, grayish brown, or dark grayish brown (10YR 5/1, 5/2, 4/2). It is strongly acid through slightly acid shaly loam or shaly sandy clay loam that has 15 to 25 percent angular siliceous shale fragments. Some pedons have a thin A2 horizon.

The B2t horizon is light yellowish brown, pale brown, grayish brown, light brown, or dark brown (10YR 6/4, 6/3, 5/2; 7/5YR 6/4, 4/4, 4/2). It ranges from very strongly acid through medium acid. The B2t horizon is weakly cemented very shaly clay loam (35 to 40 percent clay) or very shaly clay that has 35 to 55 percent angular siliceous shale fragments. The upper boundary is abrupt. There is an absolute clay increase of 15 to 25 percent from the A horizon to the B2t horizon.

The C horizon is commonly stratified. It is very pale brown (10YR 7/4, 7/3) shaly sandy clay loam or very shaly clay loam that has 15 to 55 percent shale fragments.

Cibo series

The Cibo series consists of moderately deep, well drained, slowly permeable soils that formed in residual material weathered from hard metasedimentary rocks. These soils are on foothills and mountains. Slope ranges from 9 to 50 percent. The mean annual precipitation ranges from 14 to 28 inches, and the mean annual air temperature is about 59 degrees F. Cibo soils in this survey area are mapped only in an undiffentiated group with Diablo soils.

Cibo soils are similar to Cropley, Diablo, and Zaca soils. They are commonly adjacent to Cropley, Diablo, Lodo, Los Osos, and Zaca soils. Cropley soils are very deep and formed in alluvial material. Diablo soils have chroma of less than 1.5, are calcareous, and are deep to a paralithic contact. Lodo soils contain less than 35 percent clay and are shallow. Los Osos soils have a loam or clay loam surface layer and an argillic horizon. Zaca soils are very dark gray, are calcareous throughout, and have nonintersecting slickensides.

Typical pedon of the Cibo series in an area of Diablo and Cibo clays, 30 to 50 percent slopes, about 1,000 feet west and 2,500 feet south of the northeast corner of sec. 27, T. 29 S., R. 11 E., Mount Diablo base line and meridian, Morro Bay North Quadrangle:

A11—0 to 31 inches; dark brown (7.5YR 3/2) clay, dark brown (7.5YR 3/2) moist; strong coarse prismatic and coarse angular blocky structure; very hard, very firm, sticky and plastic; common very fine roots; few very fine interstitial pores; common intersecting slickensides; cracks 1 centimeter wide extend to a depth of 31 inches; neutral; clear wavy boundary.

A12—31 to 39 inches; dark brown (7.5YR 3/2) clay loam; dark brown (7.5YR 3/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; few very fine interstitial pores; neutral; clear wavy boundary.

R—39 inches; dark yellowish brown (10YR 4/4) strongly fractured metasedimentary rock; common thin clay films and many manganese stains coat fracture faces that are less than 2 centimeters apart and less than 1 millimeter wide.

Thickness of the solum and depth to a lithic contact range from 20 to 40 inches. The A horizon is dark brown, very dark grayish brown, dark grayish brown, grayish brown, brown, dark yellowish brown, or yellowish brown (7.5YR 3/2, 4/2, 5/2; 10YR 3/2, 4/2, 4/3, 4/4, 5/2, 5/4). It is slightly acid or neutral. In some pedons, up to 15 percent cobbles, stones, or gravel fragments are at or near the surface.

Cieneba series

The Cieneba series consists of shallow, somewhat excessively drained soils that formed in residual material weathered from sandstone or shale. Permeability is moderately rapid. These soils are on foothills and mountains. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 18 to 45 inches, and the mean annual air temperature is about 58 degrees F. Cieneba soils in this survey area are mapped only in a complex with Kinkel Variant or Millsap soils.

Cieneba soils are similar to Gaviota, Gazos, Lodo, Lopez, Los Osos, and McMullin soils. They are commonly adjacent to Diablo, Kinkel Variant, Lodo, Lompico, Los Osos, McMullin, and Millsap soils. Diablo soils are calcareous, have intersecting slickensides, and are deep to a paralithic contact. Gazos, Lompico, Los Osos, and Millsap soils are moderately deep. Gaviota, Lodo, Lopez, and McMullin soils have a lithic contact.

Typical pedon of the Cieneba series in an area of Cieneba-Kinkel Variant loams, 30 to 75 percent slopes, about 775 feet east and 1,400 feet south of the

northwest corner of sec. 11, T. 25 S., R. 6 E., Mount Diablo base line and meridian, Pebblestone Shutin Quadrangle:

A1—0 to 11 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; moderate medium granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine and common fine pores; medium acid; abrupt irregular boundary.

C1r—11 to 19 inches; very pale brown (10YR 7/4) sandstone, yellowish brown (10YR 5/6) moist; loam material in fractures; many very fine roots and common fine pores within fractures; many moderately thick clay films and iron and manganese stains coat fracture faces; fractures are more than 1/2 inch and less than 1-1/2 inches apart, and less than 1 millimeter wide; clear irregular boundary.

C2r—19 inches; very pale brown (10YR 7/4) sandstone, yellowish brown (10YR 5/6) moist; few very fine roots within fractures; thin clay films and iron and manganese stains coat fracture faces that are more than 2.5 centimeters and less than 5 centimeters apart, and less than 1 millimeter wide.

Depth to a paralithic contact ranges from 11 to 20 inches. The A horizon is pale brown or light yellowish brown (10YR 6/3, 6/4). It ranges from medium acid through neutral. Clay content is less than 18 percent.

The Cieneba soils in this survey area contain less very coarse and coarse sand in the soil profile, have formed from sandstone or shale, and have rainfall greater than defined for the ranges of this series. These differences, however, do not significantly affect the use and management of the soil.

Concepcion series

The Concepcion series consists of very deep, moderately well drained soils that formed in old alluvium weathered from sedimentary rocks. Permeability is very slow. These soils are on marine terraces. Slope ranges from 2 to 30 percent. The mean annual precipitation ranges from 17 to 24 inches, and the mean annual air temperature ranges from 56 degrees to 60 degrees F.

Concepcion soils are similar to Los Osos, Millsap, San Simeon, and Tierra soils. They are commonly adjacent to Diablo, Cropley, Los Osos, Nacimiento, San Simeon, and Tierra soils. Diablo and Cropley soils have intersecting slickensides and do not have an argillic horizon. Los Osos soils do not have a mottled A2 horizon and are moderately deep to a paralithic contact. Millsap soils have an ochric epipedon, do not have a mottled A2 horizon, and are moderately deep to a lithic contact. Nacimiento soils are calcareous throughout, do not have an argillic horizon, and are moderately deep to a paralithic contact. San Simeon soils have a paralithic contact at a depth of less than 40 inches. Tierra soils are massive and hard in the surface layer and are gray or dark gray.

Typical pedon of the Concepcion series in an area of Concepcion loam, 2 to 5 percent slopes, about 2.25 miles east of the town of Los Osos, about 290 feet east and 415 feet south of the intersection of Clark Canyon Road and Los Osos Valley Road, T. 30 S., R. 11 E., Mount Diablo base line and meridian, Morro Bay South Quadrangle:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; medium acid; clear smooth boundary.

A12—5 to 14 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and coarse roots; common very fine tubular pores; strongly acid; gradual wavy boundary.

A2—14 to 19 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; few distinct brown (7.5YR 5/4) mottles, dark brown (7.5YR 4/4) moist; massive; hard, friable, nonsticky and slightly plastic; few very fine and coarse roots; many very fine tubular pores; few thin clay films; medium acid; abrupt smooth boundary.

B21t—19 to 33 inches; dark brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; brown (7.5YR 4/4) mottles; moderate medium angular blocky structure; very hard, very firm, sticky and very plastic; few very fine roots; many very fine tubular pores; many moderately thick clay films on ped faces and lining pores; slightly acid; gradual wavy boundary.

B22t—33 to 47 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate medium angular blocky structure; very hard, very firm, sticky and very plastic; few very fine roots, many very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; moderately alkaline; gradual wavy boundary.

C1—47 to 58 inches; polychromatic light brownish gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; brownish yellow and yellowish brown (10YR 6/6, 5/4) mottles, strong brown and yellowish brown (7.5YR 5/6; 10YR 5/4) moist; few very dark gray (10YR 3/1) organic matter stains in pores, black (10YR 2/1) moist; massive; hard, friable, sticky and plastic; common very fine tubular pores; common thin clay films lining pores; moderately alkaline; clear smooth boundary.

IIC2—58 to 63 inches; light gray (2.5Y 7/2) sandy clay loam, pale olive (5Y 6/3) moist; many medium distinct reddish yellow (7.5YR 6/6) mottles, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine interstitial and tubular pores; few moderately thick clay films lining pores; moderately alkaline.

Thickness of the solum ranges from 32 to more than 60 inches. Thickness of the A1 horizon ranges from 10 to 21 inches. The A1 horizon is grayish brown or dark grayish brown (10YR 5/2, 4/2). Base saturation ranges from 75 to 100 percent. The A2 horizon is very pale brown, light gray, or light brownish gray (10YR 8/3, 8/4, 7/2, 7/1, 6/2, 6/1). Mottles in hue of 10YR or 7.5YR range from none to common. The A2 horizon is sandy loam or loam.

The B2 horizon has mixed colors or is mottled and is brownish yellow, pale brown, dark brown, brown, light brownish gray, grayish brown, yellowish brown, or dark yellowish brown (10YR 6/6, 6/3, 5/6, 5/4, 4/4, 5/3, 4/3; 2.5Y 6/2, 5/2). It is clay loam, sandy clay, or clay and is 35 to 60 percent clay. The B2 horizon is slightly acid through moderately alkaline.

The C horizon is polychromatic with colors of brown, yellowish brown, light yellowish brown, light gray, or light brownish gray in hue of 2.5Y, 10YR, and 7.5YR. It is sandy clay loam or clay loam. The C horizon is neutral through moderately alkaline.

Corralitos series

The Corralitos series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in alluvium weathered from sedimentary rocks. These soils are on flood plains and alluvial fans. Slope is 0 to 15 percent. The mean annual precipitation ranges from 15 to 22 inches, and the mean annual temperature is about 58 degrees F.

Corralitos soils are similar and adjacent to Arnold, Oceano, and Tujunga soils. Arnold soils are deep to a paralithic contact. Oceano soils have lamellae and formed in eolian deposits. The Tujunga soils mapped in this survey area are calcareous throughout.

Typical pedon of the Corralitos series in an area of Corralitos sand, 2 to 15 percent slopes, about 3,500 feet west and 2,000 feet north of the intersection of Ormonde Road and Central Blvd., about 1/2 mile southeast of the northwest corner of sec. 5, T. 32 S., R. 13 E., Mount Diablo base line and meridian, Arroyo Grande N. E. Quadrangle:

A1—0 to 24 inches; light brownish gray (10YR 6/2) sand, dark gray (10YR 4/1) moist; single grained; loose, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; medium acid, abrupt wavy boundary.

C—24 to 60 inches; light gray (10YR 7/1) sand, grayish brown (2.5Y 5/2) moist; single grained; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; medium acid.

Thickness of the solum ranges from 9 to 24 inches. The A horizon is light brownish gray or pale brown (10YR 6/2, 6/3). It is slightly acid or medium acid. The C horizon is light gray, very pale brown, or pale brown (10YR 7/1, 7/2, 7/3, 6/3). Reaction is similar to that of the surface horizon.

Corralitos Variant

Corralitos Variant consists of very deep, somewhat poorly drained, rapidly permeable soils that formed in alluvium weathered from sedimentary rocks. These soils are on alluvial fans and flood plains. Slope is 0 to 2 percent. The mean annual precipitation ranges from 15 to 22 inches, and the mean annual air temperature is about 58 degrees F.

Corralitos Variant soils are similar to Camarillo, Corralitos, and Marimel soils. They are commonly adjacent to Camarillo, Mocho, and Tujunga soils. Camarillo soils have an irregular decrease in organic carbon. Corralitos soils are somewhat excessively drained and noncalcareous. Marimel and Mocho soils have a mollic epipedon. Tujunga soils are somewhat excessively drained.

Typical pedon of Corralitos Variant in an area of Corralitos Variant loamy sand, about 300 feet southwest of the crossing of the Southern Pacific Railroad and California Highway 1, north of Guadalupe, Guadalupe Quadrangle:

Ap—0 to 13 inches; pale brown (10YR 6/3) loamy sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; slightly effervescent, disseminated lime; moderately alkaline; abrupt smooth boundary.

C1—13 to 25 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; common fine faint light yellowish brown (10YR 6/4) mottles, yellowish brown (10YR 5/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; slightly effervescent, disseminated lime; moderately alkaline; abrupt smooth boundary.

C2—25 to 46 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; common medium distinct strong brown (7.5YR 5/6) mottles, yellowish brown (10YR 5/4, 5/6) moist; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; slightly effervescent, disseminated lime; moderately alkaline; gradual smooth boundary.

C3—46 to 60 inches; mixed grayish brown (10YR 5/2) and pale brown (10YR 6/3) loamy sand, dark grayish brown (10YR 4/2) and brown (10YR 5/3) moist; common medium distinct strong brown (7.5YR 5/6) mottles, yellowish brown (10YR 5/4, 5/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; slightly effervescent, disseminated lime; moderately alkaline.

Thickness of the A horizon ranges from 9 to 15 inches The A horizon is light brownish gray, pale brown, or very pale brown (10YR 6/2, 6/3, 7/3, 7/4). It is slightly effervescent to violently effervescent. The C horizon is grayish brown, pale brown, or very pale brown (10YR 5/2, 6/3, 7/3, 7/4). Faint mottles of strong brown, pale brown, or light yellowish brown (7.5YR 5/6; 10YR 6/3, 6/4) are within a depth of 13 to 40 inches. Distinct or prominent mottles are within a depth of 40 inches, and in some pedons are within a depth of 20 inches. Depth to the high water table ranges from 2 to 3 feet during the winter.

Cropley series

The Cropley series consists of very deep, moderately well drained, slowly permeable soils that formed in alluvium weathered from sedimentary rocks. These soils are on alluvial fans and alluvial plains. Slope is 0 to 9 percent. The average annual precipitation ranges from 14 to 20 inches, and the average annual air temperature ranges from 57 degrees to 60 degrees F.

Cropley soils are similar to Diablo, Salinas, and Zaca soils. They are commonly adjacent to Diablo, Marimel, and Salinas soils. Diablo soils have a paralithic contact. Marimel and Salinas soils do not have slickensides and are less than 35 percent clay. Zaca soils have nonintersecting slickensides and are calcareous throughout.

Typical pedon of the Cropley series in an area of Cropley clay, 0 to 2 percent slopes, about 100 yards west and 150 yards north of the intersection of Buckley Road and Santa Fe Road, 1,000 feet west and 600 feet north of the southeast corner of sec. 11, T. 31 S., R. 12 E., Mount Diablo base line and meridian, Pismo Beach Quadrangle:

A11—0 to 2 inches; dark gray (10YR 4/1) clay, black (10YR 2/1) moist; strong fine and medium granular structure; hard, firm, sticky and very plastic; few very fine and fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

A12—2 to 32 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong medium and coarse angular blocky structure; hard, firm, very sticky and very plastic; few very fine and fine roots; many very fine interstitial pores; common intersecting slickensides; neutral; gradual wavy boundary.

ACca—32 to 36 inches; mixed dark gray (10YR 4/1) and light brownish gray (10YR 6/2) clay; black (10YR 2/1) and dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; many very fine interstitial pores; strongly effervescent, lime in many fine irregularly shaped seams and soft masses; moderately alkaline; clear wavy boundary.

C1ca—36 to 52 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine interstitial pores; violently effervescent; moderately alkaline; clear wavy boundary.

C2ca—52 to 60 inches; light yellowish brown (10YR 6/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; violently effervescent, lime occurring as common medium irregular-shaped very pale brown (10YR 8/3) soft masses and concretions; moderately alkaline.

Thickness of the solum ranges from 30 to 40 inches. The A horizon is dark gray, very dark gray, or black (10YR 4/1, 3/1, 2/1). It is neutral through moderately alkaline. The AC horizon is absent in some pedons. Where present, it may or may not be calcareous. The C horizon is pale brown, light yellowish brown, or grayish brown (10YR 6/3, 6/4, 5/2; 2.5Y 5/2) clay loam or silty clay loam.

Diablo series

The Diablo series consists of deep, well drained, slowly permeable soils that formed in residual material weathered from sandstone, shale, or mudstone. These soils are on mountains and foothills. Slope ranges from 5 to 50 percent. The mean annual precipitation ranges from 14 to 28 inches, and the mean annual air temperature is about 59 degrees F.

Diablo soils are similar to Cibo, Cropley, and Zaca soils. They are commonly adjacent to Cibo, Cropley, Lodo, Los Osos, Nacimiento, Obispo, Salinas, and Zaca soils. Cibo soils have chroma of 2 or more throughout and are moderately deep to a lithic contact. Cropley soils formed in alluvium and are more than 60 inches deep to a paralithic contact. Lodo soils are shallow to a lithic contact. Los Osos soils are moderately deep and have an argillic horizon. Nacimiento soils have less clay in the textural control zone and are moderately deep to a paralithic contact. Zaca soils are calcareous throughout and have nonintersecting slickensides. Obispo soils are shallow to a lithic contact. Salinas soils are fine loamy and formed in alluvium.

Typical pedon of the Diablo series in an area of Diablo and Cibo clays, 15 to 30 percent slopes, about 3,480 feet north and 2,430 feet west of the intersection of

Pennington Creek Road and State Highway 1, 9,050 feet south and 4,500 feet west of the northeast corner of sec. 36, T. 29 S., R. 11 E., Mount Diablo base line and meridian, Morro Bay South Quadrangle:

A11—0 to 4 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong medium and coarse granular structure; very hard, firm, very sticky and very plastic; many very fine roots; few very fine interstitial pores; neutral; abrupt smooth boundary.

A12—4 to 14 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong coarse angular blocky structure; very hard, firm, very sticky and very plastic; many very fine and few medium roots; few very fine interstitial pores; common intersecting slickensides; mildly alkaline; gradual smooth boundary.

A13—14 to 23 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong coarse angular blocky structure; very hard, firm, very sticky and very plastic; many very fine roots; common very fine interstitial pores; few intersecting slickensides; slightly effervescent; moderately alkaline; clear wavy boundary.

ACca—23 to 38 inches; mixed very dark gray (10YR 3/1) and grayish brown (2.5Y 5/2) clay, black (10YR 2/1) and dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse angular blocky structure; hard, firm, very sticky and very plastic; many very fine roots; common very fine interstitial pores; violently effervescent; moderately alkaline; gradual smooth boundary.

C1—38 to 58 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; weak coarse subangular blocky structure; hard, firm, very sticky and very plastic; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C2r—58 inches; mixed dark gray (2.5Y 4/0) and light olive brown (2.5Y 5/4) mudstone; saprolitic structure; crushes easily to light clay; fracture faces are less than 3/4 inch apart and less than 1/25 inch wide; strongly effervescent; moderately alkaline.

Depth to a paralithic contact ranges from 40 to 60 inches. Thickness of the A horizon ranges from 20 to 30 inches. The A horizon is gray, dark gray, or very dark gray (10YR 5/1, 4/1, 3/1). It is neutral through moderately alkaline. In some pedons as much as 5 percent rock fragments are in the lower part of this horizon. The C horizon is olive gray, grayish brown, brown, or dark gray (5Y 5/2; 10YR 5/2, 4/3; 2.5Y 4/0) clay, clay loam, or silty clay.

Elder series

The Elder series consists of very deep, well drained soils that formed in alluvium weathered from sedimentary rocks. Permeability is moderately rapid. These soils are on flood plains and alluvial fans. Slope is 2 to 15 percent. The mean annual precipitation ranges from 12 to 22 inches, and the mean annual air temperature is about 58 degrees F.

Elder soils are similar to Arnold, Corralitos, Marimel, Salinas, and Still soils. They are commonly adjacent to Gaviota and Still soils. Arnold soils have an ochric epipedon and a sandy control section and are deep to a paralithic contact. Corralitos soils have an ochric epipedon and are sand throughout. Marimel, Salinas, and Still soils have a fine-loamy control section. Gaviota soils are shallow to bedrock.

Typical pedon of the Elder series in an area of Elder sandy loam, 9 to 15 percent slopes, about 2,000 feet west of Corbett Canyon Road and 150 feet north of Deer Valley Road, about 3 miles north and 2.75 miles west of the northeast corner of sec. 25, T. 32 S., R. 13 E., Mount Diablo base line and meridian, Arroyo Grande N. E. Quadrangle:

A11—0 to 12 inches; dark gray (10YR 4/1) sandy loam, very dark gray (10YR 3/1) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common very fine and few fine tubular pores; slightly acid; gradual smooth boundary.

A12—12 to 37 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; few very fine and fine tubular pores; slightly acid; diffuse smooth boundary.

C—37 to 60 inches; mixed dark grayish brown and brown (10YR 4/2, 5/3) sandy loam, very dark grayish brown and dark brown (10YR 3/2, 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine and few fine tubular pores; very few thin clay films bridging sand grains; slightly acid.

Thickness of the A horizon ranges from 12 to 48 inches. The A horizon is dark gray, dark grayish brown, gray, or grayish brown (10YR 4/2, 4/1, 5/1, 5/2). It is slightly acid or neutral. The A horizon has up to 10 percent by volume coarse fragments. The C horizon is dark grayish brown or brown (10YR 4/2, 5/3) sandy loam, fine sandy loam, or loam. The clay content averages less than 18 percent in the 10- to 40-inch control section.

Garey series

The Garey series consists of very deep, well drained soils that formed in eolian deposits. Permeability is moderately slow. These soils are on old stabilized dunes. Slope is 2 to 9 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is about 58 degrees F.

Garey soils are similar to Arnold, Baywood, Corralitos, Oceano, and Tujunga soils. They are commonly adjacent to Chamise, Lopez, Oceano, and Santa Lucia soils and Xerorthents, escarpment. Arnold soils are loamy sand or sand and are deep to a paralithic contact. Baywood soils are sandy and have a mollic epipedon. Chamise soils have a clayey-skeletal control section. Corralitos and Tujunga soils are somewhat excessively drained and formed in alluvium. Oceano soils are loamy sand throughout and have lamellae that are not thick enough to constitute an argillic horizon. Lopez soils are loamy-skeletal and shallow. Santa Lucia soils are clayey-skeletal and have a mollic epipedon. Xerorthents, escarpment, where Garey soils are mapped, consists of weakly consolidated, stratified sandy loam and loam.

Typical pedon of the Garey series in an area of Garey sandy loam, 2 to 9 percent slopes, about 1.5 miles northwest of the intersection of U.S. Highway 101 and State Highway 166, or approximately 4,700 feet northwest of that intersection on Orchard Road, then 3,200 feet southwest on a dirt road, and about 1,600 feet west, T. 11 N., R. 34 W., San Bernardino base line and meridian, Nipomo Quadrangle:

Ap—0 to 7 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial and few fine tubular pores; medium acid; clear wavy boundary.

A12—7 to 14 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine interstitial and tubular pores; medium acid; clear wavy boundary.

A13—14 to 36 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial and many very fine, fine, and medium tubular pores; slightly acid; abrupt wavy boundary.

B21t—36 to 53 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; massive; very hard, firm, sticky and slightly plastic; few very fine roots; few very fine interstitial and common very fine and fine tubular pores; continuous thin clay films lining pores; common 3/4- to 1 1/2-inch thick continuous brown (7.5YR 4/4) lamellae; neutral; clear wavy boundary.

B22t—53 to 64 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; massive; very hard, very firm, sticky and very plastic; few very fine roots; few very fine interstitial pores and few very fine and fine tubular pores; continuous thin clay films lining pores; common 1/2- to 1-inch thick continuous dark reddish brown (5YR 3/3) lamellae; neutral; clear wavy boundary.

B3t—64 to 75 inches; light yellowish brown (10YR 6/4) loamy sand, dark brown (7.5YR 4/4) moist; massive; hard, firm, nonsticky and nonplastic; many very fine interstitial pores; many thin clay bridges between sand grains; few discontinuous irregular 1/8- to 1-inch thick dark reddish brown (5YR 3/2) loam lamellae; neutral.

Thickness of the solum ranges from 52 to more than 75 inches. Thickness of the A horizon ranges from 21 to 36 inches. The A horizon is grayish brown, brown, light brownish gray, or pale brown (10YR 5/2, 5/3, 6/2, 6/3). It ranges from strongly acid through slightly acid.

The B2t horizon is pale brown, light yellowish brown, very pale brown, brown, pinkish gray, or light brown (10YR 6/3, 6/4, 7/4; 7.5YR 5/4, 6/2, 6/4, 7/2). It ranges from strongly acid through neutral. Lamellae are present that are usually one unit of value darker than the matrix and have hue of 7.5YR or 5YR. The lamellae have an increase in clay content from the overlying A horizon that is greater than 3 percent absolute. Thickness and abundance of lamellae decreases as depth increases. The cumulative thickness of the lamellae is more than 6 inches.

Gaviota series

The Gaviota series consists of shallow, well drained soils that formed in residual material weathered from hard sandstone. Permeability is moderately rapid. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 16 to 28 inches, and the mean annual air temperature is about 59 degrees F.

Gaviota soils are similar to Lodo, Lopez, and Pismo soils. They are commonly adjacent to Arnold, Elder, Lopez, and Tierra soils. Arnold and Pismo soils are loamy sand and have a paralithic contact. Elder soils are very deep and formed in alluvium. Lodo and Lopez soils are finer textured and have a mollic epipedon. Tierra soils have an argillic horizon and are very deep.

Typical pedon of the Gaviota series in an area of Gaviota fine sandy loam, 15 to 50 percent slopes, about 7,000 feet south and 8,000 feet east of the southeast corner of sec. 20, T. 31 S., R. 12 E., Mount Diablo base line and meridian, Pismo Beach Quadrangle:

A1—0 to 13 inches; light brownish gray (10YR 6/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; slightly acid; abrupt wavy boundary.

R—13 inches; very pale brown (10YR 8/4) hard fine grained sandstone, yellowish brown (10YR 5/4) moist; many thick clay films and common iron stains coat fracture faces that are more than 2 inches and less than 10 inches apart and less than 1 millimeter wide.

Thickness of the A horizon and depth to a lithic contact ranges from 10 to 20 inches. The A horizon is pale brown, light brownish gray, or grayish brown (10YR 6/3, 6/2, 5/2) sandy loam or fine sandy loam. Organic carbon content is assumed to be less than 0.6 percent. The A horizon is slightly acid or neutral.

Gazos series

The Gazos series consists of moderately deep, well drained soils that formed in residual material weathered from sandstone or shale. Permeability is moderately slow. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 15 to 28 inches, and the mean annual air temperature is about 58 degrees F. Gazos soils in this survey area are mapped only in a complex with Lodo soils.

Gazos soils are similar to Briones, Elder, Lodo, Lompico, and Salinas soils. They are commonly adjacent to Diablo, Gaviota, Lodo, and Los Osos soils. Briones soils are loamy sand over soft sandstone. Diablo soils have intersecting slickensides and are fine textured. Elder soils formed in alluvium and are coarse loamy. Gaviota and Lodo soils are shallow to a lithic contact. Lompico and Los Osos soils have an argillic horizon; Lompico soils also are mesic. Salinas soils are formed in alluvium, are calcareous, and do not have a lithic contact.

Typical pedon of the Gazos series in an area of Gazos-Lodo clay loams, 50 to 75 percent slopes, about 3.6 miles south and 4,595 feet east of the southeast corner of sec. 15, T. 27 S., R. 8 E., Mount Diablo base line and meridian, Cambria Quadrangle:

A1—0 to 11 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; slightly acid; clear smooth boundary.

B21—11 to 22 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; weak fine granular and subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many very fine interstitial and tubular pores; few thin clay films on faces of peds and lining pores; slightly acid; clear smooth boundary.

B22—22 to 30 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, sticky and plastic; few fine roots; many very fine tubular and interstitial pores; few thin clay films lining pores; slightly acid; gradual irregular boundary.

R—30 inches; strong brown (7.5YR 5/6) sandstone; fracture faces are less than 4 inches apart and less than 1 millimeter wide.

Thickness of the solum and depth to a lithic contact ranges from 22 to 38 inches. The A horizon is brown, dark brown, or dark grayish brown (10YR 5/3, 4/3, 4/2). It is slightly acid or neutral. Some pedons do not have a cambic horizon and go directly from an A horizon to the lithic contact. Coarse fragments range from 0 to 15 percent; the largest percentage is directly above the lithic contact.

Henneke series

The Henneke series consists of shallow, somewhat excessively drained soils that formed in residual material weathered from serpentine. Permeability is moderately slow. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 18 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Henneke soils are similar to Los Osos, Lodo, and Obispo soils. They are commonly adjacent to Diablo, Gazos, Lodo, Lompico, Los Osos, McMullin, and Obispo soils and Lithic Haploxerolls and Rock outcrop. Lodo, Obispo, Diablo, and McMullin soils do not have an argillic horizon and are nonskeletal. Lompico and Los Osos soils are also nonskeletal and are more than 20 inches deep.

Typical pedon of the Henneke series in an area of Henneke-Rock outcrop complex, 15 to 75 percent slopes, about 300 feet south and 1,600 feet east of the northwest corner of sec. 14, T. 25 S., R. 7 E., Mount Diablo base line and meridian, Cayucos Quadrangle:

A1—0 to 8 inches; reddish brown (5YR 4/3) very cobbly clay loam, dark reddish brown (5YR 3/3) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common medium and few fine roots; many very fine interstitial pores; neutral; gradual wavy boundary.

B2t—8 to 19 inches; dark reddish brown (2.5YR 3/4) very cobbly clay, dark reddish brown (2.5YR 3/4) moist; moderate fine and medium granular structure; hard, friable, sticky and very plastic; common medium roots and few fine and coarse roots; many very fine interstitial pores; many moderately thick and thick clay films on ped and rock faces; mildly alkaline; abrupt irregular boundary.

R—19 inches; greenish gray (5G 5/1) serpentine; many thin and moderately thick clay films line fracture faces that are less than 8 inches but more than 3/8 inch apart and less than 1 millimeter wide; few very fine roots in fractures.

Thickness of the solum and depth to a lithic contact range from 10 to 20 inches. The A horizon is brown, reddish brown, dark reddish brown, or dark reddish gray (7.5YR 4/2; 5YR 5/3, 4/2, 4/3, 3/3; 2.5YR 4/4). The B2t horizon is reddish brown, dark reddish brown, or dark brown (5YR 5/4, 4/4, 3/3, 3/2; 2.5YR 3/4). It is mildly alkaline or moderately alkaline. The B2t horizon is very cobbly clay loam or very cobbly clay; it is 35 to 50 percent gravel and cobbles by volume.

Kinkel Variant

The Kinkel Variant consists of deep, well drained, moderately permeable soils that formed in residual material weathered from sandstone. These soils are on mountains. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 25 to 45 inches, and the mean annual air temperature is about 57 degrees F.

Kinkel Variant soils are similar to Millsap and Santa Lucia soils. They are commonly adjacent to Cieneba, Diablo, Gazos, Lodo, Los Osos, and Santa Lucia soils. These soils, with the exception of Santa Lucia, are nonskeletal. Santa Lucia soils have a dark gray mollic epipedon and are moderately deep to a lithic contact.

Typical pedon of the Kinkel Variant in an area of Cieneba-Kinkel Variant loams, 30 to 75 percent slopes, about 500 feet south and 100 feet west of the northeast corner of sec. 23, T. 25 S., R. 6 E., Mount Diablo base line and meridian, Piedras Blancas Quadrangle::

A11—0 to 8 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak fine granular and subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular and interstitial pores; strongly acid; clear wavy boundary.

A12—8 to 19 inches; very pale brown (10YR 7/4) cobbly loam; dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure parting to fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular and interstitial pores; strongly acid; clear wavy boundary.

B21t—19 to 41 inches; very pale brown (10YR 7/4) very cobbly loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure parting to fine granular; slightly hard, very friable, slightly sticky and plastic; few very fine roots; many fine and medium tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; very strongly acid; abrupt wavy boundary.

B22t—41 to 48 inches; very pale brown (10YR 7/4) extremely gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium granular structure; slightly hard, very friable, slightly sticky and plastic; few very fine roots; common very fine, common fine, and few coarse tubular and interstitial pores; common moderately thick clay films on faces of peds and many thick clay films lining pores; strongly acid; abrupt wavy boundary.

B3t—48 to 52 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium granular structure; slightly hard, very friable, slightly sticky and plastic; common very fine, common fine, and few medium tubular and interstitial pores; common thin clay films on faces of peds and lining pores; medium acid; abrupt irregular boundary.

R—52 inches; very pale brown (10YR 7/4) feldspathic sandstone; fractures are 2 to 8 inches apart and less than 1 millimeter wide.

Thickness of the solum and depth to a lithic contact range from 40 to 60 inches. Thickness of the A horizon ranges from 10 to 19 inches. The A horizon is pale brown, very pale brown, or light yellowish brown (10YR 6/3, 6/4, 7/4). It is strongly acid or medium acid. Angular gravel and cobble content ranges from less than 15 percent by volume in the upper part to between 35 and 50 percent in the lower part. The Bt horizon is very pale brown, yellow, or reddish yellow (10YR 7/4, 7/6; 7.5YR 7/6) loam, sandy loam, or clay loam. It is about 18 to 30 percent clay and contains about 40 to 85 percent angular gravel and cobbles by volume. Gravel content increases as depth increases.

Kinkel Variant differs from the Kinkel series by always having a soil temperature above 47 degrees F, a mean January air temperature of about 47 degrees F, and a mean July air temperature of about 61 degrees F. It does not receive snowfall. Base saturation throughout the upper 30 inches of the argillic horizon is assumed to be 50 to 75 percent.

Lodo series

The Lodo series consists of shallow, somewhat excessively drained, moderately permeable soils that formed in residual material weathered from sandstone or shale. These soils are on foothills and mountains. Slope

ranges from 5 to 75 percent. The mean annual precipitation ranges from 15 to 35 inches, and the mean annual air temperature is about 59 degrees F.

Lodo soils are similar to Gaviota, Gazos, Lopez, Los Osos, and McMullin soils. They are commonly adjacent to Diablo, Gazos, Lompico, Los Osos, and McMullin soils. Diablo soils are deep and have slickensides. Gazos, Lompico, and Los Osos soils are moderately deep. Lompico and Los Osos soils also have an argillic horizon, and Lompico soils are mesic. Gaviota soils have an ochric epipedon. Lopez soils are skeletal, and McMullin soils are mesic.

Typical pedon of the Lodo series in an area of Lodo clay loam, 15 to 30 percent slopes, about 2,200 feet north and 1,100 feet west of the southeast corner of sec. 16, T. 30 S., R. 12 E., Mount Diablo base line and meridian, San Luis Obispo Quadrangle:

0A1—0 to 12 inches; dark brown (7.5YR 3/2) clay loam, dark brown (7.5YR 3/2) moist; weak fine granular and weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine tubular pores; slightly acid; clear wavy boundary.

R—12 inches; strong brown (7.5YR 5/6) hard sandstone; many thin clay films and manganese stains coat fracture faces that are less than 4 inches apart and less than 1 millimeter wide; few very fine roots in fractures.

Thickness of the solum and depth to a lithic contact range from 6 to 20 inches. The profile is 18 to 35 percent clay. It is slightly acid or neutral throughout. The A horizon is very dark grayish brown, dark brown, dark grayish brown, or brown (10YR 3/2, 3/3, 4/2, 4/3; 7.5YR 3/2, 4/2, 5/2).

Lompico series

The Lompico series consists of moderately deep, well drained, moderately permeable soils that formed in residual material weathered from sandstone and shale. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 25 to 45 inches, and the mean annual air temperature ranges from 54 degrees to 57 degrees F. Lompico soils in this survey area are mapped only in a complex with McMullin soils.

Lompico soils are similar to Gazos and Los Osos soils. They are commonly adjacent to Diablo, Henneke, Lodo, Los Osos, and McMullin soils. These soils, with the exception of McMullin, all have a thermic soil temperature regime and a base saturation of more than 75 percent. Diablo soils are fine textured. Henneke, McMullin, and Lodo soils are shallow to a lithic contact. Los Osos soils have more than 35 percent clay in the argillic horizon.

Typical pedon of the Lompico series in an area of Lompico-McMullin loams, 30 to 75 percent slopes, on the Hearst Ranch, about 2,400 feet north and 250 feet east of the southwest corner of sec. 11, T. 26 S., R. 8 E., Mount Diablo base line and meridian, Pebblestone Shutin Quadrangle:

A11—0 to 7 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; strong fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many fine and medium pores; slightly acid; clear smooth boundary.

A12—7 to 17 inches; brown (10YR 5/3) loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure parting to moderate medium and fine granular; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many fine and medium pores; slightly acid; clear smooth boundary.

B2t—17 to 32 inches; light brownish gray (10YR 6/2) loam, dark brown (7.5YR 4/4) moist; moderate medium angular blocky and subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common medium and fine pores; few moderately thick clay films lining tubular and interstitial pores; medium acid; abrupt irregular boundary.

Cr—32 inches; brown (10YR 5/3) fine grained firm sandstone, dark brown (10YR 3/3) moist; many thin clay films and manganese stains coat fracture faces that are less than 12 inches apart and less than 1 millimeter wide.

Thickness of the solum and depth to a paralithic contact range from 20 to 40 inches. Thickness of the A horizon ranges from 9 to 18 inches. The A horizon is gray, grayish brown, or brown (10YR 5/1, 5/2, 5/3; 7.5YR 5/2). It is slightly acid or neutral. The Bt horizon is light brownish gray, pale brown, light yellowish brown, light brown, or reddish yellow (10YR 6/2, 6/3, 6/4; 7.5YR 6/4; 5YR 6/6) loam or clay loam. Some pedons have a B3 or C horizon.

Typically, there are coarse fragments ranging from 5 to 15 percent in the upper part of the control section, increasing to as much as 35 percent directly above the paralithic contact. Base saturation is assumed to be between 50 and 75 percent in the upper 30 inches of the profile. There is an absolute clay increase of 3 to 7 percent from the A horizon to the B horizon.

Lopez series

The Lopez series consists of shallow, somewhat excessively drained, moderately permeable soils that formed in residual material weathered from acid shale. These soils are on foothills and mountains. Slope ranges

from 9 to 100 percent. The mean annual precipitation ranges from 16 to 20 inches, and the mean annual air temperature is about 58 degrees F.

Lopez soils are similar to Gaviota, Henneke, Lodo, and Santa Lucia soils. They are commonly adjacent to Calodo, Nacimiento, Santa Lucia, and Still soils. Calodo and Lodo soils are nonskeletal. Calodo soils are also calcareous. Gaviota soils have an ochric epipedon and are nonskeletal. Henneke soils are clayey. Nacimiento soils are moderately deep, calcareous, and nonskeletal. Santa Lucia soils are moderately deep. Still soils formed in alluvium and contain less than 35 percent gravel in the control section.

Typical pedon of the Lopez series in an area of Lopez very shaly clay loam, 30 to 75 percent slopes, about 2,300 feet west and 2,000 feet south of the northeast corner of sec. 36, T. 12 N., R. 3 W., San Bernardino base line and meridian, Huasna Peak Quadrangle:

A1—0 to 18 inches; gray (10YR 5/1) very shaly clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; neutral; abrupt broken boundary.

R—18 inches; very pale brown (10YR 8/3) hard acid siliceous shale, yellowish brown (10YR 5/4) moist; common thin clay films coat fracture faces that are less than 6 inches and more than 1 inch apart and less than 1 millimeter wide.

Thickness of the A horizon and depth to a lithic contact range from 6 to 20 inches. The A horizon is gray, grayish brown, dark gray, or dark grayish brown (10YR 5/1, 5/2, 4/1, 4/2). Content of gravel-size shale fragments ranges from about 20 percent at the surface to about 50 percent at a greater depth; it averages more than 35 percent by volume. The A horizon ranges from medium acid through neutral. Base saturation is assumed to be 50 to 75 percent throughout.

Los Osos series

The Los Osos series consists of moderately deep, well drained, slowly permeable soils that formed in residual material weathered from sandstone and shale. These soils are on foothills and mountains. Slope ranges from 5 to 75 percent. The mean annual precipitation ranges from 15 to 35 inches, and the mean annual air temperature ranges from 56 degrees to 59 degrees F.

Los Osos soils are similar to Gazos, Lodo, Lompico, Millsap, and Tierra soils. They are commonly adjacent to Diablo, Gazos, Lodo, Lompico, and McMullin soils. Gazos, Lodo, and McMullin soils do not have an argillic horizon, and Lodo and McMullin soils are shallow. Lompico and McMullin soils have a mesic soil temperature regime. Millsap and Tierra soils do not have a mollic epipedon. Diablo soils have intersecting slickensides.

Typical pedon of the Los Osos series in an area of Los Osos loam, 15 to 30 percent slopes, about 2,000 feet west and 1,500 feet south of the northeast corner of sec. 23, T. 30 S., R. 12 E., Mount Diablo base line and meridian, San Luis Obispo Quadrangle:

A1—0 to 14 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; medium acid; clear smooth boundary.

B2t—14 to 24 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; weak medium prismatic structure; very hard, very firm, sticky and plastic; few very fine roots; few very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; few nonintersecting slickensides; medium acid; gradual wavy boundary.

B3t—24 to 32 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, very firm, sticky and plastic; few very fine roots; common very fine tubular pores; many moderately thick clay films lining pores; few nonintersecting slickensides; few manganese concretions; slightly acid; gradual wavy boundary.

C1—32 to 39 inches; pale yellow (2.5Y 7/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; hard, friable, nonsticky and nonplastic; few manganese stains; neutral; gradual wavy boundary.

C2r—39 inches; yellowish brown (10YR 5/4) sandstone, dark brown (10YR 4/3) moist; many moderately thick clay films and few manganese stains coating fracture faces that are less than 10 centimeters apart and less than 1 millimeter wide.

Depth to a paralithic contact ranges from 20 to 40 inches. Thickness of the A horizon ranges from 10 to 16 inches. The A horizon is grayish brown, brown, dark grayish brown, or dark brown (10YR 5/2, 4/2, 5/3, 4/3; 7.5YR 5/2, 4/2, 5/4, 4/4). It is slightly acid or medium acid. The Bt horizon is light yellowish brown, yellowish brown, brownish yellow, brown, grayish brown, or light brownish gray (10YR 6/4, 6/6, 5/4, 5/2, 4/3; 7.5YR 5/4; 2.5Y 6/2, 5/2). It is clay loam, silty clay, or clay and has a weighted average of between 35 and 60 percent clay. It is slightly acid or medium acid in the lower part. The C horizon, if present, is pale yellow or olive brown (2.5Y 7/4, 4/4) sandy loam or clay loam.

Los Osos Variant

Los Osos Variant consists of very deep, well drained, slowly permeable soils that formed in residual material weathered from sandstone or shale. These soils are on

foothills and mountains. Slope ranges from 15 to 50 percent. The mean annual precipitation ranges from 14 to 22 inches, and the mean annual air temperature is about 58 degrees F.

Los Osos Variant soils are similar to Lompico, Los Osos, Millsap, and Tierra soils. They are commonly adjacent to Gazos, Lodo, Los Osos, Millsap, and Obispo soils and Rock outcrop. Gazos soils are moderately deep to a lithic contact. Lodo soils are shallow to a lithic contact. Los Osos soils are moderately deep to a paralithic contact. Millsap soils have an ochric epipedon, have an abrupt boundary between the A and B horizons, and are moderately deep. Obispo soils are clayey and shallow to serpentine. Tierra soils have a massive and hard epipedon, have an abrupt boundary between the A and B horizons, and formed in terrace deposits.

Typical pedon of Los Osos Variant in an area of Los Osos Variant clay loam, 15 to 50 percent slopes, about 11,400 feet south and 2,500 feet west of the southwest corner of sec. 35, T. 12 N., R. 16 E., San Bernardino base line and meridian, Santa Maria Quadrangle as inset on Chimney Canyon Quadrangle:

A11—0 to 1 inch; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate thick platy structure; hard, firm, sticky and plastic; many very fine roots; many very fine tubular pores; slightly acid; abrupt smooth boundary.

A12—1 to 12 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; many very fine roots; many very fine tubular pores; few moderately thick clay films lining pores; slightly acid; gradual smooth boundary.

B2t—12 to 27 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; weak coarse prismatic structure; hard, firm, sticky and plastic; very few very fine and medium roots; many very fine tubular pores; few moderately thick clay films lining pores; slightly acid; gradual smooth boundary.

B3ca—27 to 60 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, sticky and plastic; very few fine roots; common very fine tubular pores; strongly effervescent, lime disseminated and in soft masses; moderately alkaline.

Thickness of the solum ranges from 48 to more than 60 inches. Thickness of the A horizon ranges from 12 to 19 inches. The A horizon is grayish brown or dark grayish brown (10YR 5/2, 4/2; 2.5Y 5/2, 4/2). It is slightly acid or neutral. The B2t horizon is light yellowish brown, pale brown, or light brownish gray (10YR 6/4, 6/3; 2.5Y 6/2) clay loam or clay. The weighted average is about 50 percent clay. Soft lime masses are within 20 to 35 inches of the soil surface.

Marimel series

The Marimel series consists of very deep, somewhat poorly drained soils that formed in alluvium weathered from sedimentary rocks. Permeability is moderately slow. These soils are on alluvial fans, on flood plains, and in narrow valleys. Slope is 0 to 2 percent. The mean annual precipitation ranges from 15 to 20 inches, and the mean annual air temperature ranges from 56 degrees to 59 degrees F.

Marimel soils are similar to Camarillo, Mocho, Salinas, and Still soils. They are commonly adjacent to Cropley, Diablo, Los Osos, Mocho, and Salinas soils. Camarillo soils have a massive and hard epipedon. Cropley and Diablo soils have a fine textured control section and intersecting slickensides. Los Osos soils have an argillic horizon. Mocho, Salinas, and Still soils are well drained and have a regular decrease in organic carbon content as depth increases.

Typical pedon of the Marimel series in an area of Marimel sandy clay loam, occasionally flooded, about 1,400 yards south and 95 yards west of the Los Osos Valley Road overpass of U.S. Highway 101, 4,800 feet west and 900 feet south of the northeast corner of sec. 15, T. 31 S., R. 12 E., Mount Diablo base line and meridian, Pismo Beach Quadrangle:

A11—0 to 16 inches; grayish brown (2.5Y 5/2) sandy clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; mildly alkaline; clear smooth boundary.

A12ca—16 to 35 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; many very fine tubular pores; few thin clay films lining pores; mildly alkaline; slightly effervescent, lime disseminated and segregated in filaments; clear smooth boundary.

Cgca—35 to 60 inches; mixed gray and pale olive (5Y 5/1, 6/3) silty clay loam, very dark gray (5Y 3/1) moist; few fine prominent light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6) mottles, common fine distinct dark yellowish brown (10YR 4/4, 3/4) moist; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; many very fine tubular pores; few thin clay films lining pores; mildly alkaline; strongly effervescent, lime disseminated and segregated in filaments; water table at a depth of 36 inches.

Thickness of the A horizon ranges from 25 to 40 inches. The A horizon is grayish brown, very dark gray, dark gray, dark grayish brown, or dark brown (2.5Y 5/2; 10YR 3/1, 4/1, 4/2, 4/3). It ranges from neutral through moderately alkaline and is calcareous in the lower part. The C horizon is pale olive, dark gray, gray, light gray,

light brownish gray, pale brown, or grayish brown (5Y 5/1, 6/3; 10YR 4/1, 5/1, 5/2, 6/1, 6/2, 6/3, 7/1, 7/2) or is mottled in combinations of these colors. It is mildly alkaline or moderately alkaline and calcareous. The C horizon is loam, silt loam, sandy clay loam, clay loam, or silty clay loam; stratification is common.

Clay content averages between 18 and 35 percent in the 10- to 40-inch control section. The soil profile is continuously saturated with water within a depth of 2 to 5 feet of the soil surface for 90 days or more in most years.

McMullin series

The McMullin series consists of shallow, somewhat excessively drained, moderately permeable soils that formed in residual material weathered from sandstone and shale. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 25 to 45 inches, and the mean annual air temperature ranges from 54 degrees to 57 degrees F. McMullin soils in this survey area are mapped only in a complex with Lompico soils.

McMullin soils are similar to Gazos, Lodo, Lompico, and Lopez soils. They are commonly adjacent to Diablo, Henneke, Lodo, Lompico, and Los Osos soils. These soils, with the exception of Lompico, all have a thermic soil temperature regime and a base saturation of more than 75 percent. Diablo soils are deep and have intersecting slickensides. Gazos soils are moderately deep. Henneke soils have an argillic horizon and are skeletal. Lompico and Los Osos soils have an argillic horizon and are more than 20 inches deep. Lopez soils are skeletal.

Typical pedon of the McMullin series in an area of Lompico-McMullin loams, 30 to 75 percent slopes, about 400 feet south of the northeast corner of sec. 29, T. 27 S., R. 10 E., Mount Diablo base line and meridian, Cypress Mountain Quadrangle:

A1—0 to 15 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many medium and common fine tubular and interstitial pores; slightly acid; abrupt wavy boundary.

R—15 inches; light yellowish brown (10YR 6/4) sandstone, dark yellowish brown (10YR 4/4) moist; many thin clay films coat fracture faces that are less than 12 inches apart and less than 1 millimeter wide.

Depth to a lithic contact and thickness of the A horizon range from 12 to 20 inches. The A horizon is grayish brown or brown (10YR 5/2, 5/3; 7.5YR 5/2). This soil is 20 to 27 percent clay and has 15 to 25 percent gravel by volume. In some pedons, there is a B2 or C horizon. Base saturation is assumed to be between 50 and 75 percent.

Millsap series

The Millsap series consists of moderately deep, well drained soils that formed in residual material weathered from sandstone or shale. Permeability is very slow. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 18 to 30 inches, and the mean annual air temperature is about 59 degrees F.

Millsap soils are similar to Concepcion, Los Osos, Perkins, San Simeon, and Tierra soils. They are commonly adjacent to Cieneba, Diablo, Lodo, Lompico, Los Osos, and McMullin soils. Cieneba soils are shallow. Concepcion, Perkins, and Tierra soils are very deep and formed in terrace deposits. Diablo soils are more than 35 percent clay throughout and have intersecting slickensides. Lodo and McMullin soils are shallow. Lompico soils are mesic. Los Osos soils have a mollic epipedon.

Typical pedon of the Millsap series in an area of Millsap loam, 15 to 50 percent slopes, 500 feet north and 500 feet west of the southeast corner of sec. 15, T. 32 S., R. 16 E., Mount Diablo base line and meridian, Los Machos Hills Quadrangle as inset on Cypress Mountain Quadrangle:

A1—0 to 8 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; very coarse and coarse subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; many very fine roots in cracks and few very fine roots in peds; many very fine tubular pores; common organic matter stains on faces of peds; slightly acid; abrupt smooth boundary.

B2t—8 to 19 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; strong coarse prismatic structure; very hard, firm, very sticky and very plastic; common very fine roots in cracks and few very fine roots in peds; common very fine tubular pores; many moderately thick and thick clay films on faces of peds and lining pores; slightly acid; clear wavy boundary.

B3t—19 to 27 inches; light yellowish brown (10YR 6/4) very gravelly clay, dark brown (10YR 4/3) moist; moderate very fine and fine angular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; common moderately thick and thick clay films in pores and on ped faces; neutral; clear irregular boundary.

R—27 inches; pale yellow (2.5Y 7/4) fine grained feldspathic sandstone, olive brown (2.5Y 4/4) moist; fractures are 1/4 inch to 2 inches apart and less than 1 millimeter wide; few very fine roots in fractures; common moderately thick and thick clay films and common organic matter stains on rock faces.

Thickness of the solum and depth to a lithic contact range from 20 to 40 inches. Thickness of the A horizon ranges from 6 to 25 inches. The A horizon is brown, light brownish gray, or pale brown (10YR 5/3, 6/2, 6/3). It is slightly acid or medium acid. In some pedons there is a thin A2 horizon.

The B2t horizon is grayish brown, brown, or yellowish brown (10YR 5/2, 5/3, 5/4; 7.5YR 5/4) clay or clay loam. It is between 35 and 60 percent clay. The lower part of the B horizon contains up to 50 percent angular gravel by volume, but it averages less than 35 percent gravel in the control section. The B horizon is slightly acid or neutral. Absolute clay increase is at least 15 percent within a vertical distance of one inch between the A horizon and B2t horizon.

Mocho series

The Mocho series consists of very deep, well drained soils that developed in alluvium weathered from sedimentary rocks. Permeability is moderately slow. These soils are on alluvial fans and plains. Slope is 0 to 2 percent. The mean annual precipitation ranges from 12 to 20 inches, and the mean annual air temperature is about 58 degrees F.

Mocho soils are similar to Elder, Marimel, and Still soils. They are commonly adjacent to Camarillo, Corralitos, Salinas, and Tujunga soils and Psamments and Fluvents. Camarillo soils are somewhat poorly drained and have a very hard and massive epipedon. Corralitos and Tujunga soils are sandy, and Elder soils are coarse-loamy in the control section. Marimel soils are somewhat poorly drained and noncalcareous in the surface layer. Psamments and Fluvents consist of loosely consolidated stratified material. Salinas soils have a regular decrease in organic carbon as depth increases. Still soils are 15 to 35 percent by volume coarse fragments in the control section and are noncalcareous.

Typical pedon of the Mocho series in an area of Mocho silty clay loam, about 1.2 miles east of the intersection of California Highway 1 and Oso Flaco Lake Road and 2,480 feet southwest of Oso Flaco Lake Road, about 3 miles north of the town of Guadalupe, Oceano Quadrangle:

Ap—0 to 11 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; very hard, firm, sticky and plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly effervescent, disseminated lime; moderately alkaline; clear smooth boundary.

A12—11 to 18 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky and granular structure; hard, firm, sticky and plastic; common very fine roots; common very fine and fine tubular pores; strongly effervescent, disseminated lime; moderately alkaline; clear wavy boundary.

IIC1—18 to 38 inches; pale brown (10YR 6/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial and common very fine tubular pores; strongly effervescent, disseminated lime; moderately alkaline; abrupt smooth boundary.

IIIC2—38 to 45 inches; pale brown (10YR 6/3) silty clay loam, dark yellowish brown (10YR 4/4) moist; weak medium granular structure; hard, friable, sticky and plastic; common very fine interstitial and tubular pores; strongly effervescent, disseminated lime; moderately alkaline; clear wavy boundary.

IVC3—45 to 60 inches; stratified pale brown (10YR 6/3) sand, yellowish brown (10YR 5/4) moist; single grained; loose; few very fine roots; many very fine interstitial pores; slightly effervescent, disseminated lime; moderately alkaline.

Thickness of the A horizon ranges from 9 to 18 inches. The A horizon is dark grayish brown, grayish brown, or brown (10YR 4/2, 5/2, 5/3) fine sandy loam, loam, or silty clay loam. The C horizon is brown or pale brown (10YR 5/3, 6/3) stratified coarse sand, sand, loamy sand, fine sandy loam, silt loam, loam, and silty clay loam. The 10- to 40-inch control section averages 18 to 35 percent clay. In some pedons, stratified sands or gravelly sands are present below a depth of 40 inches.

Mocho Variant

Mocho Variant consists of very deep, well drained soils that developed in alluvium weathered from sedimentary rocks. Permeability is moderately rapid. These soils are on alluvial fans and plains. Slope is 0 to 2 percent. The mean annual precipitation ranges from 16 to 20 inches, and the mean annual air temperature is about 58 degrees F.

Mocho Variant soils are similar to Elder, Marimel, Mocho, and Still soils. They are commonly adjacent to Mocho, Salinas, and Tujunga soils. Elder soils have a regular decrease in organic carbon content as depth

increases, are noncalcareous, and have a mollic epipedon that is more than 20 inches thick. Marimel soils have mottles associated with wetness and are noncalcareous at the surface. Mocho, Salinas, and Still soils are fine-loamy in the control section. Still soils are also noncalcareous throughout. Tujunga soils are sandy throughout and have an ochric epipedon.

Typical pedon of Mocho Variant in an area of Mocho Variant fine sandy loam, about 2 miles west and 500 feet south of the intersection of Highway 101 and Orchard Road, T. 11 N., R. 33 W., San Bernardino base line and meridian, Nipomo Quadrangle:

Ap—0 to 15 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; strongly effervescent, disseminated lime; moderately alkaline; abrupt irregular boundary.

A1—15 to 33 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; strongly effervescent, disseminated lime; moderately alkaline; lenses of light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; abrupt smooth boundary.

IIC1—33 to 45 inches; pale brown (10YR 6/3) gravelly sand, dark yellowish brown (10YR 4/4) moist; single grained; loose; few very fine roots; many very fine interstitial pores; strongly effervescent, disseminated lime; moderately alkaline; abrupt smooth boundary.

IIIC2—45 to 53 inches; very pale brown (10YR 7/3) sand, yellowish brown (10YR 5/4) moist; single grained; loose; few very fine roots; many very fine interstitial pores; strongly effervescent, disseminated lime; moderately alkaline; abrupt wavy boundary.

IVC3—53 to 64 inches; pale brown (10YR 6/3) sand, dark yellowish brown (10YR 4/4) moist; single grained; loose; few very fine roots; many very fine interstitial pores; strongly effervescent, disseminated lime; moderately alkaline.

Thickness of the A horizon ranges from 9 to 33 inches. The A horizon is dark grayish brown, grayish brown, brown, or pale brown (10YR 4/2, 5/2, 5/3, 6/3). The C horizon is brown, pale brown, or very pale brown (10YR 5/3, 6/3, 7/3) stratified coarse sand, sand, gravelly sand, or loamy sand with thin strata of fine sandy loam, silt loam, and silty clay loam. The 10- to 40-inch control section averages less than 18 percent clay; the upper part is coarse-loamy, and the lower part is sandy or sandy-skeletal.

Nacimiento series

The Nacimiento series consists of moderately deep, well drained soils that formed in residual material weathered from calcareous sandstone or shale. Permeability is moderately slow. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 16 to 24 inches, and the mean annual air temperature is about 58 degrees F.

Nacimiento soils are similar to Gazos, Santa Lucia, and Zaca soils. They are commonly adjacent to Calodo, Diablo, Lodo, Los Osos, and Zaca soils. Calodo and Lodo soils are shallow. Diablo soils are deep. Gazos soils are noncalcareous. Los Osos soils have an argillic horizon. Santa Lucia soils are skeletal and acid. Zaca soils are clayey and have nonintersecting slickensides.

Typical pedon of the Nacimiento series in an area of Nacimiento-Calodo complex, 30 to 50 percent slopes, about 3.2 miles north and 4,400 feet west of the northeast corner of sec. 35, T. 10 N., R. 33 W., San Bernardino base line and meridian, Twitchell Dam Quadrangle:

A1—0 to 19 inches; grayish brown (10YR 5/2) silty clay loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, very friable, sticky and plastic; many very fine roots; many very fine tubular pores; violently effervescent, disseminated lime; moderately alkaline; clear smooth boundary.

C1ca—19 to 39 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, sticky and plastic; common very fine roots; many very fine tubular pores; violently effervescent, lime disseminated and segregated in filaments and as coatings on faces of peds or lining of pores; moderately alkaline; gradual wavy boundary.

C2r—39 inches; white (10YR 8/2) soft shale, very pale brown (10YR 7/3) moist; few very fine pores; violently effervescent.

Depth to a paralithic contact ranges from 20 to 40 inches. Thickness of the A horizon is 10 to 19 inches. The A horizon is dark grayish brown, grayish brown, or brown (10YR 4/2, 5/2, 5/3). It is strongly effervescent or violently effervescent. The C1 horizon is light brownish gray, pale brown, or very pale brown (10YR 6/2, 6/3, 7/4). It is silty clay loam or clay loam that is 27 to 35 percent clay.

Obispo series

The Obispo series consists of shallow, well drained, slowly permeable soils that formed in residual material weathered from serpentine rock. These soils are on foothills and mountains. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 16

to 35 inches, and the mean annual air temperature ranges from 56 degrees to 60 degrees F.

Obispo soils are similar to Cibo, Diablo, Henneke, and Lodo soils. They are commonly adjacent to Cibo, Cropley, Diablo, Gazos, Henneke, Lodo, and Los Osos soils. Cibo, Cropley, Diablo, Gazos, and Los Osos soils are more than 20 inches deep. Lodo soils are loamy and Henneke soils have an argillic horizon.

Typical pedon of the Obispo series in an area of Obispo-Rock outcrop complex, 15 to 75 percent slopes, about 3,600 feet west and 295 feet south of the southwest corner of sec. 34, T. 30 S., R. 12 E., Mount Diablo base line and meridian, San Luis Obispo Quadrangle:

A11—0 to 2 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong fine granular structure; very hard, firm, sticky and plastic; common very fine and few medium roots; few very fine tubular and interstitial pores; mildly alkaline; abrupt smooth boundary.

A12—2 to 11 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate coarse subangular blocky structure; very hard, firm, sticky and plastic; common very fine and few medium roots; few very fine tubular and interstitial pores; mildly alkaline; abrupt wavy boundary.

R1—11 to 18 inches; black (N 2/0), yellowish brown (10YR 4/6), and olive (5Y 4/4) serpentine, dug with handtools without difficulty but does not slake in water; few thin clay films coat fracture faces that are more than 3/4 inch and less than 8 inches apart and less than 1 millimeter wide; few very fine roots in fractures; clear wavy boundary.

R2—18 inches; black (N 2/0), yellowish brown (10YR 4/6), and olive (5Y 4/4) serpentine, cannot be dug with handtools; fractures are more than 1 inch and less than 12 inches apart and less than 1 millimeter wide.

Thickness of the A horizon and depth to a lithic contact range from 8 to 20 inches. The A horizon is gray, grayish brown, dark gray, dark grayish brown, very dark gray, or very dark grayish brown (10YR 5/1, 5/2, 4/1, 4/2, 3/1, 3/2). This soil is 40 to 60 percent clay. Reaction is neutral through moderately alkaline. It is assumed that the calcium to magnesium ratio is low. The R1 bedrock may or may not be present.

Oceano series

The Oceano series consists of very deep, excessively drained, rapidly permeable soils that formed in eolian deposits. These soils are on stabilized sand dunes near the coast. Slope ranges from 0 to 30 percent. The mean annual precipitation ranges from 15 to 19 inches, and the mean annual air temperature is about 58 degrees F.

Oceano soils are similar to Arnold, Baywood, Corralitos, and Tujunga soils. They are commonly adjacent to Camarillo and Garey soils and Dune land. Arnold soils have a paralithic contact. Baywood soils have a mollic epipedon. Corralitos and Tujunga soils are stratified and do not have lamellae. Camarillo and Tujunga soils are calcareous. Dune land is active sand dunes that have sparse to intermittent vegetation. Garey soils have an argillic horizon composed entirely of lamellae.

Typical pedon of the Oceano series in an area of Oceano sand, 0 to 9 percent slopes, 2 miles southwest of the overpass at Nipomo on an access road, about 600 feet southwest of U.S. Highway 101, on Orchard Road, and 115 feet south of a fence, Nipomo Quadrangle:

A11—0 to 4 inches; brown (10YR 5/3) sand, dark brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine interstitial pores; medium acid; clear smooth boundary.

A12—4 to 29 inches; brown (10YR 5/3) sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial and common very fine tubular pores; medium acid; gradual irregular boundary.

C1—29 to 49 inches; pale brown (10YR 6/3) sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many tubular pores; few thin 1/8- to 1/4-inch wavy and discontinuous bands that have few thin clay bridges between sand grains; medium acid; gradual irregular boundary.

C2—49 to 71 inches; pink (7.5YR 7/4) sand, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial and few very fine tubular pores; 3 wavy continuous dark yellowish brown (10YR 4/4) bands at depths of 49, 57, and 64 inches about 1/4 inch thick, hard when dry and very friable when moist; few thin clay bridges between sand grains; medium acid.

Thickness of the A horizon ranges from 14 to 36 inches. The profile is strongly acid or medium acid throughout. The A horizon is brown, grayish brown, or light brownish gray (10YR 5/3, 5/2, 6/2). The C horizon is pale brown, light yellowish brown, very pale brown, or pink (10YR 6/3, 6/4, 7/3, 7/4; 7.5YR 7/4). Loamy sand lamellae, 1/4- to 1/2-inch thick, are within a depth of 40 inches.

Perkins series

The Perkins series consists of very deep, well drained, slowly permeable soils that formed in old alluvium weathered from sedimentary rocks. These soils are on dissected terraces. Slope ranges from 2 to 30 percent. The mean annual precipitation ranges from 15 to 25 inches, and the mean annual air temperature is about 59 degrees F.

Perkins soils are similar to Chamise and Tierra soils. They are commonly adjacent to Chamise, Elder, and Lopez soils. Chamise soils have a mollic epipedon and an abrupt boundary between the A and B horizons. Tierra soils are nonskeletal and have an abrupt boundary between the A and B horizons. Elder soils are coarse-loamy Lopez soils are shallow to a lithic contact.

Typical pedon of the Perkins series in an area of Perkins fine sandy loam, 2 to 9 percent slopes, about 1,000 yards east and 3,500 yards south of the northwest corner of sec. 15, T. 11 N., R. 32 W., San Bernardino base line and meridian, Huasna Peak Quadrangle:

A11—0 to 7 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; medium acid; gradual irregular boundary.

A12—7 to 17 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial and few very fine tubular pores; slightly acid; clear wavy boundary.

B1t—17 to 32 inches; reddish brown (5YR 5/3) loam, reddish brown (5YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular and interstitial pores; few thin clay films lining pores; neutral; gradual irregular boundary.

B21t—32 to 47 inches; light reddish brown (5YR 6/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) and reddish brown (5YR 5/3) moist; weak very fine and fine subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine interstitial and few very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; neutral; gradual irregular boundary.

B22t—47 to 70 inches; reddish brown (2.5YR 4/4) very gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; massive; hard, firm, sticky and plastic; few very fine roots; common very fine and fine interstitial pores; many moderately thick clay films lining pores; neutral; gradual irregular boundary.

B3t—70 to 84 inches; mixed light reddish brown (2.5YR 6/4) and reddish brown (2.5YR 4/4) very gravelly clay loam, reddish brown (2.5YR 5/4) and dark reddish brown (2.5YR 3/4) moist; massive; hard, friable, sticky and plastic; common very fine and fine interstitial pores; many moderately thick clay films lining pores; neutral.

Thickness of the A horizon ranges from 17 to 45 inches. The A horizon is grayish brown, dark brown, or brown (10YR 5/2, 5/3; 7.5YR 4/2). It is slightly acid or medium acid. The B2t horizon is light reddish brown, reddish brown, or yellowish red (2.5YR 6/4, 4/4; 5YR 6/4, 5/4, 4/6) clay loam, gravelly clay loam, very gravelly clay loam, or very gravelly sandy clay loam. Coarse fragments in the control section average from 10 to 35 percent. The B2t horizon is slightly acid or neutral.

Pismo series

The Pismo series consists of shallow, somewhat excessively drained, rapidly permeable soils that formed in residual material weathered from soft sandstone. These soils are on foothills and mountains. Slope ranges from 9 to 75 percent. The mean annual precipitation ranges from 15 to 22 inches, and the mean annual air temperature ranges from 57 degrees to 60 degrees F.

Pismo soils are similar to Baywood, Briones, Corralitos, Gaviota, Oceano, and Tujunga soils. They are commonly adjacent to Arnold, Briones, Corralitos, Gaviota, and Tierra soils. Arnold soils are deep. Baywood soils are on old stabilized sand dunes, have a mollic epipedon, and are very deep. Briones soils are moderately deep. Corralitos and Tujunga soils are in stratified alluvium. Tujunga soils are also calcareous. Gaviota soils have a loamy control section and are underlain by hard sandstone. Oceano soils are on old stabilized sand dunes, have lamellae that contain at least 3 percent more clay than the overlying horizon, and are very deep. Tierra soils are very deep and have an argillic horizon.

Typical profile of the Pismo series in an area of Pismo loamy sand, 9 to 30 percent slopes, about 4,700 feet west and 1,500 feet south of the junction of Central Blvd. and Noyes Road, T. 32 S., R. 13 E., Mount Diablo base line and meridian, Arroyo Grande N. E. Quadrangle:

A11—0 to 1 inch; light brownish gray (10YR 6/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; common very fine interstitial and tubular pores; medium acid; abrupt smooth boundary.

A12—1 to 14 inches; light brownish gray (10YR 6/2) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial and tubular pores; medium acid; gradual smooth boundary.

A13—14 to 19 inches; light brownish gray (10YR 6/2) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common very fine and fine interstitial and tubular pores; medium acid; abrupt wavy boundary.

Cr—19 inches; white (10YR 8/2) sandstone crushing easily to loamy sand, light yellowish brown (10YR 6/4) moist; many very fine roots and thick clay films in vertical cracks that are less than 30 centimeters apart and less than 1 millimeter wide; iron stains coat fracture faces; directly overlying the paralithic contact is a continuous 1/4- to 1/8-inch thick very dark brown (10YR 2/2) band of sandy clay loam; medium acid.

Depth to a paralithic contact ranges from 8 to 20 inches. Organic matter content ranges from 0.2 to 0.6 percent. The profile is loamy sand or sand and slightly acid through strongly acid. The A horizon is gray, light gray, grayish brown, or light brownish gray (10YR 5/1, 6/1, 5/2, 6/2). Where present, the C horizon is light brownish gray, pale brown, light gray, or very pale brown (10YR 6/2, 6/3, 7/2, 7/3). In most pedons, an accumulation of black sandy clay loam, sandy clay, clay, or silty clay is directly over the paralithic contact and ranges from a thin film to 2 inches in thickness. Common to many, moderately thick to thick clay films coat vertical fracture faces. Base saturation is assumed to be more than 60 percent in some part of the profile.

Salinas series

The Salinas series consists of very deep, well drained soils that formed in alluvium weathered from sedimentary rocks. Permeability is moderately slow. These soils are on alluvial fans and plains. Slope is 0 to 9 percent. The mean annual precipitation ranges from 14 to 22 inches, and the mean annual air temperature ranges from 57 degrees to 60 degrees F.

Salinas soils are similar to the Cropley, Elder, and Mocho soils. They are adjacent to Camarillo, Cropley, Elder, and Mocho soils. Camarillo soils are poorly drained. Cropley soils are fine textured and have intersecting slickensides. Elder soils have a coarse-loamy control section. Mocho soils are calcareous throughout and have an irregular decrease in organic carbon content as depth increases.

Typical pedon of the Salinas series in an area of Salinas silty clay loam, 0 to 2 percent slopes, about 0.5 mile north of Guadalupe on State Highway 1, and 1.25 miles west; 1.7 miles east and 5.1 miles north of the northeast corner of sec. 1, T. 9 N., R. 36 W., San Bernardino base line and meridian, Guadalupe Quadrangle:

Ap—0 to 5 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium granular structure; hard, firm, sticky and plastic; many very fine roots; common very fine and fine interstitial pores; neutral; clear wavy boundary.

A12—5 to 13 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to moderate fine and medium granular; hard, firm, sticky and plastic; many very fine roots; common very fine interstitial and few very fine tubular pores; mildly alkaline; gradual wavy boundary.

A13—13 to 29 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium granular structure; hard, friable, sticky and plastic; common very fine roots; many very fine and fine interstitial and tubular pores; moderately alkaline; gradual irregular boundary.

C1—29 to 49 inches; very pale brown (10YR 7/4) very fine sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial and tubular pores; strongly effervescent, disseminated lime; moderately alkaline; abrupt smooth boundary.

IIC2cs—49 to 64 inches; light yellowish brown (10YR 6/4) silty clay loam, yellowish brown (10YR 5/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine roots; common very fine interstitial pores and many very fine tubular pores; strongly effervescent, disseminated lime; moderately alkaline; fine irregular-shaped gypsum masses make up as much as 10 percent of the soil; abrupt smooth boundary.

IIC3—64 to 72 inches; very pale brown (10YR 7/4) silty clay loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, sticky and plastic; few very fine roots; common very fine interstitial and tubular pores; strongly effervescent, disseminated lime; moderately alkaline.

Thickness of the A horizon ranges from 20 to 35 inches. The A horizon is gray or dark gray (10YR 5/1, 4/1) silty clay loam or loam. It ranges from neutral through moderately alkaline and is noncalcareous. The C horizon is yellowish brown, light yellowish brown, pale brown, or very pale brown (10YR 5/6, 6/4, 6/3, 7/4). A few weakly defined strata have texture ranging from silty clay loam through very fine sandy loam. The content of clay in the control section ranges from 18 through 35 percent. The C horizon is mildly alkaline or moderately alkaline.

San Simeon series

The San Simeon series consists of moderately deep, moderately well drained soils that formed in residual

material weathered from sandstone. Permeability is very slow. These soils are on terraces. Slope ranges from 2 to 50 percent. The mean annual precipitation ranges from 18 to 25 inches, and the mean annual air temperature is about 55 degrees F.

San Simeon soils are similar to Concepcion and Los Osos soils. They are commonly adjacent to Concepcion, Diablo, Gazos, Lodo, Los Osos, and Salinas soils. Concepcion soils are very deep. Diablo soils are deep. Gazos and Lodo soils do not have an argillic horizon, they both have a lithic contact, and Lodo soils are shallow. Los Osos soils do not have an A2 horizon. Salinas soils are deep and formed in alluvium.

Typical pedon of the San Simeon series in an area of San Simeon sandy loam, 9 to 15 percent slopes, about 3,700 feet north and 5,900 feet east of the Piedras Blancas Lighthouse, T. 26 S., R. 6 E., Mount Diablo base line and meridian, Piedras Blancas Quadrangle:

O2—2 inches to 0; decomposed leaves and grass.

A11—0 to 11 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and common fine roots; many very fine tubular and interstitial pores; medium acid; clear smooth boundary.

A12—11 to 20 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 3/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; medium acid; clear smooth boundary.

A2—20 to 24 inches; light yellowish brown (10YR 6/4) sandy loam, dark brown (10YR 4/3) moist; few fine faint brown (7.5YR 5/4) mottles; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; very few thin clay films bridging sand grains; medium acid; abrupt smooth boundary.

B2t—24 to 34 inches; mottled brown (7.5YR 5/4), strong brown (7.5YR 5/6), and dark red (2.5YR 3/6) clay, dark brown (7.5YR 4/2), strong brown (7.5YR 5/6), and dark red (2.5YR 3/6) moist; moderate fine prismatic structure; very hard, firm, sticky and plastic; few fine roots; common very fine tubular pores; many moderately thick dark brown clay films on faces of peds and lining pores; very strongly acid; clear wavy boundary.

Cr—34 inches; reddish yellow (7.5YR 6/6) sandstone, yellowish red (5YR 5/6) moist; massive; few very fine roots along fracture faces; many very fine interstitial and tubular pores; few thick clay films lining pores and on fracture faces; fractures are more than 3/4 inch and less than 4 inches apart and less than 1 millimeter wide; very strongly acid.

Depth to a paralithic contact and thickness of the solum range from 20 to 40 inches. Thickness of the A1 horizon ranges from 9 to 20 inches. The A1 horizon is gray, grayish brown, or brown (10YR 5/1, 5/2, 5/3; 7.5YR 5/2). It is medium acid or slightly acid. The A2 horizon is light gray, gray, light yellowish brown, light brownish gray, or grayish brown (10YR 7/1, 6/1, 6/2, 6/4; 2.5Y 5/2) and has distinct mottling. It is medium acid through very strongly acid. The B2t horizon is mottled with brown, yellowish brown, light yellowish brown, strong brown, dark grayish brown, dark red, and grayish brown (7.5YR 5/4, 5/6; 10YR 4/2, 5/2, 5/4) clay or sandy clay. It is medium acid through very strongly acid.

Santa Lucia series

The Santa Lucia series consists of moderately deep, well drained, moderately permeable soils that formed in residual material weathered from acid shale. These soils are on foothills and mountains. Slope ranges from 5 to 75 percent. The mean annual precipitation ranges from 15 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Santa Lucia soils are similar to Gazos, Lopez, and Zaca soils. They are commonly adjacent to Diablo, Gazos, Lodo, Lopez, Los Osos, and Zaca soils. These soils, with the exception of Lopez, all have less than 35 percent coarse fragments. Diablo soils are deep. Gazos soils have chroma of 2 or 3 and are fine-loamy. Lodo and Lopez soils are shallow. Los Osos soils have an argillic horizon, and Zaca soils are calcareous.

Typical pedon of the Santa Lucia series in an area of Santa Lucia shaly clay loam, 50 to 75 percent slopes, about 2,750 feet south and 1,000 feet east of the southwest corner of sec. 26, T. 30 S., R. 10 E., Mount Diablo base line and meridian, Morro Bay South Quadrangle:

A11—0 to 17 inches; dark gray (10YR 4/1) shaly clay loam, black (10YR 2/1) moist; moderate very fine, fine, and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; medium acid; diffuse irregular boundary.

A12—17 to 36 inches; grayish brown (10YR 5/2) very shaly clay loam, very dark grayish brown (10YR 3/2) moist; moderate very fine, fine, and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores; slightly acid; diffuse irregular boundary.

R—36 inches; very pale brown (10YR 7/3), fractured, hard, acid shale, dark yellowish brown (10YR 4/4) moist; many thick clay films coat fracture faces that are 1/2 inch to 3 inches apart and 1 to 5 millimeters

wide in the upper part, decreasing to less than 1 millimeter wide as depth increases.

Thickness of the A horizon and depth to a lithic contact range from 20 to 40 inches. The A horizon is gray, dark gray, very dark gray, grayish brown, or dark grayish brown (10YR 5/1, 5/2, 4/1, 4/2, 3/1). Content of angular shale gravel and cobbles range from 15 to 70 percent and averages more than 35 percent. Coarse fragment content increases as depth increases. The soil is slightly acid through strongly acid.

Still series

The Still series consists of very deep, well drained soils that formed in alluvium weathered from sedimentary rocks (fig. 21). Permeability is moderately slow. These soils are on alluvial fans and coastal terraces. Slope ranges from 0 to 25 percent. The mean annual precipitation ranges from 16 to 22 inches, and the mean annual air temperature ranges from 57 degrees to 60 degrees F.

Still soils are similar to Elder, Marimel, Salinas, and Santa Lucia soils. They are adjacent to Lopez, Santa Lucia, and Elder soils. Elder soils are coarse-loamy. Marimel soils are mottled and somewhat poorly drained. Salinas soils are calcareous. Santa Lucia soils are loamy-skeletal and moderately deep to a lithic contact. Lopez soils are loamy-skeletal and shallow to a lithic contact.

Figure 21.—A profile of Still gravelly sandy clay loam

Typical pedon of the Still series in an area of Still gravelly sandy clay loam, 0 to 2 percent slope, about 2,200 feet south and 200 feet west of the northwest corner of sec. 35, T. 12 N., R. 35 W., San Bernardino base line and meridian, Oceano Quadrangle:

A1—0 to 40 inches; very dark gray (10YR 3/1) gravelly sandy clay loam, black (10YR 2/1) moist; massive; sticky and plastic; many medium roots; many medium interstitial pores; neutral; diffuse smooth boundary.

IIC1—40 to 64 inches; light brownish gray (10YR 6/2) gravelly sand, grayish brown (10YR 5/2) moist; massive; nonsticky and nonplastic; common medium roots; many medium interstitial pores; neutral.

Thickness of the A horizon is 20 to 40 inches. The A horizon is dark grayish brown, grayish brown, very dark gray, dark gray, or gray (10YR 4/2, 5/2, 3/1, 4/1, 5/1). It is slightly acid or neutral. Typically, this soil contains 10 to 45 percent gravel but averages 15 to 35 percent in the control section. The C horizon is grayish brown or light brownish gray (10YR 5/2, 6/2). Some profiles are stratified with sand, loam, light clay loam, or sandy clay loam. Stratified texture can be gravelly or very gravelly, and it averages less than 35 percent gravel in the 10- to 40-inch control section. The C horizon ranges from slightly acid through moderately alkaline.

Suey series

The Suey series consists of very deep, well drained, moderately permeable soils that formed in loess which has been deposited over old stream terraces. These soils are on hills and terraces overlooking the Santa Maria Valley. Slope ranges from 2 to 50 percent. The mean annual precipitation ranges from 13 to 18 inches, and the mean annual air temperature is about 58 degrees F.

Suey soils are similar to Baywood, Capistrano, Garey, Gazos, Oceano, and Salinas soils. They are commonly adjacent to Calodo, Concepcion, Diablo, Lodo, Nacimiento, Tierra, and Zaca soils. Baywood soils are sand throughout. Capistrano soils are sandy loam. Calodo, Gazos, Lodo, and Nacimiento soils are clay loam and formed in residual material. Diablo and Zaca soils are clay. Concepcion and Tierra soils have clayey argillic horizons. Garey soils are sandy loam and have lamellae, and Oceano soils are loamy sand and have

lamellae. Salinas soils formed in alluvium and are fine-loamy.

Typical pedon of the Suey series in an area of Suey silt loam, 15 to 30 percent slopes, about 2,500 feet north and 6,800 feet east of the southeast corner of sec 2, T. 10 N., R. 34 W., San Bernardino base line and meridian, Santa Maria Quadrangle:

O1—1 inch to 0; annual grass litter.

A11—0 to 5 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; slightly acid; abrupt smooth boundary.

A12—5 to 21 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; common very fine and few medium tubular pores; neutral; gradual smooth boundary.

A13—21 to 40 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine and common fine and medium tubular pores; mildly alkaline; diffuse wavy boundary.

C—40 to 80 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 4/2) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine tubular pores; moderately alkaline.

Thickness of the A horizon ranges from 30 to 60 inches. The A12 and A13 horizons range from very fine sandy loam through silt loam throughout and are less than 15 percent fine sand or coarser. The A horizon is dark grayish brown, dark brown, grayish brown, or brown (10YR 4/2, 4/3, 5/2, 5/3; 7.5YR 5/2). It is slightly acid or neutral. Some pedons have a cambic horizon. The C horizon is brown, pinkish gray, reddish brown, light reddish brown, or reddish yellow (7.5YR 5/4, 6/2; 5YR 5/4, 6/4, 6/6). It is neutral through moderately alkaline.

Tierra series

The Tierra series consists of very deep, moderately well drained soils that formed in old alluvium weathered from sedimentary rocks. Permeability is very slow. These soils are on terraces. Slope ranges from 2 to 50 percent. The mean annual precipitation ranges from 16 to 24 inches, and the mean annual air temperature is about 58 degrees F.

Tierra soils are similar to Chamise, Concepcion, Los Osos, and Millsap soils. They are commonly adjacent to Briones, Chamise, Concepcion, Cropley, Diablo, Pismo, and Salinas soils. These soils do not have a massive and hard surface layer. Briones soils are loamy sand and are moderately deep to a paralithic contact. Chamise soils are skeletal. Concepcion soils have a mottled A2 horizon. Cropley and Diablo soils have intersecting slickensides that extend to the surface, and Diablo soils are deep to a paralithic contact. Los Osos soils are moderately deep to a paralithic contact. Millsap soils are moderately deep to a lithic contact. Pismo soils are loamy sand and are shallow to a paralithic contact. Salinas soils do not have an argillic horizon.

Typical pedon of the Tierra series in an area of Tierra sandy loam, 2 to 9 percent slopes, about 700 feet south of the northwest corner of sec. 14, T. 31 S., R. 12 E., Mount Diablo base line and meridian, Pismo Beach Quadrangle:

A1—0 to 9 inches; gray (10YR 5/1) sandy loam, very dark gray (10YR 3/1) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores, slightly acid; abrupt smooth boundary.

A2—9 to 11 inches; light gray (10YR 6/1) sandy loam, very dark gray (10YR 3/1) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; slightly acid; abrupt smooth boundary.

B21t—11 to 29 inches; mixed gray (10YR 5/1) and brown (10YR 5/3) sandy clay, very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) moist; strong medium and coarse prismatic structure; very hard, very firm, sticky and plastic; common very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; slightly acid; diffuse wavy boundary.

B22t—29 to 42 inches; pale brown (10YR 6/3) sandy clay with coatings of gray (10YR 5/1), brown (10YR 5/3) with coatings of very dark gray (10YR 3/1) moist; moderate medium and coarse angular blocky structure; very hard, very firm, sticky and plastic; few very fine roots; many very fine tubular pores; continuous moderately thick clay films on faces of peds and many slickensides; neutral; diffuse wavy boundary.

C—42 to 60 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; light yellowish brown (10YR 6/4) mottles, dark yellowish brown (10YR 4/4) moist; massive; very hard, very firm, sticky and slightly plastic; mildly alkaline.

Thickness of the solum ranges from 40 to 52 inches. Thickness of the A1 horizon is 9 to 30 inches. The A1 horizon is gray, grayish brown, or dark gray (10YR 5/1, 5/2, 4/1). It is slightly acid or medium acid. The A2 horizon is light gray (10YR 6/1, 7/1, 7/2). Reaction is similar to that of the surface horizon. The Bt horizon is typically mixed and is dark grayish brown, gray, grayish

brown, brown, light brownish gray, and pale brown (10YR 4/2, 5/1, 5/2, 5/3, 6/2, 6/3). It is medium acid through neutral. It is sandy clay or clay with common or many slickensides. The C horizon has colors similar to those of the Bt horizon. It is medium acid through moderately alkaline. In some pedons, lime is disseminated or segregated. The C horizon is clay loam or sandy clay loam.

Tujunga series

The Tujunga series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in alluvium weathered from sedimentary rocks. These soils are on flood plains and alluvial fans. Slope is 0 to 9 percent. The mean annual precipitation ranges from 12 to 22 inches, and the mean annual air temperature is about 58 degrees F.

Tujunga soils are similar to and adjacent to Arnold, Corralitos, Gaviota, and Oceano soils. Arnold soils are deep to a paralithic contact. Gaviota soils are sandy loam and shallow to a lithic contact. Corralitos soils are noncalcareous. Oceano soils have lamellae, are noncalcareous, and formed in eolian deposits.

Typical pedon of the Tujunga series in an area of Tujunga loamy sand, 0 to 2 percent slopes, about 3.3 miles west and 600 feet north of the intersection of Highway 166 and U. S. Highway 101, T. 11 N., R. 34 W., San Bernardino base line and meridian, Santa Maria Quadrangle:

Ap—0 to 11 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine interstitial pores and few very fine tubular pores; slightly effervescent, disseminated lime; moderately alkaline; clear wavy boundary.

IIC1—11 to 27 inches; very pale brown (10YR 7/3) sand, yellowish brown (10YR 5/4) moist; single grained; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; slightly effervescent, disseminated lime; moderately alkaline, abrupt smooth boundary.

IIIC2—27 to 31 inches; very pale brown (10YR 7/3) loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine interstitial pores and few very fine tubular pores; slightly effervescent, disseminated lime; moderately alkaline; clear smooth boundary.

IVC3—31 to 82 inches; pale brown (10YR 6/3) gravelly sand, yellowish brown (10YR 5/4) moist; single grained; loose, nonsticky and nonplastic; many very fine interstitial pores; contains strata of medium and coarse gravel with a few water-rounded cobblestones up to 6 inches in diameter; strongly effervescent, disseminated lime; moderately alkaline.

Thickness of the A horizon ranges from 4 to 36 inches. The A horizon is pale brown or very pale brown (10YR 6/3, 7/3, 7/4). It is mildly alkaline or moderately alkaline and slightly effervescent or strongly effervescent. The C horizon is very pale brown or pale brown (10YR 6/3, 7/3). Reaction is similar to that of the surface horizon. The C horizon is sand or loamy sand throughout; stratification is common.

Tujunga soils in this survey area are calcareous and more alkaline than is defined in the range for the series. This difference, however, does not significantly affect use and management. Coarse fragments range up to 35 percent; the higher amounts are below a depth of 40 inches. Thin strata of silty or similar finer textures are not present.

Zaca series

The Zaca series consists of deep, well drained, slowly permeable soils that formed in residual material weathered from calcareous mudstone, sandstone, or shale. These soils are on foothills and mountains. Slope ranges from 9 to 75 percent. The mean annual precipitation ranges from 15 to 22 inches, and the mean annual air temperature is about 58 degrees F.

Zaca soils are similar to Cibo, Diablo, and Nacimiento soils. They are commonly adjacent to Cropley, Diablo, Lodo, Nacimiento, and Santa Lucia soils. Cibo, Cropley, and Diablo soils have intersecting slickensides and are not calcareous in the surface layer. Cibo soils are moderately deep to a lithic contact. Cropley soils formed in alluvium. Lodo soils are shallow and noncalcareous. Nacimiento soils are moderately deep and have less than 35 percent clay. Santa Lucia soils are skeletal and noncalcareous.

Typical pedon of the Zaca series in an area of Zaca clay, 9 to 15 percent slopes, about 4.17 miles west and 1,500 feet north of the southeast corner of sec. 1, T. 11 N., R. 34 W., San Bernardino base line and meridian, Nipomo Quadrangle:

Ap—0 to 4 inches; very dark gray (10YR 3/1) clay; very dark gray (10YR 3/1) moist; strong fine and medium granular structure; very hard, friable, very sticky and very plastic; common very fine roots; many very fine interstitial pores; slightly effervescent, disseminated lime; moderately alkaline; clear smooth boundary.

A12—4 to 16 inches; very dark gray (10YR 3/1) clay, very dark gray (10YR 3/1) moist; strong medium and coarse subangular blocky and weak fine granular structure; very hard, friable, very sticky and very plastic; many very fine roots; many very fine interstitial and few very fine tubular pores; strongly effervescent, disseminated lime; moderately alkaline; gradual wavy boundary.

A13—16 to 36 inches; very dark gray (10YR 3/1) clay, very dark gray (10YR 3/1) moist; strong fine subangular blocky structure; moderate fine granular structure; very hard, friable, very sticky and very plastic; common very fine roots; many very fine interstitial pores and few very fine tubular pores; many slickensides on ped faces; slightly effervescent, disseminated lime; moderately alkaline; clear irregular boundary.

Cca—36 to 54 inches; mixed very dark grayish brown (10YR 3/2) and yellowish brown (10YR 5/4) silty clay, very dark brown (10YR 2/2) and dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky and granular structure; hard, friable, very sticky and plastic; few very fine roots; many very fine interstitial pores; violently effervescent, lime disseminated and segregated in large irregularly shaped soft masses; moderately alkaline; clear smooth boundary.

Cr—54 inches; yellowish brown (10YR 5/4) soft mudstone, dark yellowish brown (10YR 4/4) moist; massive; many very fine interstitial pores; violently effervescent, lime is segregated in medium irregular-shaped soft masses; moderately alkaline.

Depth to a paralithic contact ranges from 40 to 60 inches. Thickness of the A horizon is 27 to 45 inches. The A horizon is gray, dark gray, or very dark gray (10YR 5/1, 4/1, 3/1). Cracks range from 1 to 2 centimeters in width to a depth of more than 20 inches when the soil is dry.

formation of the soils

In this section, the physical processes that affect the formation and morphology of the soils in the coastal part of San Luis Obispo County are discussed.

factors of soil formation

The definition of the word *soil* varies depending on the discipline concerned. To an engineer, *soil* is regolith or any unconsolidated material, regardless of depth or mode of formation. To the pedologist or soil scientist, soil is the collection of natural bodies on the earth's surface, containing living matter that supports or is capable of supporting plants (*13*). It is a mixture of varying proportions of rocks and minerals, elements combined as salts or as ions, organic matter, water, and air.

The processes involved in soil formation are complex, and the soil is constantly changing. Five genetic and environmental factors interact to form soil. They are (1) parent material; (2) the climate in which the soil material accumulated and has existed since accumulation; (3) the relief, or topography, which influences the local or internal environment of the soil, its drainage, moisture content, aeration, susceptibility to erosion, and exposure to sun and wind; (4) biological forces that act upon the soil material, such as the plants and animals living on and in it; and (5) the length of time the climatic and biological forces have acted on the soil material.

These factors form a soil that differs from the material from which it is derived in many physical, chemical, and biological characteristics.

morphology of soils

The results of the soil-forming factors are evidenced by the different layers, or soil horizons, in a profile. The soil profile extends from the surface down to materials that are little altered by the soil-forming processes.

Most soils contain three major horizons—the A, B, and C horizons (*12*). The major horizons can be subdivided by the use of numbers and letters to indicate differences within the horizon. The B2t horizon, for example, represents the best developed part of a B horizon that has an accumlation of clay from overlying horizons. The Los Osos soils, for example, have a B2t horizon.

The A horizon is a mineral surface layer. An A1 horizon is darkened by humified organic matter. An Ap horizon is a plow layer, also commonly darkened with organic matter. The A horizon is the layer of maximum leaching or eluviation of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, the horizon is called the A2 horizon. Where it occurs, the A2 horizon is normally the lightest colored horizon in the profile.

The B horizon normally underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer.

In some soils, such as the Gazos soils, the B horizon formed mainly by alteration of the original material rather than by illuviation. The alteration can be caused by the weathering of the parent material, the releasing of iron to give rusty colors, and the development of soil structure in place of the original rock or sediment structure. The B horizon commonly has blocky or prismatic structure; it generally is firmer and lighter in color than the A1 horizon, but it is darker than the C horizon or the A2 horizon.

The C horizon is below the A or B horizon. It consists of materials that are little altered by the soil forming processes, but it may be modified by weathering. In youthful soils, such as those that formed in recent alluvium or in man-deposited fill materials, the C horizon can reach to or nearly to the soil surface. The B horizon and, in places, even the A horizon may be absent. Corralitos soils do not have a B horizon.

processes of soil horizon differentiation

Several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble constituents, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes often operate simultaneously and have been going on for thousands of years in older soils.

The accumulation and incorporation of organic matter takes place as plant residue and man-deposited organic materials decompose and are mixed into the soil. These additions darken the mineral soil materials and are responsible for forming the A1 horizon.

In order for a soil to have a distinct subsoil, lime and the more soluble materials must be leached before the translocation of clay minerals. After this has taken place,

the clay can disperse more easily and be moved as part of the percolation. Clay has accumulated in the Bt horizon of those soils classified as Alfisols by being leached from overlying horizons and stopping in the B horizon as a result of flocculation and the drying up of the percolating water. Also, clay is formed within the B horizon from the weathering of primary minerals. More inert materials, such as silt- and sand-size quartz, are concentrated in the A horizon as the more soluble materials and clay are leached out.

The well drained and moderately well drained soils in this survey area, such as Los Osos or Millsap soils, generally have a yellowish brown or reddish brown subsoil. These colors come from finely divided iron oxide minerals that coat the sand, silt, and clay particles. These iron oxides formed from iron released during the weathering of silicate minerals in the present soil or in soils that were the source of the sediment in which the present soil developed. In more poorly drained soils, such as Marimel soils, gray colors in lower horizons indicate the absence of free iron oxide coatings. In the gray zones, the iron has been chemically reduced to a more soluble form during wet conditions when oxygen was excluded and the iron was either leached from the soils or was concentrated in iron oxide mottles and concretions.

soil formation by geomorphic units

This section was prepared by Christopher W. Smith, soil scientist, Soil Conservation Service

The San Luis Obispo County, California, Coastal Part, soil survey area is bordered on the west and southwest by the Pacific Ocean. The eastern survey boundary follows the ridge of the Santa Lucia mountains from the northernmost point at the Monterey County line in a southeasterly direction to just north of State Highway 46, where it continues along the Los Padres National Forest boundary in approximately the same direction to the Santa Barbara County line in the south. A majority of the survey area is composed of the Coastal Range with the remainder of the area made up of either the erosional material derived from these mountains or windblown material derived from coastal beaches and rivers.

The soils of this survey area have been separated into 4 major geomorphic groups which correspond to groups of soils on the General Soils Map. They are (1) soils on hills and mountains; (2) soils on foothills and terraces; (3) soils on windblown deposits; and (4) soils on alluvial fans and plains. The five soil forming factors as they pertain to the major soils in this survey area are discussed for each of these groups.

soils on hills and mountains

Most of the soils within this group (general soil map units 10 through 14) are weathered from rocks of the Franciscan assemblage that make up the San Luis formation. The predominate rocks are sandstone and, to a lesser extent, shale. This material, under the existing weathering conditions, has given rise to soils of the fine-loamy and fine textural families. The predominant soils are of the Los Osos, Lodo, Diablo, and Millsap series. Ultramafic rocks, mainly serpentine, have intruded into the Franciscan rocks but are not considered part of the Franciscan formation (*4*). This serpentine, and the associated metamorphosed marine muds are parent material for the Henneke and Obispo soils (general soil map unit 13). The rest of this group is comprised mainly of marine deposits of calcareous, tuffaceous, and diatomaceous shales and mudstones that have weathered to form the Santa Lucia, Lopez, Nacimiento, and Calodo soils (general soil map units 11 and 12).

The Los Osos and Millsap series are the most mature in terms of profile development. The sandstone has provided a relatively high concentration of silica and magnesium, and the climatic conditions have been such that extensive leaching has not taken place. This has given rise to the high content of montmorillonite in the clay fraction (*2*) that is typical of soils in this map unit. Rainfall leached through the initial regolith where Los Osos and Millsap soils exist today enough to move (translocate) the silt- and clay-sized particles down through the soil profile where they were deposited along structural faces and within pores in the lower portion of the profile, but not out of the profile completely. This decreased the pore size, slowing the percolation rate and allowing still greater amounts of fines to accumulate along with clay formed in place until, at the present time, a strongly developed, clay textured horizon exists.

Typically, the boundary between the A and B horizons is clear in the Los Osos soil and abrupt in the Millsap soil. In some areas, an abrupt boundary occurs in soils that are similar to Los Osos soils. This indicates that these profiles are stable and have probably existed in place the longest of any of the upland soils in the survey area. Millsap soils have many properties that are similar to Los Osos soils. Millsap soils differ mainly by having a significantly harder consistence and less organic matter content in the surface horizon. Also, a thin A2 horizon is present in some areas. These differences indicate an advanced stage of weathering in comparison to Los Osos soils. As slope increases, because of the fine textured subsoil, these soils become subject to slippage, destroying their diagnostic horizons.

Lodo and Gazos are commonly in this landform and are often adjacent to Los Osos soils. The parent rock underlying Gazos and Lodo soils is harder and less susceptible to weathering than that underlying Los Osos and Millsap soils. This and the topography are probably the two major soil forming factors that cause these soils to differ from the Los Osos soils. Typically, these soils are on steep to very steep slopes on a variety of aspects, but mainly on south to west aspects or ridges and convex side slopes of rolling hills. These conditions

reduce the amount of rainfall that enters the soil or the amount of water stored for any length of time. This and a hard parent rock generates soils that apparently are eroded at about the same rate as they are formed. Gazos soils contain a slight increase in clay in the lower part of many profiles.

Other soils that are extensive throughout the uplands are the Diablo series. Diablo soils share the same topography, climate, and apparent age as the Los Osos soils. However, the two soils are quite different. The Diablo soils are deeper, darker, and contain more clay throughout the soil profile than the Los Osos soils. The rock from which the Diablo soils formed is more easily weathered than that of the Los Osos soils. This is probably the main soil forming factor that accounts for the difference in soil profiles.

The lime that is commonly present in the lower part of the profiles of the Los Osos and Diablo soils is primarily pedogenic. The rocks which gave rise to the parent material do not normally contain lime but do have sufficient amounts of calcium that will react with the carbon dioxide given off by living organisms.

The serpentine rock, which has intruded into the Franciscan rocks, has weathered to form the Henneke and Obispo soils. This parent rock, under these climate conditions, gives rise to soils that exhibit low calcium to magnesium ratios. It is apparent that the serpentine rock, even though it has a Mohs hardness of about 3, is more resistant to weathering than the surrounding Franciscan sandstones and marine muds commonly associated with these intrusions. Evidence of this is the shallow depth to rock, the quantity of rock fragments within the profile (particularly with the Henneke soils), and the presence of rock outcrops that are typical of these areas. The digger pine, manzanita, and yucca on the Henneke soils and the annual and perennial grasses typical of the Obispo soils indicate that there may be elements that favor one plant community over another. Why these two soils, forming from seemingly similar parent material, on similar topography, and under similar climate, should develop such varied characteristics is a subject for continued study.

The Nacimiento and Calodo soils formed from soft, calcareous shales and mudstone. They are very similar except for depth. The high content of calcium carbonate impedes the maturation of the soils by flocculating the clay particles and thereby preventing translocation of the clay. Calodo soils normally are on ridges, convex areas of side slopes, or areas where the parent rock is slightly harder than that of the adjacent Nacimiento soils. This accounts for its shallower depth to rock as compared to Nacimiento soils.

Where the shales are harder, tuffaceous or diatomaceous and acidic Santa Lucia and Lopez soils have formed. Because of the highly fractured nature of the shale in the Santa Lucia series, weathering was able to proceed along these fractures. Because of the steep or very steep slopes commonly present, the Santa Lucia soils were prone to 'creep' downslope, thereby rotating the shale fragments into their present positions. These soils exhibit unique behavior when clay content, cation exchange capacity, and bulk density are compared. Textures in the field appear to be loamy, but lab analysis shows a much higher content of clay-size particles. This is caused by diatom skeleton fragments or tuff present in the shale that are of clay particle size but which have little or no cation exchange capacity and have a low bulk density. These soils also exhibit a lower base saturation than is typical for most other soils in the survey area. This, however, is due to lack of base cations in the parent material rather than to the loss of bases by leaching from the soil profile.

Some other soils of lesser extent include Lompico and McMullin soils. These are similar in some ways to Gazos and Lodo soils. They normally are on north aspects or in swales. Because of the dense tree canopy and the aspect that is typical of these soils, the soil temperature is cooler than surrounding grass and brush areas; therefore, the precipitation is not as readily evaporated. This allows a greater amount of moisture to leach through the soil and, in the absence of base recycling grasses, some of the base cations are removed from the profile. Because organic matter is less subject to oxidation and volitalization, these soils typically are well flocculated and friable.

soils on foothills and terraces

The terraces within the survey area are of both marine and fresh water origin. The soils formed from marine terrace material occur from the western end of Los Osos valley intermittently along the coast to just north of Ragged Point. Their source material is of Franciscan origin or from soils formed from Franciscan and related rocks. The major soils that formed on these terraces are Concepcion and San Simeon soils (general soil map unit 8).

The freshwater terraces were deposited by rivers and vary in composition depending on the source material. Southeast of San Luis Obispo, in the area around the San Luis Obispo County Airport and throughout much of the Edna valley, deposits are high in clay content and lack coarse fragments. This material has given rise to the Tierra soils (general soil map unit 6). The deeply dissected terraces just north of Nipomo are high in clay content but also contain a very high amount of angular, silicious shale fragments of gravel size. This material was derived from the Monterey formation that was adjacent to the terraces in the past but since has been separated, for the most part, by volcanic activity. The major soils mapped here are the Chamise soils (general soil map unit 9). The soils formed in these deposits have very mature profiles and are probably the oldest soils in the survey area.

Concepcion and San Simeon soils, which are on the terraces along the north coast, are very similar except that San Simeon soils have developed a weakly indurated substratum at a depth of about 20 to 40 inches. The erosional material from the Franciscan assemblage has supplied a high quantity of montmorillonitic clay and easily weathered primary minerals. Over the long period of time that these soils have been in place, the rainfall has leached the surface layer until a loam A1 horizon, a sandy loam A2 horizon, a clay B2t horizon, and an abrupt boundary between the A and B horizons exist today (fig. 22). These soils also have a polychromatic substratum containing segregated oxidized iron and manganese, organic matter stains, and clay films deep within the profile. These indicate a relatively high quantity of moisture available for translocation of clay and other weathering processes.

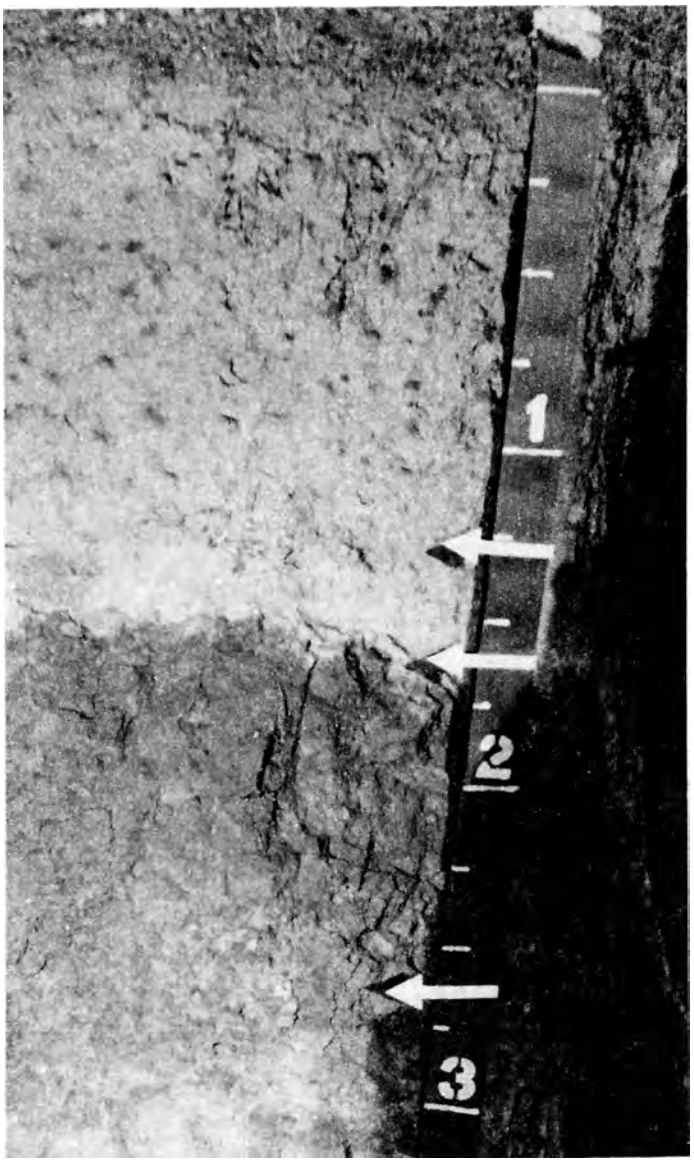

Figure 22.—A profile of the San Simeon series. Note the bleached A2 horizon at a depth of about 15 inches, which is directly above the clay subsoil.

The sediments underlying the clay subsoil of the San Simeon soils have many properties associated with soil development within an unconsolidated regolith, such as pores containing thick clay films. It is apparent, however, that this horizon is becoming increasingly indurated. There are inclusions in mapping where this feature is very weakly expressed or more strongly expressed than is typical for the series. This gives evidence that this induration is a pedogenic process rather than an inherited characteristic of the parent material. The San Simeon soils normally have steeper slopes than the Concepcion soils, which causes greater runoff and, therefore, less water is available to percolate through the San Simeon profile. This may be a major factor in the development of the indurated layer.

The rainfall and fog in the area help to maintain a good vegetative cover and high organic matter content, which has created the typical grayish brown surface layer of these soils. A few areas around the town of Cambria are under conifer vegetation and typically have a lower pH and base saturation than adjacent areas under grass vegetation. This is due to the lack of base recycling that grasses can provide and because of the addition of organic acids from the forest litter.

The foothills in this geomorphic group are composed of marine sandstone of the Pismo formation. Unconsolidated material weathered from this soft, white, silicious sandstone is parent material for the Arnold, Briones, and Pismo soils (general soil map units 6 and 7). The only significant difference between these soils is depth. Arnold soils are deep, Briones soils are moderately deep, and Pismo soils are shallow. Because of the high content of quartz sand in the parent material, these soils have not been able to form a significant amount of clay. The result is a loamy sand texture that has low available water capacity and promotes only limited plant growth, subsequently causing a low organic matter accumulation. Because of this, much of the organic matter that does enter the soil is easily oxidized and volatilized.

These three soils are not cohesive to any significant extent because of the lack of clay and organic matter; therefore, they are susceptible to erosion. Sheet erosion is believed to be responsible for the difference in depth of these soils. Evidence of this is the elevated crown and partially exposed root systems of scattered oaks on the Briones and Pismo soils and, to a lesser extent, on the Arnold soils.

All three soils typically have a black or very dark brown clay or silty clay band that lies directly over the parent rock. This band ranges from about 1/8 inch to 2 inches in thickness. Apparently, most of the clay that is

formed or was present as the cementing agent in the sandstone was and is being eluviated because of the rapid permeability to the top of the most impermeable layer, the sandstone. This unique feature seems to have dramatically slowed the weathering of the sandstone, even though the sandstone is normally easily weathered. The dark color of this band is believed to be due to translocated manganese oxide.

soils on windblown deposits

The two major soil series in this landform are Baywood soils and Oceano soils (general soil map unit 5). These soils formed in windblown, sandy deposits that were derived from coastal beaches during recent geologic times, and they are probably of about the same age. Other soils of lesser extent are the Capistrano, Garey, and Suey soils that were also formed in windblown material. Dune land is also included here. It is the most recently formed of the above mentioned soils and is presently composed of shifting dunes, adjacent to the ocean, that have no profile development and only intermittent vegetation.

Baywood soils are only in the vicinity of Los Osos. Oceano soils are over most of the Nipomo Mesa and between Grover City and Arroyo Grande.

Most of the organic matter provided by the sparse brush and annual grass vegetation on the Oceano soils has been lost through oxidation because of the sand texture and droughty conditions. The most interesting feature of these soils is the presence of several distinct, slightly clay-enriched bands or lamellae that are at a depth of about 40 inches to more than 60 inches (see fig. 16). The genesis of these bands is uncertain. One hypothesis is that they are a result of the illuviation of fines rather than deposits of finer material that were blown in with the rest of the initial material. The varying depths of the lamellae could be explained by the change in the amount of rainfall that percolated, for the most part, to a particular depth from season to season and then to a lesser depth as climatic conditions changed. Perhaps deposition has occurred from time to time after the initial soil forming processes began, which continually buried the lamellae deeper. A combination of these factors may be involved.

The lamellae in Oceano soils occurs at a shallower depth than do the lamellae in the Baywood soils. In the Baywood soils, the lamellae are nearly always deeper than 60 inches. Rainfall in the area of Baywood soils is, at present, about the same as in the area of Oceano soils. The Los Osos area, however, because it is closer to the ocean than the Nipomo Mesa and somewhat more exposed to prevailing ocean breezes, receives a higher amount of moist air, fog, and overcast days, thereby reducing the evapotranspiration rate. This may be sufficient, along with a finer sand texture than Oceano soils, to retain a greater amount of moisture within the profile, so that additional rain within a season could illuviate fines deeper in the profile. These conditions also favor the retention of organic matter in the Baywood soils and are probably the reason that Baywood soils have a mollic epipedon and Oceano soils have an ochric epipedon.

An interesting example of natural mechanical separation is evident in the area where Oceano soils occur. As a transect is made from the ocean in a southeast direction, or in the direction of the prevailing wind, the particle size groupings become increasingly finer. At the ocean, Dune land has generated sand dunes of a slightly finer particle size than the beach sands. Farther inland, Oceano sands are mapped adjacent to and northwest of Garey sandy loam. Often, a transitional area of loamy sand is encountered. Then, at the southeastern end of the transect, where erosion has not removed the deposits, Suey silt loam occurs as a loess deposit over old terraces that were formed by an ancient course of the Santa Maria River.

Garey soils have lamellae that are higher in clay content than the lamellae in Oceano soils. This is probably because of the finer initial material available for translocation within the Garey series.

Suey soils are silt loam throughout. The finer texture retains a higher available water content, which aids in the production and retention of higher amounts of organic matter, thereby forming a mollic epipedon. Lamellae or other forms of illuviation of clay or silt have not been observed in this soil. This may be because of the more or less uniform particle and pore size grouping that would reduce the amount of fines translocated. It is possible also that this soil had its origin from silty material deposited by the Santa Maria River when the river was higher in the landscape. This material then could have been wind transported to its present location. If this is the case, the silty deposits are probably younger than Oceano's and Garey's parent material. Evidence for this is the way that the Santa Maria River has cut away a portion of the Nipomo Mesa, forming the present escarpment (fig. 23). The younger soil, therefore, might not have had time to show signs of illuviation.

Capistrano, the last soil in this landform group, is mapped in small, somewhat peninsular-like areas along the coast from San Simeon to Ragged Point. This soil is similar to Baywood soils in its mode of formation. The major differences are that Capistrano soil has a slightly redder color in the C horizon (presumably because of iron) and a higher clay content than the Baywood soils. Included within the Capistrano map units are a few small areas where these wind deposits have become weakly consolidated in the substratum. A paralithic contact occurs in these areas at a depth of about 40 inches. The increased amount of free oxidized iron, the higher clay content, and the slight induration, combined with the fact that Baywood's and Capistrano's climatic conditions are similar, seem to indicate that the dune material which Capistrano soils formed in was deposited at some time before the Baywood parent material.

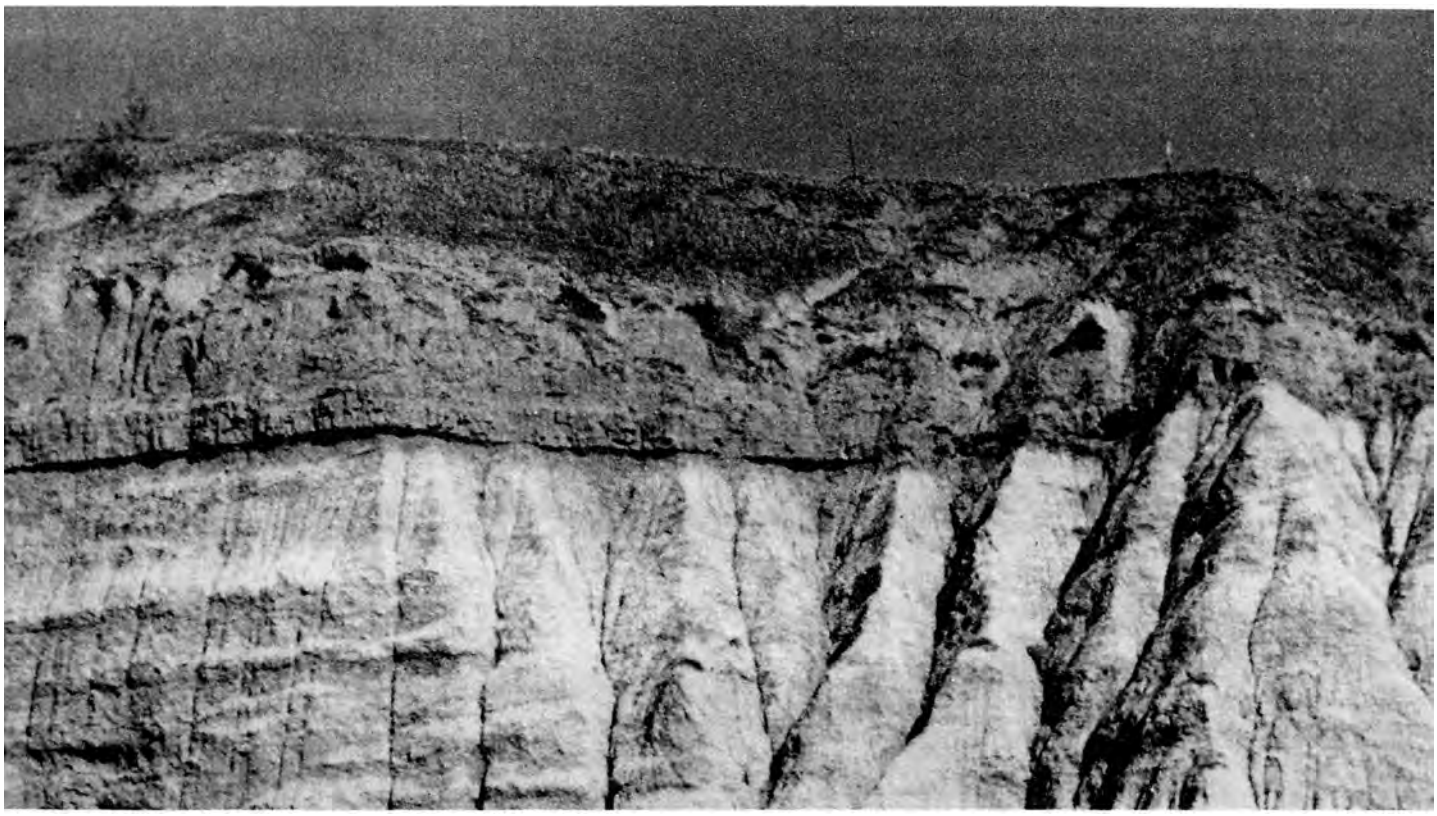

Figure 23.—A typical view of Suey silt loam capping the escarpment just north of Santa Maria.

soils on alluvial fans and plains

The source of the alluvium, the distance traveled by the alluvium, and the relative geographical location of deposition are the main factors affecting the morphology of these soils.

The Cropley and Salinas soils in general map unit 2 occur either in narrow valleys from the Chorro Valley north to San Simeon, or in broader fans and plains in the Los Osos Valley and in the area extending from San Luis Obispo southward through much of the Edna Valley. In each case, the alluvium was derived from soils formed from Franciscan and related rocks. The major soils that provided alluvium were the Los Osos, Lodo, and Diablo soils that have surface texture of loam, clay loam, or clay. To a lesser extent, Obispo clay provided erosional material.

The Salinas soils are primarily silty clay loam or loam in the surface layer and silty clay loam through very fine sandy loam in the C horizon. Cropley soils have a silty clay or clay surface layer and a clay, clay loam, or silty clay loam substratum. The deposition of the somewhat coarser material that gave rise to the Salinas soils was, in general, upstream or closer to the source of the alluvium. This is most evident in the narrow valleys, such as in the Villa Creek Valley north of Cayucos. The greater degree of stratification in the substratum of Salinas soils also indicates a more rapid and fluctuating velocity of the streamflow that is associated with the upstream area.

In both soils, there is a slightly higher clay content in the surface layer. This, the relatively high amount of organic matter that both soils exhibit, and the lack of irregular fluctuations in organic matter as depth increases indicate that these soils have been in place long enough to weather and form additional clays, but not long enough to show signs of clay illuviation. These factors also indicate that additional deposition has not occurred in the recent past. Inclusions in mapping, however, indicate small areas where flooding and deposition still occur. In some areas where the broader fans occur, Cropley soils are in depressional areas, most of which have since been raised higher by the change in course and downcutting of streams.

The Salinas and Marimel soils in general soil map unit 3 are similar in their source of alluvium and texture, but

they differ because Marimel soils occupy lower elevations on the landscape than Salinas soils relative to existing drainageways. Therefore, they are subject to overflow. Marimel soils are somewhat poorly drained because of a high water table during the winter months. They could be considered younger than Salinas soils because major deposition is still occurring.

The Elder and Still soils in general soil map unit 4 formed in alluvium derived from different upland soils and their parent material. Map unit 4 south of Cambria along the coastal terraces is composed mainly of Still gravelly sandy clay loam. The alluvium was derived from hard, highly fractured, silicious sandstone and other rocks, such as metasedimentary radiolarian jasper, and the soils that formed from these rocks, such as Gazos, Lodo, and Los Osos soils. The deposition of the parent material from which these soils formed occurred in the recent past, as is evidenced by the lack of translocation of fines and the organic matter content that remains relatively high as depth increases. The velocity of flow of the water that carried this material was apparently relatively rapid because of the significant amounts of gravel-size fragments throughout the soil profile. The high clay content of the soil, however, seems to indicate that the runoff water contained a high sediment load from fine textured but gravelly sources, and flooding was localized and of short duration. Other examples of a more typical landform setting for the Still soils are located between Montana de Oro State Park and Port San Luis and in the area of Shell Beach. The source of the alluvium in these areas was from the Santa Lucia and Lopez soils. The rock fragments in these soils are fragments of Monterey shale.

Elder soils, which are also in the group of alluvial soils, lack the coarse fragments typical of the Still soils and are sandy loam throughout the profile. Elder soils are mapped mainly in the lower part of Los Berros Canyon, Squire Canyon, and in the Phoenix Creek area south of Lopez Lake. The source of the alluvium is primarily from Gaviota and Tierra sandy loams and Arnold, Briones, and Pismo loamy sands. This explains the coarse texture and lack of rock fragments in the Elder soils. Organic matter remains relatively high as depth increases in this soil, which indicates fairly recent deposition.

The soils in general soil map unit 1 are the Salinas, Mocho, and Camarillo soils and are mapped adjacent to each other, primarily in the Santa Maria Valley. The elevation of the valley at its eastern end in this survey area is about 200 feet. The elevation at the western end near Oso Flaco Lake is less than 20 feet. The elevation changes more or less uniformly between the two points. In general, the texture of the soils is coarser to the east becoming finer as a transect is made to the west. Also, the soils become somewhat poorly drained as elevation drops to near sea level. The water table, however, is of freshwater origin. Fairly recent stream meanders have deposited sandy material in the area to the west, but the majority of the soils are finer textured. Coarser, fresh alluvium is also encountered along the entire present channel of the Santa Maria River.

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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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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

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

	Inches
Very low	0 to 2.5
Low	2.5 to 5
Moderate	5 to 7.5
High	7.5 to 10
Very high	More than 10

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.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

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.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

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) 15.2 to 38.1 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 (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

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.

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.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

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

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from

seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

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

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion hazard. The severity with which water erodes a soil that does not have a vegetative cover.

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

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (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 rapid movement of water into the soil.

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

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flocculate. To aggregate or clump together individual tiny soil particles, especially fine clay, into small clumps or granules.

Flocculation. The process by which suspended colloidal or very fine particles are assembled into larger masses, or floccules, which eventually settle out of suspension.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant 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.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

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

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

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

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.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2 ..... very low
0.2 to 0.4 ..... low
0.4 to 0.75 ..... moderately low
0.75 to 1.25 ..... moderate
1.25 to 1.75 ..... moderately high
1.75 to 2.5 ..... high
More than 2.5 ..... very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the 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.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Langleys per day. An amount of energy contained in the solar spectrum that is available for energy conversion processes, such as evaporation, heating, or photosynthesis, on a daily basis. A langley is equivalent to one gram calorie per square centimeter of irradiated surface.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

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

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

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

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

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

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

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.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

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

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

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.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

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. Seepage 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.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

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

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

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

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. In this survey, range of slope is defined as—
0 to 2 percent slopes.—Nearly level (simple slopes or complex slopes).
2 to 5 percent slopes.—Gently sloping (simple slopes) or undulating (complex slopes).
5 to 9 percent slopes.—Moderately sloping (simple slopes) or gently rolling (complex slopes).
9 to 15 percent slopes.—Strongly sloping (simple slopes) or rolling (complex slopes).
15 to 30 percent slopes.—Moderately steep (simple slopes) or hilly (complex slopes).
30 to 50 percent slopes.—Steep (simple slopes or complex slopes)
50 to 75 percent slopes.—Very steep (simple slopes or complex slopes).
More than 75 percent slopes.—Extremely steep (simple slopes or complex slopes).

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1 0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0 25
Fine sand	0.25 to 0.10
Very fine sand	0 10 to 0 05
Silt	0.05 to 0 002
Clay	less than 0 002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A 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.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

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 which provide vegetative barriers to wind 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).

Subsoil. Technically, the B horizon; roughly, the part of the solum below the A horizon.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. Technically, the A horizon excluding the A2 horizon. Usually, it is that part of the profile that is highest in organic matter content and darkest in color.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. The part of the soil below the A or AC horizon that is relatively unaffected by the processes of soil formation.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Based on data recorded in the period 1931-60]

Month	Temperature					Precipitation		
			2 years in 10 will have at least 4 days with--				1 year in 10 will have--	
	Average daily maximum	Average daily minimum	Maximum temperature equal to or higher than--	Minimum temperature equal to or lower than--	Average number of growing degree days[1]	Average monthly	Less than--	More than--
	°F	°F	°F	°F	Units	In	In	In
January	62	42	73	33	372	4.4	0.2	9.3
February	63	43	73	34	364	4.4	0.6	9.9
March	65	45	79	37	465	3.1	0.1	6.9
April	68	46	82	39	510	1.9	0.1	5.2
May	70	49	84	42	604	0.4	trace	1.0
June	74	50	84	45	660	0.2	0	0.2
July	77	53	90	48	775	trace	0	0.1
August	77	53	86	48	775	trace	0	trace
September	78	52	93	47	750	0.1	0	0.6
October	76	50	90	43	713	0.7	0	1.7
November	71	47	84	37	570	1.7	0	3.9
December	64	44	78	35	434	4.6	0.5	10.2
Yearly:								
Average	70	48	100[2]	30[3]	---	---	---	---
Total	---	---	---	---	6,992	21.5	11.6	30.7

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

[2]Average highest annual maximum.

[3]Average lowest annual minimum.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
101	Aquolls, saline	715	0.1
102	Arnold loamy sand, 5 to 15 percent slopes	3,335	0.6
103	Arnold loamy sand, 15 to 50 percent slopes	3,940	0.7
104	Baywood fine sand, 2 to 9 percent slopes	3,545	0.6
105	Baywood fine sand, 9 to 15 percent slopes	1,755	0.3
106	Baywood fine sand, 15 to 30 percent slopes	720	0.1
107	Beaches	835	0.1
108	Briones loamy sand, 15 to 50 percent slopes	2,090	0.4
109	Briones-Pismo loamy sands, 9 to 30 percent slopes	2,320	0.4
110	Briones-Tierra complex, 15 to 50 percent slopes	6,950	1.2
111	Camarillo sandy loam	775	0.1
112	Camarillo loam, drained	2,035	0.4
113	Capistrano sandy loam, undulating	215	*
114	Capistrano sandy loam, rolling	515	0.1
115	Chamise shaly loam, 9 to 15 percent slopes	1,165	0.2
116	Chamise shaly loam, 15 to 30 percent slopes	2,585	0.5
117	Chamise shaly sandy clay loam, 5 to 9 percent slopes	1,075	0.2
118	Cieneba-Kinkel Variant loams, 30 to 75 percent slopes	5,130	0.9
119	Cieneba-Millsap loams, 30 to 75 percent slopes	1,645	0.3
120	Concepcion loam, 2 to 5 percent slopes	5,340	0.9
121	Concepcion loam, 5 to 9 percent slopes	4,440	0.8
122	Concepcion loam, 9 to 15 percent slopes	970	0.2
123	Concepcion loam, 15 to 30 percent slopes	645	0.1
124	Corralitos sand, 0 to 2 percent slopes	695	0.1
125	Corralitos sand, 2 to 15 percent slopes	1,310	0.2
126	Corralitos Variant loamy sand	385	0.1
127	Cropley clay, 0 to 2 percent slopes	4,735	0.8
128	Cropley clay, 2 to 9 percent slopes	9,630	1.7
129	Diablo clay, 5 to 9 percent slopes	6,150	1.1
130	Diablo and Cibo clays, 9 to 15 percent slopes	6,960	1.2
131	Diablo and Cibo clays, 15 to 30 percent slopes	12,990	2.3
132	Diablo and Cibo clays, 30 to 50 percent slopes	14,320	2.5
133	Diablo-Lodo complex, 15 to 50 percent slopes	18,285	3.3
134	Dune land	12,770	2.3
135	Elder sandy loam, 2 to 5 percent slopes	1,055	0.2
136	Elder sandy loam, 5 to 9 percent slopes	280	*
137	Elder sandy loam, 9 to 15 percent slopes	280	*
138	Elder sandy loam, occasionally flooded, 0 to 2 percent slopes	560	0.1
139	Elder sandy loam, occasionally flooded, 2 to 9 percent slopes	1,650	0.3
140	Garey sandy loam, 2 to 9 percent slopes	790	0.1
141	Gaviota sandy loam, 50 to 75 percent slopes	5,602	1.0
142	Gaviota fine sandy loam, 15 to 50 percent slopes	10,445	1.9
143	Gazos-Lodo clay loams, 15 to 30 percent slopes	3,600	0.6
144	Gazos-Lodo clay loams, 30 to 50 percent slopes	14,940	2.7
145	Gazos-Lodo clay loams, 50 to 75 percent slopes	6,135	1.1
146	Henneke-Rock outcrop complex, 15 to 75 percent slopes	11,180	2.0
147	Lodo clay loam, 5 to 15 percent slopes	1,380	0.2
148	Lodo clay loam, 15 to 30 percent slopes	4,415	0.8
149	Lodo clay loam, 30 to 50 percent slopes	8,095	1.4
150	Lodo clay loam, 50 to 75 percent slopes	4,140	0.7
151	Lodo-Rock outcrop complex, 9 to 30 percent slopes	1,370	0.2
152	Lodo-Rock outcrop complex, 30 to 75 percent slopes	9,240	1.6
153	Lompico-McMullin loams, 15 to 30 percent slopes	380	0.1
154	Lompico-McMullin loams, 30 to 75 percent slopes	20,395	3.6
155	Lopez very shaly clay loam, 9 to 30 percent slopes	3,585	0.6
156	Lopez very shaly clay loam, 30 to 75 percent slopes	25,000	4.4
157	Lopez-Rock outcrop complex, 75 to 100 percent slopes	5,080	0.9
158	Los Osos loam, 5 to 9 percent slopes	1,680	0.3
159	Los Osos loam, 9 to 15 percent slopes	3,515	0.6
160	Los Osos loam, 15 to 30 percent slopes	8,125	1.4
161	Los Osos loam, 30 to 50 percent slopes	10,085	1.8
162	Los Osos-Diablo complex, 5 to 9 percent slopes	2,355	0.4
163	Los Osos-Diablo complex, 9 to 15 percent slopes	4,770	0.8
164	Los Osos-Diablo complex, 15 to 30 percent slopes	6,485	1.2
165	Los Osos-Diablo complex, 30 to 50 percent slopes	12,325	2.2
166	Los Osos-Lodo complex, 15 to 30 percent slopes	740	0.1
167	Los Osos-Lodo complex, 30 to 75 percent slopes	19,525	3.5
168	Los Osos Variant clay loam, 15 to 50 percent slopes	2,120	0.4
169	Marimel sandy clay loam, occasionally flooded	2,330	0.4
170	Marimel silty clay loam, drained	2,970	0.5

See footnote at end of table.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
171	Millsap loam, 15 to 50 percent slopes	6,865	1.2
172	Millsap-Rock outcrop complex, 30 to 75 percent slopes	6,395	1.1
173	Mocho fine sandy loam	1,210	0.2
174	Mocho loam	820	0.1
175	Mocho silty clay loam	1,200	0.2
176	Mocho Variant fine sandy loam	1,845	0.3
177	Nacimiento silty clay loam, 15 to 30 percent slopes	560	0.1
178	Nacimiento silty clay loam, 30 to 50 percent slopes	4,070	0.7
179	Nacimiento silty clay loam, 50 to 75 percent slopes	1,120	0.2
180	Nacimiento-Calodo complex, 15 to 30 percent slopes	1,280	0.2
181	Nacimiento-Calodo complex, 30 to 50 percent slopes	5,255	0.9
182	Nacimiento-Calodo complex, 50 to 75 percent slopes	1,625	0.3
183	Obispo-Rock outcrop complex, 15 to 75 percent slopes	12,030	2.1
184	Oceano sand, 0 to 9 percent slopes	14,060	2.5
185	Oceano sand, 9 to 30 percent slopes	4,980	0.9
186	Perkins fine sandy loam, 2 to 9 percent slopes	950	0.2
187	Perkins fine sandy loam, 9 to 30 percent slopes	455	0.1
188	Perkins gravelly fine sandy loam, 9 to 30 percent slopes	300	0.1
189	Pismo loamy sand, 9 to 30 percent slopes	3,660	0.7
190	Pismo-Rock outcrop complex, 30 to 75 percent slopes	2,080	0.4
191	Pismo-Tierra complex, 9 to 15 percent slopes	3,040	0.5
192	Psamments and Fluvents, occasionally flooded	3,000	0.5
193	Psamments and Fluvents, wet	800	0.1
194	Riverwash	5,300	0.9
195	Rock outcrop-Lithic Haploxerolls complex, 30 to 75 percent slopes	28,950	5.1
196	Salinas loam, 0 to 2 percent slopes	1,720	0.3
197	Salinas silty clay loam, 0 to 2 percent slopes	6,070	1.1
198	Salinas silty clay loam, 2 to 9 percent slopes	2,765	0.5
199	San Simeon sandy loam, 2 to 9 percent slopes	1,725	0.3
200	San Simeon sandy loam, 9 to 15 percent slopes	2,250	0.4
201	San Simeon sandy loam, 15 to 30 percent slopes	5,025	0.9
202	San Simeon sandy loam, 30 to 50 percent slopes	1,140	0.2
203	Santa Lucia shaly clay loam, 30 to 50 percent slopes	10,460	1.9
204	Santa Lucia shaly clay loam, 50 to 75 percent slopes	25,315	4.5
205	Santa Lucia very shaly clay loam, 5 to 9 percent slopes	320	0.1
206	Santa Lucia very shaly clay loam, 9 to 15 percent slopes	695	0.1
207	Santa Lucia very shaly clay loam, 15 to 30 percent slopes	1,825	0.3
208	Still gravelly loam, 9 to 15 percent slopes	295	0.1
209	Still gravelly sandy clay loam, 0 to 2 percent slopes	680	0.1
210	Still gravelly sandy clay loam, 2 to 9 percent slopes	2,900	0.5
211	Still gravelly sandy clay loam, 15 to 25 percent slopes	255	*
212	Suey silt loam, 2 to 9 percent slopes	1,505	0.3
213	Suey silt loam, 9 to 15 percent slopes	505	0.1
214	Suey silt loam, 15 to 30 percent slopes	1,245	0.2
215	Suey silt loam, 30 to 50 percent slopes	745	0.1
216	Tierra sandy loam, 2 to 9 percent slopes	1,960	0.3
217	Tierra loam, 9 to 15 percent slopes	585	0.1
218	Tierra loam, 15 to 30 percent slopes	590	0.1
219	Tujunga loamy sand, 0 to 2 percent slopes	1,920	0.3
220	Tujunga loamy sand, frequently flooded, 2 to 9 percent slopes	335	0.1
221	Xererts-Xerolls-Urban land complex, 0 to 15 percent slopes	1,310	0.2
222	Xerorthents, eroded	1,000	0.2
223	Xerorthents, escarpment	1,920	0.3
224	Zaca clay, 9 to 15 percent slopes	3,250	0.6
225	Zaca clay, 15 to 30 percent slopes	4,275	0.8
226	Zaca clay, 30 to 50 percent slopes	1,480	0.3
227	Zaca clay, 50 to 75 percent slopes	745	0.1
	Water	5,900	1.0
	Total	562,152	100.0

* Less than 0.1 percent.

TABLE 3.--YIELDS PER ACRE OF IRRIGATED AND NONIRRIGATED CROPS

[Yields for all crops are for irrigated soils except for dryland garbonzo and dryland barley. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Lemons	Wine grapes	Lettuce	Broccoli	Celery	Dryland garbonzo	Dryland barley
	Box[1]	Ton	Crate[2]	Ton	Crate[3]	CWT	CWT
102---------- Arnold	600	---	---	---	---	---	---
103---------- Arnold	600	---	---	---	---	---	---
110---------- Briones-Tierra	---	---	---	---	---	7	10
111---------- Camarillo	---	---	900	4.2	800	12	25
112---------- Camarillo	---	---	900	4.5	1050	11	20
113, 114---------- Capistrano	---	---	900	4.2	900	12	22
115---------- Chamise	---	---	---	---	---	---	16
116---------- Chamise	---	---	---	---	---	---	12
117---------- Chamise	---	---	---	---	---	---	16
120, 121---------- Concepcion	625	3.2	---	---	---	12	24
122, 123---------- Concepcion	625	3.2	---	---	---	12	22
124---------- Corralitos	---	---	900	4.2	750	10	16
125---------- Corralitos	---	3.2	---	---	---	---	14
126---------- Corralitos Variant	---	---	875	3.7	800	---	---
127---------- Cropley	---	---	800	3.8	860	12	24
128---------- Cropley	---	---	775	3.8	860	12	24
129---------- Diablo	---	---	---	---	---	11	21
130---------- Diablo and Cibo	---	---	---	---	---	11	21
135---------- Elder	---	---	900	4.5	900	12	25
136---------- Elder	---	---	---	---	---	11	22

See footnotes at end of table.

TABLE 3.--YIELDS PER ACRE OF IRRIGATED AND NONIRRIGATED CROPS--Continued

Soil name and map symbol	Lemons	Wine grapes	Lettuce	Broccoli	Celery	Dryland garbonzo	Dryland barley
	Box[1]	Ton	Crate[2]	Ton	Crate[3]	CWT	CWT
138, 139---------- Elder	---	3.2	---	---	---	9	17
140---------- Garey	---	---	---	---	---	9	17
158---------- Los Osos	550	---	---	---	---	10	21
159---------- Los Osos	550	---	---	---	---	10	21
160---------- Los Osos	550	---	---	---	---	9	19
162---------- Los Osos-Diablo	550	---	---	---	---	10	22
163---------- Los Osos-Diablo	550	---	---	---	---	10	21
164---------- Los Osos-Diablo	---	---	---	---	---	9	19
169---------- Marimel	---	---	800	4.0	800	11	22
170---------- Marimel	---	---	900	4.5	1,000	12	26
173---------- Mocho	875	---	875	4.0	900	12	23
174---------- Mocho	750	---	900	4.5	1,000	12	25
175---------- Mocho	---	---	875	4.0	900	12	23
176---------- Mocho Variant	---	---	875	4.0	900	12	23
177, 178---------- Nacimiento	---	---	---	---	---	10	21
180---------- Nacimiento-Calodo	---	---	---	---	---	8	14.2
184---------- Oceano	450	3	---	---	---	---	---
186---------- Perkins	---	---	900	4.4	900	11	22
187, 188---------- Perkins	---	---	---	---	---	10	16
196, 197---------- Salinas	---	---	900	4.5	1,000	12	25
198---------- Salinas	---	---	900	4.5	1,000	12	25
199, 200---------- San Simeon	---	---	---	---	---	10	15

See footnotes at end of table.

TABLE 3.--YIELDS PER ACRE OF IRRIGATED AND NONIRRIGATED CROPS--Continued

Soil name and map symbol	Lemons	Wine grapes	Lettuce	Broccoli	Celery	Dryland garbonzo	Dryland barley
	Box[1]	Ton	Crate[2]	Ton	Crate[3]	CWT	CWT
203---------- Santa Lucia	425	---	---	---	---	---	---
205, 206---------- Santa Lucia	425	---	---	---	---	12	16
207---------- Santa Lucia	425	---	---	---	---	10	14
208---------- Still	---	---	950	4.2	900	10	18
209, 210---------- Still	---	---	800	4.2	900	10	18
211---------- Still	---	---	800	4.2	900	10	18
212---------- Suey	750	3.2	775	4.0	800	12	20
213---------- Suey	750	3.2	---	---	---	12	20
214---------- Suey	---	---	---	---	---	8	14
216---------- Tierra	---	3.2	---	---	---	9	18
217---------- Tierra	---	---	---	---	---	9	16
218---------- Tierra	---	---	---	---	---	8	14
219---------- Tujunga	---	3.2	800	4.2	900	12	20
220---------- Tujunga	---	---	---	---	---	12	20
224---------- Zaca	550	---	---	---	---	11	16
225---------- Zaca	550	---	---	---	---	10	14

[1] One box equals 60 pounds.

[2] One crate equals 40 pounds.

[3] One crate equals 60 pounds.

TABLE 4.--STORIE INDEX RATING

[The symbol < means less than. See text for explanation of rating factors A, B, C, and X; index rating; and grade]

Map Symbol	Map Unit Designation	Rating factors				Index	Grade	Limitation in X factor
		A	B	C	X			
101	Aquolls, saline	100	85	100	20x10	2	6	drainage, salinity
102	Arnold loamy sand, 5 to 15 percent slopes	95	80	85	95x95	58	3	drainage, fertility
103	Arnold loamy sand, 15 to 50 percent slopes	95	80	55	95x95	38	4	drainage, fertility
104	Baywood fine sand, 2 to 9 percent slopes	100	65	90	95x95	53	3	drainage, fertility
105	Baywood fine sand, 9 to 15 percent slopes	100	65	85	95x95	50	3	drainage, fertility
106	Baywood fine sand, 15 to 30 percent slopes	100	65	75	95x95	44	3	drainage, fertility
107	Beaches	---	---	---	---	<10	6	---
108	Briones loamy sand, 15 to 50 percent slopes	70	80	55	95x95	28	4	drainage, fertility
109	Briones-Pismo loamy sands, 9 to 30 percent slopes	---	---	---	---	33*	4	---
	Briones part	70	80	75	95x95	---	---	drainage, fertility
	Pismo part	50	80	75	95x95	---	---	drainage, fertility
110	Briones-Tierra complex, 15 to 50 percent slopes	---	---	---	---	27*	4	---
	Briones part	70	80	55	95x95	---	---	drainage, fertility
	Tierra part	40	95	75	95x90	---	---	drainage, fertility
111	Camarillo sandy loam	100	95	100	70x90	60	2	drainage, flooding
112	Camarillo loam, drained	100	100	100	100	100	1	none
113	Capistrano sandy loam, undulating	100	95	95	100	90	1	none
114	Capistrano sandy loam, rolling	100	95	90	100	86	1	none
115	Chamise shaly loam, 9 to 15 percent slopes	40	80	85	90	24	4	fertility
116	Chamise shaly loam, 15 to 30 percent slopes	40	80	75	90	22	4	fertility
117	Chamise shaly sandy clay loam, 5 to 9 percent slopes	40	75	90	90	24	4	fertility
118	Cieneba-Kinkel Variant loams, 30 to 75 percent slopes	---	---	---	---	14*	5	---
	Cieneba part	30	95	30	95	---	---	fertility
	Kinkel Variant part	85	85	30	90	---	---	fertility
119	Cieneba-Millsap loams, 30 to 75 percent slopes	---	---	---	---	10*	4	---
	Cieneba part	30	95	30	95x95	---	---	erosion, fertility
	Millsap part	45	100	30	95x95	---	---	erosion, fertility
120	Concepcion loam, 2 to 5 percent slopes	50	100	95	95x95	43	3	drainage, fertility

See footnotes at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors				Index	Grade	Limitation in X factor
		A	B	C	X			
121	Concepcion loam, 5 to 9 percent slopes	50	100	90	95x95	41	3	drainage, fertility
122	Concepcion loam, 9 to 15 percent slopes	50	100	85	95x95	38	4	drainage, fertility
123	Concepcion loam, 15 to 30 percent slopes	50	100	75	95x95	34	4	drainage, fertility
124	Corralitos sand, 0 to 2 percent slopes	100	60	100	95x90	51	3	drainage, fertility
125	Corralitos sand, 2 to 15 percent slopes	100	60	85	95x90	44	3	drainage, fertility
126	Corralitos Variant loamy sand	100	80	100	70x90	50	3	drainage, flooding
127	Cropley clay, 0 to 2 percent slopes	100	60	100	100	60	2	none
128	Cropley clay, 2 to 9 percent slopes	100	60	90	100	54	3	none
129	Diablo clay, 5 to 9 percent slopes	95	60	90	100	51	3	none
130	Diablo and Cibo clays, 9 to 15 percent slopes	---	---	---	---	42*	3	---
	Diablo part	95	60	85	100	---	---	none
	Cibo part	70	60	85	100	---	---	none
131	Diablo and Cibo clays, 15 to 30 percent slopes	---	---	---	---	38*	3	---
	Diablo part	95	60	75	100	---	---	none
	Cibo part	70	60	75	100	---	---	none
132	Diablo and Cibo clays, 30 to 50 percent slopes	---	---	---	---	20*	4	---
	Diablo part	95	60	40	100	---	---	none
	Cibo part	70	60	40	100	---	---	none
133	Diablo-Lodo complex, 15 to 50 percent slopes	---	---	---	---	23*	4	---
	Diablo part	95	60	55	100	---	---	none
	Lodo part	30	85	55	95	---	---	fertility
134	Dune land	---	---	---	---	<10	6	---
135	Elder sandy loam, 2 to 5 percent slopes	100	95	95	100	90	1	none
136	Elder sandy loam, 5 to 9 percent slopes	100	95	90	95	81	1	erosion
137	Elder sandy loam, 9 to 15 percent slopes	100	95	85	85	69	2	erosion
138	Elder sandy loam, occasionally flooded, 0 to 2 percent slopes	100	95	100	95x85	77	2	erosion, flooding
139	Elder sandy loam, occasionally flooded, 2 to 9 percent slopes	100	95	90	95x85	69	2	erosion, flooding
140	Garey sandy loam, 2 to 9 percent slopes	90	95	90	95x95	69	2	erosion, fertility
141	Gaviota sandy loam, 50 to 75 percent slopes	30	95	20	95x95	5	6	erosion, fertility

See footnotes at end of table

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
142	Gaviota fine sandy loam, 15 to 50 percent slopes	30	100	55	95x95	15	5	erosion, fertility
143	Gazos-Lodo clay loams, 15 to 30 percent slopes	---	---	---	---	27*	4	---
	Gazos part	60	85	75	95	---	---	erosion, fertility
	Lodo part	30	85	75	95x95	---	---	erosion, fertility
144	Gazos-Lodo clay loams, 30 to 50 percent slopes	---	---	---	---	14*	5	---
	Gazos part	60	85	40	95	---	---	erosion, fertility
	Lodo part	30	85	40	95x95	---	---	erosion, fertility
145	Gazos-Lodo clay loams, 50 to 75 percent slopes	---	---	---	---	7*	6	---
	Gazos part	60	85	20	95	---	---	erosion, fertility
	Lodo part	30	85	20	95x95	---	---	erosion, fertility
146	Henneke-Rock outcrop complex, 15 to 75 percent slopes	---	---	---	---	3*	6	---
	Henneke part	40	60	35	90x70	---	---	erosion, fertility
	Rock outcrop part.							
147	Lodo clay loam, 5 to 15 percent slopes	30	85	85	95x95	20	4	erosion, fertility
148	Lodo clay loam, 15 to 30 percent slopes	30	85	75	95x95	17	5	erosion, fertility
149	Lodo clay loam, 30 to 50 percent slopes	30	85	40	90x95	9	6	erosion, fertility
150	Lodo clay loam, 50 to 75 percent slopes	30	85	20	90x95	4	6	erosion, fertility
151	Lodo-Rock outcrop complex, 9 to 30 percent slopes	---	---	---	---	10*	5	---
	Lodo part	30	85	75	95x95	---	---	---
	Rock outcrop part	---	---	---	---	---	---	---
152	Lodo-Rock outcrop complex, 30 to 75 percent slopes	---	---	---	---	4*	6	---
	Lodo part	30	85	30	95x95	---	---	erosion, fertility
	Rock outcrop part.							
153	Lompico-McMullin loams, 15 to 30 percent slopes	---	---	---	---	37*	4	---
	Lompico part	65	95	75	95	---	---	fertility
	McMullin part	35	80	75	95	---	---	fertility
154	Lompico-McMullin loams, 30 to 75 percent slopes	---	---	---	---	14*	5	---
	Lompico part	65	95	30	95x95	---	---	erosion, fertility
	McMullin part	35	85	30	95x95	---	---	erosion, fertility
155	Lopez very shaly clay loam, 9 to 30 percent slopes	40	70	75	95x95	19	5	erosion, fertility
156	Lopez very shaly clay loam, 30 to 75 percent slopes	40	70	30	90x95	7	6	erosion, fertility
157	Lopez-Rock outcrop complex, 75 to 100 percent slopes	---	---	---	---	2*	6	---
	Lopez part	40	70	10	90x95	---	---	erosion, fertility
	Rock outcrop part.							

See footnotes at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors				Index	Grade	Limitation in X factor
		A	B	C	X			
158	Los Osos loam, 5 to 9 percent slopes	80	100	90	95	68	2	fertility
159	Los Osos loam, 9 to 15 percent slopes	80	100	85	95	65	2	fertility
160	Los Osos loam, 15 to 30 percent slopes	80	100	75	95x95	54	3	erosion, fertility
161	Los Osos loam, 30 to 50 percent slopes	80	100	40	95x95	29	4	erosion, fertility
162	Los Osos-Diablo complex, 5 to 9 percent slopes	---	---	---	---	60	2	---
	Los Osos part	80	100	90	95	---	---	fertility
	Diablo part	95	60	90	100	---	---	none
163	Los Osos-Diablo complex, 9 to 15 percent slopes	---	---	---	---	57*	3	---
	Los Osos part	80	100	85	95	---	---	fertility
	Diablo part	95	60	85	100	---	---	none
164	Los Osos-Diablo complex, 15 to 30 percent slopes	---	---	---	---	48*	3	---
	Los Osos part	80	100	75	95x95	---	---	erosion, fertility
	Diablo part	95	60	75	95	---	---	erosion
165	Los Osos-Diablo complex, 30 to 50 percent slopes	---	---	---	---	26*	4	---
	Los Osos part	80	100	40	95x95	---	---	erosion, fertility
	Diablo part	95	60	40	95	---	---	erosion, fertility
166	Los Osos-Lodo complex, 15 to 30 percent slopes	---	---	---	---	40*	3	---
	Los Osos part	80	100	75	95x95	---	---	erosion, fertility
	Lodo part	30	85	75	95x95	---	---	erosion, fertility
167	Los Osos-Lodo complex, 30 to 75 percent slopes	---	---	---	---	16*	5	---
	Los Osos part	80	100	30	90x95	---	---	erosion, fertility
	Lodo part	30	85	30	90x95	---	---	erosion, fertility
168	Los Osos Variant clay loam, 15 to 50 percent slopes	85	85	55	95	38	4	erosion
169	Marimel sandy clay loam, occasionally flooded	100	85	100	65x90	50	3	drainage, flooding
170	Marimel silty clay loam, drained	100	90	100	100	90	1	none
171	Millsap loam, 15 to 50 percent slopes	45	100	55	95x95	22	4	erosion, fertility
172	Millsap-Rock outcrop complex, 30 to 75 percent slopes	---	---	---	---	8*	6	---
	Millsap part	45	100	30	95x95	---	---	erosion fertility
	Rock outcrop part.							
173	Mocho fine sandy loam	90	100	100	100	90	1	none
174	Mocho loam	100	100	100	100	100	1	none
175	Mocho silty clay loam	90	90	100	100	81	1	none
176	Mocho Variant fine sandy loam	80	100	100	95	76	2	fertility
177	Nacimiento silty clay loam, 15 to 30 percent slopes	80	90	75	95x95	49	3	erosion, fertility

See footnotes at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors				Index	Grade	Limitation in X factor
		A	B	C	X			
178	Nacimiento silty clay loam, 30 to 50 percent slopes	80	90	40	95x95	26	4	erosion, fertility
179	Nacimiento silty clay loam, 50 to 75 percent slopes	80	90	20	95x95	13	5	erosion, fertility
180	Nacimiento-Calodo complex, 15 to 30 percent slopes	---	---	---	---	41*	3	---
	Nacimiento part	80	90	75	95x95	---	---	erosion, fertility
	Calodo part	45	100	75	95x95	---	---	erosion, fertility
181	Nacimiento-Calodo complex, 30 to 50 percent slopes	---	---	---	---	22*	4	---
	Nacimiento part	80	90	40	95x95	---	---	erosion, fertility
	Calodo part	45	100	40	95x95	---	---	erosion, fertility
182	Nacimiento-Calodo complex, 50 to 75 percent slopes	---	---	---	---	9*	6	---
	Nacimiento part	80	90	20	90x95	---	---	erosion, fertility
	Calodo part	45	100	20	90x95	---	---	erosion, fertility
183	Obispo-Rock outcrop complex, 15 to 75 percent slopes	---	---	---	---	3*	6	---
	Obispo part	30	55	35	90x70	---	---	erosion, toxicity
	Rock outcrop part.							
184	Oceano sand, 0 to 9 percent slopes	100	60	90	95x95	49	3	drainage, fertility
185	Oceano sand, 9 to 30 percent slopes	100	60	75	95x95	41	3	drainage, fertility
186	Perkins fine sandy loam, 2 to 9 percent slopes	85	100	90	95	73	2	fertility
187	Perkins fine sandy loam, 9 to 30 percent slopes	85	100	75	95x95	58	3	erosion, fertility
188	Perkins gravelly fine sandy loam, 9 to 30 percent slopes	85	80	75	95x95	46	3	erosion, fertility
189	Pismo loamy sand, 9 to 30 percent slopes	45	80	75	90x95	23	4	erosion, fertility
190	Pismo-Rock outcrop complex, 30 to 75 percent slopes	---	---	---	---	5*	6	---
	Pismo part	45	80	30	90x95	---	---	erosion, fertility
	Rock outcrop part.							
191	Pismo-Tierra complex, 9 to 15 percent slopes	---	---	---	---	29*	4	---
	Pismo part	45	80	85	95x95	---	---	erosion, fertility
	Tierra part	45	95	85	95x90	---	---	erosion, fertility
192	Psamments and Fluvents, occasionally flooded	90	60-80	95	65x90 x85	26-34	4	drainage, flooding, deposition
193	Psamments and Fluvents, wet	90	60-80	95	20x75	8-10	6	drainage, salinity
194	Riverwash	---	---	---	---	<5	6	drainage, flooding
195	Rock outcrop-Lithic Haploxerolls complex, 30 to 75 percent slopes	---	---	---	---	<5	6	erosion
196	Salinas loam, 0 to 2 percent slopes	95	100	100	100	95	1	none

See footnotes at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors				Index	Grade	Limitation in X factor
		A	B	C	X			
197	Salinas silty clay loam, 0 to 2 percent slopes	95	90	100	100	86	1	none
198	Salinas silty clay loam, 2 to 9 percent slopes	95	90	90	100	77	2	none
199	San Simeon sandy loam, 2 to 9 percent slopes	65	95	90	95x95	50	3	drainage, fertility
200	San Simeon sandy loam, 9 to 15 percent slopes	65	95	85	95x95	47	3	drainage, fertility
201	San Simeon sandy loam, 15 to 30 percent slopes	65	95	75	95x95 x95	40	3	drainage, erosion, fertility
202	San Simeon sandy loam, 30 to 50 percent slopes	65	95	40	95x95 x95	21	4	drainage, erosion, fertility
203	Santa Lucia shaly clay loam, 30 to 50 percent slopes	70	70	40	95	19	5	erosion
204	Santa Lucia shaly clay loam, 50 to 75 percent slopes	70	70	20	90	9	6	erosion
205	Santa Lucia very shaly clay loam, 5 to 9 percent slopes	65	60	90	95	33	4	erosion
206	Santa Lucia very shaly clay loam, 9 to 15 percent slopes	65	60	85	95	31	4	erosion
207	Santa Lucia very shaly clay loam, 15 to 30 percent slopes	65	60	75	95	28	4	erosion
208	Still gravelly loam, 9 to 15 percent slopes	100	80	85	95	65	2	erosion
209	Still gravelly sandy clay loam, 0 to 2 percent slopes	90	75	100	100	68	2	none
210	Still gravelly sandy clay loam, 2 to 9 percent slopes	100	75	90	95	64	2	erosion
211	Still gravelly sandy clay loam, 15 to 25 percent slopes	100	75	75	95	53	3	erosion
212	Suey silt loam, 2 to 9 percent slopes	100	100	90	95	86	1	erosion
213	Suey silt loam, 9 to 15 percent slopes	100	100	85	95	81	1	erosion
214	Suey silt loam, 15 to 30 percent slopes	100	100	75	95	71	2	erosion
215	Suey silt loam, 30 to 50 percent slopes	100	100	40	90	36	4	erosion
216	Tierra sandy loam, 2 to 9 percent slopes	40	95	90	95x90	29	4	drainage, fertility
217	Tierra loam, 9 to 15 percent slopes	40	100	85	95x90	29	4	drainage, fertility
218	Tierra loam, 15 to 30 percent slopes	40	100	75	95x95 x90	24	4	drainage, erosion, fertility

See footnotes at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors				Index	Grade	Limitation in X factor
		A	B	C	X			
219	Tujunga loamy sand, 0 to 2 percent slopes	90	80	100	95x90 x95	58	3	drainage, fertility flooding
220	Tujunga loamy sand, frequently flooded, 2 to 9 percent slopes	90	80	90	95x90 x75	42	3	drainage, fertility, flooding
221	Xererts-Xerolls-Urban land complex, 0 to 15 percent slopes	---	---	---	---	**	**	---
222	Xerorthents, eroded	45	95	20	50	4	6	erosion
223	Xerorthants, escarpment	70	95	40	70	19	5	erosion
224	Zaca clay, 9 to 15 percent slopes	95	65	85	95	50	3	fertility
225	Zaca clay, 15 to 30 percent slopes	95	65	75	95	44	3	fertility
226	Zaca clay, 30 to 50 percent slopes	95	65	40	95x95	22	4	erosion, fertility
227	Zaca clay, 50 to 75 percent slopes	95	65	20	95x95	11	5	erosion, fertility

* Weighted value
** Variable

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
102, 103---------- Arnold	Sandy (15)----------	Favorable Normal Unfavorable	1,500 1,200 1,000	Wild oat---------- Soft chess---------- Oak---------- Foxtail fescue---------- Red brome---------- Filaree---------- Chamise---------- Goldenbush---------- California sagebrush----------	15 10 10 10 10 10 5 5 5
104, 105, 106------ Baywood	Sandy (14)----------	Favorable Normal Unfavorable	1,600 1,200 800	Chamise---------- Manzanita---------- Brome---------- California scrub oak---------- Wild oat---------- Annual lupine----------	25 20 15 15 10 5
108---------- Briones	Sandy (15)----------	Favorable Normal Unfavorable	2,500 1,800 1,200	Wild oat---------- Brome---------- Filaree---------- Fescue---------- California sagebrush---------- Oak----------	20 20 20 5 5 5
109*: Briones---------- Pismo----------	Sandy (15)---------- Shallow Sandy (15)----------	Favorable Normal Unfavorable Favorable Normal Unfavorable	2,500 1,800 1,200 2,500 1,800 1,300	Wild oat---------- Brome---------- Filaree---------- Fescue---------- California sagebrush---------- Oak---------- Wild oat---------- Filaree---------- Brome---------- Saltgrass---------- Fescue---------- Barley---------- California sagebrush---------- Bluegrass----------	20 20 20 5 5 5 30 20 10 5 5 5 5 5
110*: Briones---------- Tierra----------	Sandy (15)---------- Coarse Loamy Claypan (15)-----	Favorable Normal Unfavorable Favorable Normal Unfavorable	2,500 1,800 1,200 2,800 2,100 1,600	Wild oat---------- Brome---------- Filaree---------- Fescue---------- California sagebrush---------- Oak---------- Wild oat---------- Soft chess---------- Filaree---------- Needlegrass---------- Ripgut brome---------- Barley---------- Fescue---------- Red brome---------- Lupine---------- California buckwheat---------- Oak----------	20 20 20 5 5 5 15 10 10 5 5 5 5 5 5 5 5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
111---------- Camarillo	Coarse Loamy Flat (14)--------	Favorable	5,500	Saltgrass----------	20
		Normal	5,100	Willow----------	15
		Unfavorable	4,100	Red brome----------	10
				Coyotebush----------	10
				Barley----------	10
				Burclover----------	5
				Filaree----------	5
				Anise----------	5
				Common milkthistle----------	5
113, 114---------- Capistrano	Coarse Loamy Bottom (14)------	Favorable	4,800	Burclover----------	20
		Normal	3,200	Filaree----------	15
		Unfavorable	2,500	Narrowleaf plantain----------	10
				Coyotebush----------	10
				Coast fescue----------	5
				Barley----------	5
				Lupine----------	5
				Italian ryegrass----------	5
				Fescue----------	5
				Brome----------	5
115, 116---------- Chamise	Gravelly Loamy (15)----------	Favorable	3,000	Wild oat----------	15
		Normal	2,000	Filaree----------	10
		Unfavorable	1,000	Rattail fescue----------	10
				Mustard----------	5
				Ripgut brome----------	5
				Red brome----------	5
				Purple needlegrass----------	5
				Barley----------	5
				Coyotebush----------	5
				California sagebrush----------	5
				Oak----------	5
117---------- Chamise	Gravelly Fine Loamy (15)------	Favorable	3,700	Wild oat----------	15
		Normal	2,500	Filaree----------	15
		Unfavorable	1,800	Barley----------	10
				Burclover----------	10
				Ripgut brome----------	5
				Red brome----------	5
				Purple needlegrass----------	5
				Fescue----------	5
				Coyotebush----------	5
				Live oak----------	5
118*:					
Cieneba----------	Very Shallow Loamy (15)-------	Favorable	2,300	Chamise----------	20
		Normal	1,700	Ceanothus----------	10
		Unfavorable	1,200	California sagebrush----------	10
				Manzanita----------	10
				Filaree----------	5
				Brome----------	5
				Fescue----------	5
				Purple needlegrass----------	5
				Toyon----------	5
				Oak----------	5
				Poison-oak----------	5
				Common deerweed----------	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
118*:					
Kinkel Variant	Loamy (15)	Favorable	4,100	Wild Oat	10
		Normal	2,700	Brome	10
		Unfavorable	2,100	Oak	10
				Purple needlegrass	10
				Filaree	5
				Ponderosa pine	5
				Burclover	5
				Muhly	5
				Fescue	5
				Manzanita	5
				Ceanothus	5
				Bluegrass	5
				California buckthorn	5
119*:					
Cieneba	Very Shallow Loamy (15)	Favorable	2,300	Chamise	20
		Normal	1,700	Ceanothus	10
		Unfavorable	1,200	California sagebrush	10
				Manzanita	10
				Filaree	5
				Brome	5
				Fescue	5
				Purple needlegrass	5
				Toyon	5
				Oak	5
				Poison-oak	5
				Common deerweed	5
Millsap	Loamy Claypan (15)	Favorable	3,500	Soft chess	15
		Normal	2,500	Wild oat	10
		Unfavorable	1,800	Purple needlegrass	10
				Blue oak	10
				Ripgut brome	5
				Red brome	5
				Filaree	5
				Oak	5
				Burclover	5
				Fescue	5
				Digger pine	5
				Bluegrass	5
120, 121, 122, 123-Concepcion	Loamy Claypan (14)	Favorable	3,300	Wild oat	15
		Normal	2,800	Filaree	15
		Unfavorable	2,300	Burclover	15
				Narrowleaf plantain	5
				Clover	5
				Fescue	5
				Mediterranean barley	5
				Coyotebush	5
				Mustard	5
				Lupine	5
124, 125-Corralitos	Sandy Bottom (14)	Favorable	2,200	Wild oat	20
		Normal	1,300	Red brome	10
		Unfavorable	900	Fescue	10
				Radish	10
				Ripgut brome	5
				Soft chess	5
				Coyotebush	5
				Saltgrass	5
				Oak	5
				California sagebrush	5
				Barley	5
				Tarweed	5
				Fremont cottonwood	5
				Willow	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
127, 128---------- Cropley	Clayey (14)----------	Favorable	6,700	Wild oat----------	15
		Normal	5,400	Burclover----------	10
		Unfavorable	4,000	Purple needlegrass----------	10
				Bluegrass----------	10
				Clover----------	10
				Brome----------	10
				Filaree----------	5
				Fescue----------	5
				Mustard----------	5
				Lupine----------	5
				Coyotebush----------	5
				Australian saltbush----------	5
129---------- Diablo	Clayey (15)----------	Favorable	6,700	Wild oat----------	15
		Normal	5,400	Burclover----------	10
		Unfavorable	4,000	Brome----------	10
				Bluegrass----------	10
				Purple needlegrass----------	10
				Clover----------	10
				Lupine----------	5
				Filaree----------	5
				Foxtail fescue----------	5
				Mustard----------	5
				Coyotebush----------	5
				Australian saltbush----------	5
130*, 131*, 132*: Diablo----------	Clayey (15)----------	Favorable	6,700	Wild oat----------	15
		Normal	5,400	Burclover----------	10
		Unfavorable	4,000	Ripgut brome----------	10
				Bluegrass----------	10
				Purple needlegrass----------	10
				Clover----------	10
				Lupine----------	5
				Filaree----------	5
				Foxtail fescue----------	5
				Mustard----------	5
				Coyotebush----------	5
Cibo----------	Clayey (15)----------	Favorable	6,500	Wild oat----------	15
		Normal	5,200	Purple needlegrass----------	10
		Unfavorable	3,700	Burclover----------	10
				Bluegrass----------	10
				Clover----------	10
				Brome----------	10
				Fescue----------	5
				Filaree----------	5
				Mustard----------	5
133*: Diablo----------	Clayey (15)----------	Favorable	6,700	Wild oat----------	15
		Normal	5,400	Burclover----------	10
		Unfavorable	4,000	Ripgut brome----------	10
				Bluegrass----------	10
				Purple needlegrass----------	10
				Clover----------	10
				Lupine----------	5
				Filaree----------	5
				Foxtail fescue----------	5
				Mustard----------	5
				Coyotebush----------	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
133*: Lodo	Shallow Fine Loamy (15)	Favorable	2,500	Brome	20
		Normal	1,800	Fescue	20
		Unfavorable	1,200	Filaree	10
				Wild oat	10
				Chamise	5
				Purple needlegrass	5
				Foothill stipa	5
				California buckwheat	5
				California sagebrush	5
135, 136, 137 Elder	Coarse Loamy Bottom (14)	Favorable	5,000	Wild oat	20
		Normal	3,500	Ripgut brome	10
		Unfavorable	2,000	Filaree	10
				Burclover	10
				Fescue	10
				Brome	5
				Saltgrass	5
				Needlegrass	5
				Mustard	5
				Coyotebush	5
				Anise	5
138, 139 Elder	Coarse Loamy Flat (14)	Favorable	6,900	Saltgrass	15
		Normal	5,200	Barley	15
		Unfavorable	3,900	Filaree	10
				Red brome	10
				Coyotebush	10
				Willow	10
				Burclover	5
				Clover	5
				Mustard	5
140 Garey	Coarse Loamy Bottom (14)	Favorable	5,000	Wild oat	20
		Normal	3,500	Ripgut brome	10
		Unfavorable	2,000	Filaree	10
				Burclover	10
				Fescue	10
				Coyotebush	10
				Clover	5
				Brome	5
				Saltgrass	5
				Needlegrass	5
				Wild radish	5
141, 142 Gaviota	Shallow Coarse Loamy (15)	Favorable	2,500	California sagebrush	20
		Normal	1,800	Chamise	10
		Unfavorable	1,200	Buckbrush	5
				Manzanita	5
				Filaree	5
				Oak	5
				Foxtail fescue	5
				Red brome	5
				Purple needlegrass	5
				Poison-oak	5
				Toyon	5
				Wild oat	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
143*, 144*, 145*:					
Gazos	Fine Loamy (15)	Favorable	5,800	Wild oat	15
		Normal	4,300	Fescue	15
		Unfavorable	3,100	Brome	15
				Needlegrass	10
				Bluegrass	10
				Burclover	5
				Clover	5
				Lupine	5
				Filaree	5
				Coyotebush	5
				California sagebrush	5
Lodo	Shallow Fine Loamy (15)	Favorable	2,500	Brome	20
		Normal	1,800	Fescue	20
		Unfavorable	1,200	Filaree	10
				Wild oat	10
				Chamise	5
				Purple needlegrass	5
				Foothill stipa	5
				California buckwheat	5
				California sagebrush	5
146*:					
Henneke	Fine Loamy Serpentine (15)	Favorable	1,900	Leather oak	25
		Normal	1,500	Manzanita	20
		Unfavorable	1,200	Ceanothus	5
				Purple needlegrass	5
				Fescue	5
				Bottlebrush squirreltail	5
				Soap plant	5
				Sixweeks threeawn	5
				Chapparal yucca	5
				Barley	5
				Wild oats	5
Rock outcrop.					
147, 148, 149, 150-Lodo	Shallow Fine Loamy (15)	Favorable	2,500	Brome	20
		Normal	1,800	Fescue	20
		Unfavorable	1,200	Filaree	10
				Wild oat	10
				Chamise	5
				Purple needlegrass	5
				Foothill stipa	5
				California buckwheat	5
				California sagebrush	5
151*, 152*:					
Lodo	Shallow Fine Loamy (15)	Favorable	2,500	Brome	20
		Normal	1,800	Fescue	20
		Unfavorable	1,200	Filaree	10
				Wild oat	10
				Chamise	5
				Purple needlegrass	5
				Foothill stipa	5
				California buckwheat	5
				California sagebrush	5
Rock outcrop.					

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
153*, 154*: Lompico.					
McMullin	Shallow Loamy (15)	Favorable	2,800	Coyotebush	10
		Normal	2,100	Leather oak	10
		Unfavorable	1,500	Manzanita	10
				Brome	5
				Redberry	5
				Bush monkeyflower	5
				Poison-oak	5
				Gooseberry	5
				Blue wildrye	5
				Chamise	5
				Wild oat	5
				Needlegrass	5
				Toyon	5
				Fescue	5
155, 156--- Lopez	Shallow Gravelly Fine Loamy (15).	Favorable	2,200	Manzanita	20
		Normal	1,300	Buckbrush	10
		Unfavorable	700	Brome	10
				Wild oat	10
				Bush monkeyflower	5
				Digger pine	5
				Fescue	5
				Needlegrass	5
				Oak	5
				Filaree	5
				Barley	5
				Lupine	5
157*: Lopez	Shallow Gravelly Fine Loamy (15).	Favorable	2,200	Manzanita	20
		Normal	1,300	Buckbrush	10
		Unfavorable	700	Red brome	10
				Wild oat	10
				Bush monkeyflower	5
				Digger pine	5
				Fescue	5
				Purple needlegrass	5
				Oak	5
				Filaree	5
				Barley	5
Rock outcrop.					
158, 159, 160, 161- Los Osos	Loamy Claypan (15)	Favorable	3,600	Wild oat	15
		Normal	2,700	Brome	15
		Unfavorable	2,100	Soft chess	10
				Filaree	10
				Burclover	5
				Clover	5
				Oak	5
				Lupine	5
				Purple needlegrass	5
				Coyotebush	5
				Fescue	5
				Barley	5
				Mustard	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
162*, 163*, 164*:					
Los Osos	Loamy Claypan (15)	Favorable	3,600	Wild oat	15
		Normal	2,700	Soft chess	10
		Unfavorable	2,100	Filaree	10
				Ripgut brome	5
				Red brome	5
				Burclover	5
				Clover	5
				Oak	5
				Annual lupine	5
				Purple needlegrass	5
				Coyotebush	5
				Fescue	5
Diablo	Clayey (15)	Favorable	6,700	Wild oat	15
		Normal	5,400	Burclover	10
		Unfavorable	4,000	Ripgut brome	10
				Bluegrass	10
				Purple needlegrass	10
				Clover	10
				Lupine	5
				Filaree	5
				Foxtail fescue	5
				Mustard	5
				Coyotebush	5
165*:					
Los Osos	Loamy Claypan (15)	Favorable	3,500	Wild oat	20
		Normal	3,000	Soft chess	20
		Unfavorable	2,000	Burclover	10
				Filaree	10
				Ripgut brome	5
				Red brome	5
				Clover	5
				Oak	5
				Blue oak	5
				Annual lupine	5
Diablo	Clayey (15)	Favorable	5,000	Wild oat	20
		Normal	2,500	Soft chess	15
		Unfavorable	2,000	Burclover	10
				Ripgut brome	10
				Filaree	10
				Bluegrass	5
				Purple needlegrass	5
				Clover	5
				Lupine	5
				Foxtail fescue	5
				Barley	5
				Deervetch	5
166*, 167*:					
Los Osos	Loamy Claypan (15)	Favorable	3,600	Wild oat	15
		Normal	2,700	Soft chess	10
		Unfavorable	2,100	Filaree	10
				Ripgut brome	5
				Red brome	5
				Burclover	5
				Clover	5
				Oak	5
				Annual lupine	5
				Purple needlegrass	5
				Coyotebush	5
				Fescue	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
166*, 167*: Lodo	Shallow Fine Loamy (15)	Favorable	2,500	Brome	20
		Normal	1,800	Fescue	20
		Unfavorable	1,200	Filaree	10
				Wild oat	10
				Chamise	5
				Purple needlegrass	5
				Foothill stipa	5
				California buckwheat	5
				California sagebrush	5
168--- Los Osos Variant	Fine Loamy (15)	Favorable	5,400	Wild oat	15
		Normal	4,000	Filaree	10
		Unfavorable	2,800	Brome	10
				Fescue	10
				Purple needlegrass	10
				Bluegrass	10
				Burclover	5
				Oak	5
				Soft chess	5
				Lupine	5
				Clover	5
				Coyotebush	5
				California sagebrush	5
169--- Marimel	Fine Loamy Flat (14)	Favorable	6,900	Wild oat	10
		Normal	5,500	Brome	10
		Unfavorable	4,100	Fescue	10
				Sweetclover	10
				Willow	10
				Coyotebush	5
				Anise	5
				Mustard	5
				Barley	5
				Saltgrass	5
				Poison-hemlock	5
				Clover	5
				Baltic rush	5
				Common milkthistle	5
				Elderberry	5
171--- Millsap	Loamy Claypan (15)	Favorable	3,500	Soft chess	15
		Normal	2,500	Wild oat	10
		Unfavorable	1,800	Purple needlegrass	10
				Blue oak	10
				Ripgut brome	5
				Red brome	5
				Filaree	5
				Oak	5
				Burclover	5
				Fescue	5
				Digger pine	5
				Bluegrass	5
172*: Millsap	Loamy Claypan (15)	Favorable	3,500	Soft chess	15
		Normal	2,500	Wild oat	10
		Unfavorable	1,800	Purple needlegrass	10
				Blue oak	10
				Ripgut brome	5
				Red brome	5
				Filaree	5
				Oak	5
				Burclover	5
				Fescue	5
				Digger pine	5
				Bluegrass	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
172*:					
Rock outcrop.					
177, 178, 179------	Fine Loamy (15)----------	Favorable	5,800	Wild oat----------	20
Nacimiento		Normal	4,300	Brome----------	15
		Unfavorable	2,900	Needlegrass----------	10
				Filaree----------	10
				Fescue----------	10
				Burclover----------	5
				Clover----------	5
				Oak----------	5
				California sagebrush----------	5
				Mustard----------	5
180*, 181*, 182*:					
Nacimiento--------	Fine Loamy (15)----------	Favorable	5,800	Wild oat----------	20
		Normal	4,300	Brome----------	15
		Unfavorable	2,900	Purple needlegrass----------	10
				Filaree----------	10
				Burclover----------	5
				Clover----------	5
				Oak----------	5
				California sagebrush----------	5
Calodo----------	Shallow Loamy (15)----------	Favorable	2,200	Fescue----------	20
		Normal	1,600	Wild oat----------	10
		Unfavorable	1,300	Red brome----------	10
				Needlegrass----------	10
				Filaree----------	10
				Brome----------	10
				California sagebrush----------	5
				Mustard----------	5
				Chamise----------	5
183*:					
Obispo----------	Shallow Clayey Serpentine (15)	Favorable	1,800	Wild oat----------	20
		Normal	1,300	Purple needlegrass----------	10
		Unfavorable	900	Italian ryegrass----------	10
				Barley----------	10
				California sagebrush----------	5
				Chapparal yucca----------	5
				Leather oak----------	5
				Manzanita----------	5
				Bottlebrush squirreltail------	5
				Fescue----------	5
				Sixweeks threeawn----------	5
				Brome----------	5
Rock outcrop.					
184, 185----------	Sandy (14)----------	Favorable	1,600	Soft chess----------	10
Oceano		Normal	1,200	Wild oat----------	10
		Unfavorable	900	Brome----------	10
				Fescue----------	5
				Lupine----------	5
				Manzanita----------	5
				Chamise----------	5
				California sagebrush----------	5
				Needlegrass----------	5
				Blue oak----------	5
				Goldenbush----------	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
186, 187---------- Perkins	Coarse Loamy (14)----------	Favorable	3,500	Wild oat----------	15
		Normal	2,700	Brome----------	10
		Unfavorable	1,800	Filaree----------	10
				Burclover----------	10
				Fescue----------	10
				Soft chess----------	5
				Ripgut brome----------	5
				Clover----------	5
				Barley----------	5
				Oak----------	5
				Needlegrass----------	5
				Bluegrass----------	5
				California sagebrush----------	5
188---------- Perkins	Gravelly Coarse Loamy (15)----	Favorable	3,100	Wild oat----------	15
		Normal	2,200	Brome----------	10
		Unfavorable	1,500	Filaree----------	10
				Burclover----------	10
				Fescue----------	10
				Soft chess----------	5
				Clover----------	5
				Barley----------	5
				Oak----------	5
				Needlegrass----------	5
				Bluegrass----------	5
				California sagebrush----------	5
189---------- Pismo	Shallow Sandy (15)----------	Favorable	2,500	Wild oat----------	30
		Normal	1,800	Filaree----------	20
		Unfavorable	1,300	Brome----------	10
				Saltgrass----------	5
				Fescue----------	5
				Barley----------	5
				California sagebrush----------	5
				Bluegrass----------	5
190*:					
Pismo----------	Shallow Sandy (15)----------	Favorable	2,500	Wild oat----------	30
		Normal	1,800	Filaree----------	20
		Unfavorable	1,300	Brome----------	10
				Saltgrass----------	5
				Fescue----------	5
				Barley----------	5
				California sagebrush----------	5
				Bluegrass----------	5
Rock outcrop.					
191*:					
Pismo----------	Shallow Sandy (15)----------	Favorable	2,500	Wild oat----------	30
		Normal	1,800	Filaree----------	20
		Unfavorable	1,300	Brome----------	10
				Saltgrass----------	5
				Fescue----------	5
				Barley----------	5
				California sagebrush----------	5
				Bluegrass----------	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
191*:					
Tierra	Coarse Loamy Claypan (15)	Favorable	2,800	Wild oat	15
		Normal	2,100	Soft chess	10
		Unfavorable	1,600	Filaree	10
				Needlegrass	5
				Ripgut brome	5
				Barley	5
				Fescue	5
				Red brome	5
				Lupine	5
				California buckwheat	5
				Oak	5
196 Salinas	Loamy Bottom (14)	Favorable	4,800	Wild oat	15
		Normal	3,500	Red brome	10
		Unfavorable	2,800	Redstem filaree	10
				Ripgut brome	5
				Fescue	5
				Oak	5
				Clover	5
				Brome	5
				Coyotebush	5
				Australian saltbush	5
				Mustard	5
197, 198 Salinas	Fine Loamy Bottom (14)	Favorable	5,800	Wild oat	17
		Normal	4,300	Red brome	10
		Unfavorable	3,200	Filaree	10
				Fescue	10
				Purple needlegrass	10
				Oak	5
				Clover	5
				Brome	5
				Coyotebush	5
				Mustard	5
199, 200, 201, 202- San Simeon	Coarse Loamy Claypan (15)	Favorable	3,500	Live oak	10
		Normal	2,500	Blue wildrye	10
		Unfavorable	1,800	Poison-oak	10
				Toyon	10
				Blackberry	10
				Purple needlegrass	5
				California buckthorn	5
				Little quakinggrass	5
				Giant wildrye	5
				Clover	5
				Wild oat	5
				Ceanothus	5
				Manzanita	5
				Brome	5
				Fescue	5
203, 204, 205, 206- Santa Lucia	North Slope Gravelly Fine Loamy (15).	Favorable	2,100	Soft chess	15
		Normal	1,700	Wild oat	10
		Unfavorable	1,500	Ripgut brome	10
				Filaree	10
				Fescue	5
				Purple needlegrass	5
				Clover	5
				Oak	5
				Burclover	5
				Blue oak	5
				Buckbrush	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
207---------- Santa Lucia	North Slope Gravelly Fine Loamy (15).	Favorable	2,100	Soft chess----------	15
		Normal	1,700	Wild oat----------	10
		Unfavorable	1,500	Ripgut brome----------	10
				Filaree----------	10
				Fescue----------	5
				Purple needlegrass----------	5
				Clover----------	5
				Oak----------	5
				Burclover----------	5
				Blue oak----------	5
				Buckbrush----------	5
208---------- Still	Gravelly Coarse Loamy (14)----	Favorable	3,500	Wild oat----------	15
		Normal	2,400	Fescue----------	10
		Unfavorable	1,500	Filaree----------	10
				Brome----------	10
				Clover----------	5
				Purple needlegrass----------	5
				Mustard----------	5
				Coyotebush----------	5
				California sagebrush----------	5
				Italian ryegrass----------	5
				Barley----------	5
				Plantain----------	5
209---------- Still	Gravelly Fine Loamy (14)------	Favorable	3,800	Wild oat----------	15
		Normal	2,800	Brome----------	15
		Unfavorable	2,000	Fescue----------	10
				Burclover----------	10
				Filaree----------	5
				Italian ryegrass----------	5
				Purple needlegrass----------	5
				Mustard----------	5
				Clover----------	5
				Coyotebush----------	5
				Barley----------	5
				California sycamore----------	5
				Live oak----------	5
				Plantain----------	5
210, 211---------- Still	Gravelly Fine Loamy (14)------	Favorable	3,800	Wild oat----------	15
		Normal	2,800	Soft chess----------	10
		Unfavorable	2,000	Fescue----------	10
				Burclover----------	10
				Ripgut brome----------	5
				Filaree----------	5
				Clover----------	5
				Purple needlegrass----------	5
				Mustard----------	5
				Coyotebush----------	5
				Live oak----------	5
				California sagebrush----------	5
				Italian ryegrass----------	5
				Barley----------	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
212, 213, 214, 215--Suey	Loamy (15)	Favorable	5,000	Burclover	15
		Normal	3,700	Wild oat	15
		Unfavorable	2,500	Filaree	10
				Mouse barley	10
				Brome	10
				Fescue	10
				Australian saltbush	5
				Saltgrass	5
				Anise	5
				Needlegrass	5
				Bluegrass	5
216--Tierra	Coarse Loamy Claypan (15)	Favorable	2,800	Wild oat	15
		Normal	2,100	Soft chess	10
		Unfavorable	1,600	Filaree	10
				Needlegrass	5
				Brome	5
				Barley	5
				Fescue	5
				Lupine	5
				California buckwheat	5
				Oak	5
				Deervetch	5
217--Tierra	Loamy Claypan (15)	Favorable	3,500	Wild oat	15
		Normal	2,500	Filaree	10
		Unfavorable	2,000	Brome	10
				Soft chess	5
				Needlegrass	5
				Burclover	5
				Barley	5
				Lupine	5
				California sagebrush	5
				Oak	5
				Clover	5
				Fescue	5
218--Tierra	Loamy Claypan (15)	Favorable	3,500	Wild oat	15
		Normal	2,500	Filaree	10
		Unfavorable	2,000	Soft chess	5
				Needlegrass	5
				Burclover	5
				Ripgut brome	5
				Barley	5
				Red brome	5
				Lupine	5
				California sagebrush	5
				Oak	5
219, 220--Tujunga	Sandy Bottom (14)	Favorable	1,500	Wild oat	10
		Normal	1,000	Saltgrass	10
		Unfavorable	700	Coyotebush	5
				Deergrass	5
				Brome	5
				Filaree	5
				Willow	5
				California sycamore	5
				California sagebrush	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
224, 225, 226, 227--Zaca	Clayey (15)	Favorable	6,500	Wild oat	15
		Normal	5,200	Burclover	10
		Unfavorable	3,700	Purple needlegrass	10
				Clover	10
				Soft chess	5
				Filarec	5
				Ripgut brome	5
				Barley	5
				Fescue	5
				Mustard	5
				Lupine	5
				Bluegrass	5
				Oak	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--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
101*. Aquolls					
102---- Arnold	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Moderate: droughty, slope.
103---- Arnold	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
104---- Baywood	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
105---- Baywood	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope.
106---- Baywood	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: slope.
107*. Beaches					
108---- Briones	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
109*: Briones----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Pismo----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, thin layer.
110*: Briones----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tierra----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
111---- Camarillo	Severe: floods.	Moderate: wetness.	Moderate: wetness.	Slight----	Slight.
112---- Camarillo	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
113---- Capistrano	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Moderate: soil blowing.	Slight.
114---- Capistrano	Moderate: soil blowing.	Moderate: soil blowing.	Severe: slope.	Moderate: soil blowing.	Slight.
115---- Chamise	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: slope, small stones.	Moderate: dusty.	Moderate: small stones, droughty, slope.
116---- Chamise	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
117--- Chamise	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty.
118*:					
Cieneba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Kinkel Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
119*:					
Cieneba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Millsap	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
120--- Concepcion	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Moderate: dusty.	Slight.
121--- Concepcion	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Moderate: dusty.	Slight.
122--- Concepcion	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Moderate: dusty.	Moderate: slope.
123--- Concepcion	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
124--- Corralitos	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
125--- Corralitos	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
126--- Corralitos Variant	Severe: floods.	Moderate: wetness.	Moderate: small stones, wetness, floods.	Slight	Moderate: droughty, floods.
127--- Cropley	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Severe: too clayey.
128--- Cropley	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.	Severe: too clayey.
129--- Diablo	Moderate: too clayey.	Moderate: too clayey.	Severe: slope, too clayey.	Moderate: too clayey.	Severe: too clayey.
130*:					
Diablo	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope, too clayey.	Moderate: too clayey.	Severe: too clayey.
Cibo	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Severe: too clayey.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
131*:					
Diablo	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Moderate: too clayey, slope.	Severe: slope, too clayey.
Cibo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope, too clayey.
132*:					
Diablo	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Severe: slope, too clayey.
Cibo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too clayey.
133*:					
Diablo	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Severe: slope, too clayey.
Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, thin layer.
134*. Dune land					
135 Elder	Slight	Slight	Moderate: small stones, slope.	Slight	Slight.
136 Elder	Slight	Slight	Severe: slope.	Slight	Slight.
137 Elder	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
138 Elder	Severe: floods.	Slight	Moderate: small stones.	Slight	Moderate: floods.
139 Elder	Severe: floods.	Slight	Moderate: small stones, slope.	Slight	Moderate: floods.
140 Garey	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Severe: erodes easily.	Moderate: droughty.
141, 142 Gaviota	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
143*:					
Gazos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Moderate: slope.	Severe: slope, thin layer.
144*, 145*:					
Gazos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
144*, 145*: Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, thin layer.
146*: Henneke	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
Rock outcrop.					
147--- Lodo	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Slight---	Severe. thin layer.
148--- Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Moderate: slope.	Severe: slope, thin layer.
149, 150--- Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, thin layer.
151*: Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Moderate: slope.	Severe: slope, thin layer.
Rock outcrop.					
152*: Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
153*: Lompico	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
McMullin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope, dusty.	Severe: slope, thin layer.
154*: Lompico	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
McMullin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
155, 156--- Lopez	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones.	Severe: small stones, thin layer.
157*: Lopez	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones.	Severe: small stones, thin layer.
Rock outcrop.					

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
158--Los Osos	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.	Moderate: thin layer.
159--Los Osos	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
160--Los Osos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
161--Los Osos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
162*:					
Los Osos	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.	Moderate: thin layer.
Diablo	Moderate: too clayey.	Moderate: too clayey.	Severe: slope, too clayey.	Moderate: too clayey.	Severe: too clayey.
163*:					
Los Osos	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
Diablo	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope, too clayey.	Moderate: too clayey.	Severe: too clayey.
164*:					
Los Osos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Diablo	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Moderate: too clayey, slope.	Severe: slope, too clayey.
165*:					
Los Osos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Diablo	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Severe: slope, too clayey.
166*:					
Los Osos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Moderate: slope.	Severe: slope, thin layer.
167*:					
Los Osos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Lodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, thin layer.
168--Los Osos Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
169--Marimel	Severe: floods.	Moderate: wetness.	Moderate: wetness.	Slight	Moderate: floods.
170--Marimel	Slight	Slight	Slight	Slight	Slight.
171--Millsap	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
172*: Millsap	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
173--Mocho	Slight	Slight	Moderate: small stones.	Slight	Slight.
174--Mocho	Moderate: dusty.	Moderate: dusty.	Moderate: small stones.	Severe: erodes easily.	Slight.
175--Mocho	Slight	Slight	Moderate: small stones.	Severe: erodes easily.	Slight.
176--Mocho Variant	Slight	Slight	Moderate: small stones.	Slight	Slight.
177, 178--Nacimiento	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
179--Nacimiento	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
180*: Nacimiento	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Calodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.	Severe: slope, thin layer.
181*, 182*: Nacimiento	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Calodo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, thin layer.
183*: Obispo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, thin layer, too clayey.
Rock outcrop.					
184--Oceano	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Moderate: droughty, too sandy.
185--Oceano	Severe: slope, too sandy, soil blowing.	Severe: slope, too sandy, soil blowing.	Severe: slope, too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
186--- Perkins	Slight	Slight	Moderate: small stones, slope.	Slight	Slight.
187--- Perkins	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
188--- Perkins	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
189--- Pismo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, thin layer.
190*: Pismo---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
191*: Pismo---	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: thin layer.
Tierra---	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: droughty, slope.
192*, 193*: Psamments.					
Fluvents.					
194*. Riverwash					
195*: Rock outcrop.					
Lithic Haploxerolls.					
196--- Salinas	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
197--- Salinas	Slight	Slight	Slight	Severe: erodes easily.	Slight.
198--- Salinas	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
199--- San Simeon	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, depth to rock.	Slight	Moderate: droughty, thin layer.
200--- San Simeon	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: droughty, slope, thin layer.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
201---------- San Simeon	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
202---------- San Simeon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
203, 204---------- Santa Lucia	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
205, 206---------- Santa Lucia	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
207---------- Santa Lucia	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: slope, small stones
208---------- Still	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: dusty.	Moderate: small stones slope.
209, 210---------- Still	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones
211---------- Still	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
212---------- Suey	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
213---------- Suey	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
214---------- Suey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
215---------- Suey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
216---------- Tierra	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Moderate: droughty.
217---------- Tierra	Moderate: slope, percs slowly, dusty.	Moderate: slope, percs slowly, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
218---------- Tierra	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
219---------- Tujunga	Severe: floods.	Moderate: soil blowing.	Moderate: floods.	Moderate: soil blowing.	Moderate: droughty, floods.
220---------- Tujunga	Severe: floods.	Moderate: soil blowing.	Severe: floods.	Moderate: floods, soil blowing.	Severe: floods.
221*: Xererts.					

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
221*: Xerolls. Urban land. 222*, 223*. Xerorthents					
224----- Zaca	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Severe: too clayey.
225----- Zaca	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope, too clayey.
226, 227----- Zaca	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
101*. Aquolls												
102---------- Arnold	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
103---------- Arnold	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
104, 105---------- Baywood	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
106---------- Baywood	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
107*. Beaches												
108---------- Briones	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
109*: Briones----------	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Pismo----------	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
110*: Briones----------	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Tierra----------	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
111---------- Camarillo	Fair	Fair	Good	---	---	Good	Good	Good	Fair	---	Good	Good.
112---------- Camarillo	Fair	Good	Good	---	---	Good	Poor	Poor	Good	---	Poor	Good.
113, 114---------- Capistrano	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
115, 116, 117------ Chamise	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
118*: Cieneba----------	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Kinkel Variant----	Very poor.	Very poor.	Good	Good	---	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	Good.
119*: Cieneba----------	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Millsap----------	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
120, 121---------- Concepcion	Poor	Good	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.

See footnote at end of table.

TABLE 7.-- 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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
122, 123---------- Concepcion	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
124, 125---------- Corralitos	Fair	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
126---------- Corralitos Variant	Fair	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
127---------- Cropley	Fair	Good	Poor	---	---	Poor	Poor	Poor	Fair	---	Poor	Poor.
128---------- Cropley	Fair	Good	Poor	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
129---------- Diablo	Fair	Good	Poor	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
130*, 131*: Diablo----------	Fair	Good	Poor	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
Cibo.												
132*: Diablo----------	Poor	Fair	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Cibo.												
133*: Diablo----------	Poor	Fair	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Lodo----------	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
134*. Dune land												
135, 136---------- Elder	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
137, 138, 139------ Elder	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
140---------- Garey	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
141, 142---------- Gaviota	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
143*: Gazos----------	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
Lodo----------	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
144*: Gazos----------	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
Lodo----------	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 7.--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
145*:												
Gazos	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Lodo	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
146*:												
Henneke	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop.												
147, 148, 149, 150-Lodo	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
151*, 152*:												
Lodo	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rock outcrop.												
153*:												
Lompico	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
McMullin	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
154*:												
Lompico	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
McMullin	Very poor.	Poor	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
155, 156-Lopez	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
157*:												
Lopez	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop.												
158-Los Osos	Fair	Good	Good	---	---	Good	Poor	Very poor.	Good	---	Very poor.	Good.
159-Los Osos	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
160-Los Osos	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
161-Los Osos	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
162*:												
Los Osos	Fair	Good	Good	---	---	Good	Poor	Very poor.	Good	---	Very poor.	Good.
Diablo	Fair	Good	Poor	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
163*:												
Los Osos	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.

See footnote at end of table.

TABLE 7.--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
163*:												
Diablo	Fair	Good	Poor	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
164*:												
Los Osos	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
Diablo	Fair	Good	Poor	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
165*:												
Los Osos	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
Diablo	Poor	Fair	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
166*:												
Los Osos	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
Lodo	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
167*:												
Los Osos	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
Lodo	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
168--- Los Osos Variant	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
169--- Marimel	Fair	Fair	Good	---	---	Good	Fair	Fair	Fair	---	Fair	Good.
170--- Marimel	Good	Good	Good	---	---	Good	Fair	Poor	Good	---	Poor	---
171--- Millsap	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
172*:												
Millsap	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Rock outcrop.												
173, 174, 175--- Mocho	Good	Good	Good	---	---	Good	Poor	Poor	Good	---	Poor	Good.
176--- Mocho Variant	Good	Good	Good	---	---	Good	Poor	Poor	Good	---	Poor	Good.
177, 178--- Nacimiento	Fair	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
179--- Nacimiento	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
180*:												
Nacimiento	Fair	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.

See footnote at end of table.

TABLE 7.--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
180*:												
Calodo	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
181*:												
Nacimiento	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
Calodo	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
182*:												
Nacimiento	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Calodo	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
183*:												
Obispo	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop.												
184 Oceano	Poor	Poor	Good	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
185 Oceano	Very poor.	Very poor.	Good	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
186, 187, 188 Perkins	Fair	Good	Good	Good	---	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
189 Pismo	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
190*:												
Pismo	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop.												
191*:												
Pismo	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Tierra	Fair	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
192*, 193*: Psamments.												
Fluvents.												
194*. Riverwash												
195*:												
Rock outcrop.												
Lithic Haploxerolls.												

See footnote at end of table.

TABLE 7.--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
196, 197---------- Salinas	Good	Good	Good	---	---	Good	Poor	Poor	Good	---	Poor	Good.
198---------- Salinas	Good	Good	Good	---	---	Good	Poor	Very poor.	Good	---	Very poor.	Good.
199, 200---------- San Simeon	Fair	Good	Good	---	---	Fair	Very poor.	Very poor.	Good	---	Very poor.	Fair.
201---------- San Simeon	Poor	Fair	Good	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
202---------- San Simeon	Very poor.	Very poor.	Good	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
203---------- Santa Lucia	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
204---------- Santa Lucia	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
205, 206---------- Santa Lucia	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
207---------- Santa Lucia	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
208---------- Still	Fair	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
209. Still												
210, 211---------- Still	Fair	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
212, 213. Suey												
214---------- Suey	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
215---------- Suey	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
216, 217---------- Tierra	Fair	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
218---------- Tierra	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
219, 220---------- Tujunga	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
221*: Xererts.												
Xerolls.												
Urban land.												
222*, 223*. Xerorthents												
224, 225---------- Zaca	Fair	Good	Poor	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.

See footnote at end of table.

TABLE 7. 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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
226, 227---------- Zaca	Poor	Fair	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

ome 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	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1*. quolls						
2---- rnold	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
3---- rnold	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
4---- aywood	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.
5---- aywood	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
6---- aywood	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
7*. eaches						
8---- riones	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
9*: riones----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ismo----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
0*: riones----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ierra----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
1---- amarillo	Severe: cutbanks cave, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Moderate: wetness, floods.	Slight.
2---- amarillo	Severe: cutbanks cave.	Slight----------	Moderate: wetness.	Slight----------	Slight----------	Slight.
3---- apistrano	Slight----------	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
4---- apistrano	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
5---- hamise	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: small stones, droughty, slope.
6---- hamise	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
117---------- Chamise	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Moderate: small stones droughty.
118*:						
Cieneba----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Kinkel Variant---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
119*:						
Cieneba----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Millsap----------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
120, 121---------- Concepcion	Slight---------	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
122---------- Concepcion	Moderate: slope.	Severe: shrink-swell.	Moderate: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
123---------- Concepcion	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
124---------- Corralitos	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty, too sandy.
125---------- Corralitos	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
126---------- Corralitos Variant	Severe: cutbanks cave, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.	Moderate: droughty, floods.
127, 128---------- Cropley	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
129---------- Diablo	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
130*:						
Diablo----------	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
Cibo----------	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: too clayey.
131*, 132*:						
Diablo----------	Severe: cutbanks cave, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope, too clayey.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
131*, 132*: Cibo	Severe: depth to rock, cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
133*: Diablo	Severe: cutbanks cave, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope, too clayey.
Lodo	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
134*. Dune land						
135 Elder	Slight	Slight	Slight	Slight	Slight	Slight.
136 Elder	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
137 Elder	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
138, 139 Elder	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
140 Garey	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
141, 142 Gaviota	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
143*, 144*, 145*: Gazos	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lodo	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
146*: Henneke	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: small stones, large stones, slope.
Rock outcrop.						
147 Lodo	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
148, 149, 150 Lodo	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
151*, 152*: Lodo	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
153*, 154*:						
Lompico	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
McMullin	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
155, 156 Lopez	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer.
157*:						
Lopez	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer.
Rock outcrop.						
158 Los Osos	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: thin layer.
159 Los Osos	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
160, 161 Los Osos	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
162*:						
Los Osos	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: thin layer.
Diablo	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
163*:						
Los Osos	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
Diablo	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
164*, 165*:						
Los Osos	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Diablo	Severe: cutbanks cave, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope, too clayey.
166*, 167*:						
Los Osos	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
166*, 167*: Lodo	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
168---- Los Osos Variant	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
169---- Marimel	Severe: wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.	Moderate: floods.
170---- Marimel	Slight----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
171---- Millsap	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
172*: Millsap----	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Rock outcrop.						
173---- Mocho	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
174---- Mocho	Slight----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
175---- Mocho	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
176---- Mocho Variant	Severe: cutbanks cave.	Slight----	Slight----	Slight----	Slight----	Slight.
177, 178, 179---- Nacimiento	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
180*, 181*, 182*: Nacimiento----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Calodo----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
183*: Obispo----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, thin layer, too clayey.
Rock outcrop.						
184---- Oceano	Severe: cutbanks cave.	Slight----	Slight----	Moderate: slope.	Slight----	Moderate: droughty, too sandy.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
185--- Oceano	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
186--- Perkins	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.
187, 188--- Perkins	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
189--- Pismo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
190*: Pismo---	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.						
191*: Pismo---	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: thin layer.
Tierra---	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Moderate: droughty, slope.
192*, 193*: Psamments.						
Fluvents.						
194*. Riverwash						
195*: Rock outcrop.						
Lithic Haploxerolls.						
196, 197--- Salinas	Slight---	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
198--- Salinas	Slight---	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.
199--- San Simeon	Moderate: depth to rock, too clayey.	Slight---	Moderate: depth to rock.	Moderate: slope.	Slight---	Moderate: droughty, thin layer.
200--- San Simeon	Moderate: depth to rock, too clayey, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, thin layer.
201, 202--- San Simeon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
203, 204---------- Santa Lucia	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
205---------- Santa Lucia	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: small stones.
206---------- Santa Lucia	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: small stones.
207---------- Santa Lucia	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
208---------- Still	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: small stones, slope.
209---------- Still	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: small stones.
210---------- Still	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Moderate: small stones.
211---------- Still	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
212---------- Suey	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
213---------- Suey	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
214, 215---------- Suey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
216---------- Tierra	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Moderate: droughty.
217---------- Tierra	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Moderate: slope.
218---------- Tierra	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
219---------- Tujunga	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: droughty, floods.
220---------- Tujunga	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
221*: Xererts. Xerolls. Urban land.						
222*, 223*. Xerorthents						

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
224---------- Zaca	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: too clayey.
225, 226, 227----- Zaca	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
101*. Aquolls					
102---------- Arnold	Severe: poor filter.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: seepage, too sandy.
103---------- Arnold	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
104---------- Baywood	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
105---------- Baywood	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
106---------- Baywood	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
107*. Beaches					
108---------- Briones	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, seepage, too sandy.
109*: Briones----------	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, seepage, too sandy.
Pismo----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
110*: Briones----------	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, seepage, too sandy.
Tierra----------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
111---------- Camarillo	Severe: wetness.	Severe: seepage, floods, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness, thin layer.
112---------- Camarillo	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Slight----------	Fair: too clayey, thin layer.

See footnote at end of table.

TABLE 9.--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
113---------- Capistrano	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
114---------- Capistrano	Slight----------	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Good.
115---------- Chamise	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: small stones.
116---------- Chamise	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
117---------- Chamise	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Poor: small stones.
118*:					
Cieneba----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Kinkel Variant-----	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
119*:					
Cieneba----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Millsap----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
120---------- Concepcion	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
121---------- Concepcion	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
122---------- Concepcion	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
123---------- Concepcion	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
124---------- Corralitos	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
125---------- Corralitos	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
126---------- Corralitos Variant	Severe: floods, wetness, poor filter.	Severe: seepage, floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 9.--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
127---------- Cropley	Severe: percs slowly.	Slight----------	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
128---------- Cropley	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
129---------- Diablo	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
130*: Diablo----------	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: slope, depth to rock.	Poor: too clayey, hard to pack.
Cibo----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
131*, 132*: Diablo----------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, slope, hard to pack.
Cibo----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
133*: Diablo----------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, slope, hard to pack.
Lodo----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
134*. Dune land					
135---------- Elder	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
136---------- Elder	Slight----------	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Good.
137---------- Elder	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
138, 139---------- Elder	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
140---------- Garey	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: too sandy, thin layer.

See footnote at end of table.

TABLE 9.--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
141, 142---------- Gaviota	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
143*, 144*, 145*: Gazos----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Lodo----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
146*: Henneke----------	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, large stones.
Rock outcrop.					
147---------- Lodo	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
148, 149, 150------- Lodo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
151*, 152*: Lodo----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
153*, 154*: Lompico----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
McMullin----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
155, 156---------- Lopez	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
157*: Lopez----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Rock outcrop.					
158, 159---------- Los Osos	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
160, 161---------- Los Osos	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--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
162*:					
Los Osos	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Diablo	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
163*:					
Los Osos	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Diablo	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: slope, depth to rock.	Poor: too clayey, hard to pack.
164*, 165*:					
Los Osos	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Diablo	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, slope, hard to pack.
166*, 167*:					
Los Osos	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Lodo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
168 Los Osos Variant	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
169 Marimel	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: too clayey, wetness.
170 Marimel	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
171 Millsap	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
172*:					
Millsap	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					

See footnote at end of table.

TABLE 9.--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
173---------- Mocho	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, thin layer.
174---------- Mocho	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
175---------- Mocho	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, thin layer.
176---------- Mocho Variant	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
177, 178, 179------- Nacimiento	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
180*, 181*, 182*: Nacimiento--------- Calodo----------	Severe: depth to rock, percs slowly, slope. Severe: depth to rock, slope.	Severe: depth to rock, slope. Severe: depth to rock, slope.	Severe: depth to rock, slope. Severe: depth to rock, slope.	Severe: depth to rock, slope. Severe: depth to rock, slope.	Poor: area reclaim, slope. Poor: area reclaim, slope.
183*: Obispo---------- Rock outcrop.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, slope.
184---------- Oceano	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
185---------- Oceano	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
186---------- Perkins	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----------	Poor: too clayey, small stones.
187, 188---------- Perkins	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, small stones, slope.
189---------- Pismo	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
190*: Pismo---------- Rock outcrop.	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 9.--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
191*: Pismo	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
Tierra	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
192*, 193*: Psamments.					
Fluvents.					
194*. Riverwash					
195*: Rock outcrop.					
Lithic Haploxerolls.					
196--- Salinas	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight---	Fair: too clayey.
197--- Salinas	Severe: percs slowly.	Slight---	Moderate: too clayey.	Slight---	Fair: too clayey.
198--- Salinas	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight---	Fair: too clayey.
199--- San Simeon	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
200--- San Simeon	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
201, 202--- San Simeon	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
203, 204--- Santa Lucia	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.
205, 206--- Santa Lucia	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, small stones.
207--- Santa Lucia	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.

See footnote at end of table.

TABLE 9.--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
208---------- Still	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
209---------- Still	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: too clayey, small stones.
210---------- Still	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, small stones.
211---------- Still	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
212---------- Suey	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
213---------- Suey	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
214, 215---------- Suey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
216---------- Tierra	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
217---------- Tierra	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
218---------- Tierra	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
219, 220---------- Tujunga	Severe: floods, poor filter.	Severe: seepage, floods.	Severe: floods, seepage, too sandy.	Severe: floods, seepage.	Poor: seepage, too sandy.
221*: Xererts. Xerolls. Urban land.					
222*, 223*. Xerorthents					
224---------- Zaca	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
225, 226, 227------- Zaca	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
101*. Aquolls				
102---------- Arnold	Fair: area reclaim, thin layer.	Improbable: thin layer.	Improbable: too sandy.	Fair: slope, too sandy.
103---------- Arnold	Poor: slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: slope.
104, 105---------- Baywood	Good----------	Probable----------	Improbable: too sandy.	Poor: too sandy.
106---------- Baywood	Fair: slope.	Probable----------	Improbable: too sandy.	Poor: too sandy, slope.
107*. Beaches				
108---------- Briones	Poor: area reclaim, slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: slope.
109*: Briones----------	Poor: area reclaim.	Improbable: thin layer.	Improbable: too sandy.	Poor: slope.
Pismo----------	Poor: area reclaim.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, slope.
110*: Briones----------	Poor: area reclaim, slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: slope.
Tierra----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
111---------- Camarillo	Fair: wetness.	Probable----------	Improbable: too sandy.	Good.
112---------- Camarillo	Good----------	Probable----------	Improbable: too sandy.	Good.
113, 114---------- Capistrano	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
115---------- Chamise	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
116---------- Chamise	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
117---------- Chamise	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
118*:				
Cieneba	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Kinkel Variant	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
119*:				
Cieneba	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Millsap	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
120, 121 Concepcion	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
122 Concepcion	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
123 Concepcion	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
124, 125 Corralitos	Good	Probable	Improbable: too sandy.	Poor: too sandy.
126 Corralitos Variant	Fair: wetness.	Probable	Improbable: too sandy.	Poor: thin layer.
127, 128 Cropley	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
129 Diablo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
130*:				
Diablo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Cibo	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
131*:				
Diablo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Cibo	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
132*:				
Diablo	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
132*:				
Cibo	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
133*:				
Diablo	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Lodo	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
134*. Dune land				
135, 136 Elder	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
137 Elder	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
138, 139 Elder	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
140 Garey	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
141, 142 Gaviota	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
143*:				
Gazos	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Lodo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
144*, 145*:				
Gazos	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Lodo	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
146*:				
Henneke	Poor: area reclaim, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones.
Rock outcrop.				
147 Lodo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
148---------- Lodo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
149, 150---------- Lodo	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
151*: Lodo----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
152*: Lodo----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
153*: Lompico----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
McMullin----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
154*: Lompico----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
McMullin----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
155, 156---------- Lopez	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
157*: Lopez----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Rock outcrop.				
158, 159---------- Los Osos	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
160---------- Los Osos	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
161---------- Los Osos	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
162*, 163*: Los Osos	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Diablo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
164*: Los Osos	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Diablo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
165*: Los Osos	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Diablo	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
166*: Los Osos	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Lodo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
167*: Los Osos	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Lodo	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
168 Los Osos Variant	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
169 Marimel	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
170 Marimel	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
171 Millsap	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
172*: Millsap	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
173--- Mocho	Good	Probable	Probable	Fair: small stones, area reclaim.
174--- Mocho	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
175--- Mocho	Good	Probable	Probable	Fair: too clayey, small stones, area reclaim.
176--- Mocho Variant	Good	Probable	Probable	Poor: small stones.
177, 178--- Nacimiento	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
179--- Nacimiento	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
180*: Nacimiento---	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Calodo---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
181*, 182*: Nacimiento---	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Calodo---	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
183*: Obispo---	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, small stones.
Rock outcrop.				
184--- Oceano	Good	Probable	Improbable: too sandy.	Poor: too sandy.
185--- Oceano	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
186--- Perkins	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
187, 188--- Perkins	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
189--- Pismo	Poor: area reclaim.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, slope.
190*: Pismo---	Poor: area reclaim, slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim, slope.
Rock outcrop.				
191*: Pismo---	Poor: area reclaim.	Improbable: thin layer.	Improbable: too sandy.	Poor: area reclaim.
Tierra---	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
192*, 193*: Psamments.				
Fluvents.				
194*. Riverwash				
195*: Rock outcrop.				
Lithic Haploxerolls.				
196--- Salinas	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
197, 198--- Salinas	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
199--- San Simeon	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
200--- San Simeon	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
201--- San Simeon	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
202--- San Simeon	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
203, 204--- Santa Lucia	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
205, 206---------- Santa Lucia	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
207---------- Santa Lucia	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
208---------- Still	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
209---------- Still	Good----------	Probable----------	Probable----------	Poor: small stones.
210---------- Still	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
211---------- Still	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
212---------- Suey	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
213---------- Suey	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
214---------- Suey	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
215---------- Suey	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
216, 217---------- Tierra	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
218---------- Tierra	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
219, 220---------- Tujunga	Good----------	Probable----------	Probable----------	Fair: small stones, too sandy.
221*: Xererts. Xerolls. Urban land.				
222*, 223*. Xerorthents				
224---------- Zaca	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
225---------- Zaca	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
226, 227---------- Zaca	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
101*. Aquolls						
102, 103---------- Arnold	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
104---------- Baywood	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
105, 106---------- Baywood	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
107*. Beaches						
108---------- Briones	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock too sandy.	Slope, droughty, depth to rock.
109*: Briones----------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock too sandy.	Slope, droughty, depth to rock.
Pismo----------	Severe: depth to rock, slope.	Severe: thin layer, seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock too sandy.	Slope, droughty, depth to rock.
110*: Briones----------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock too sandy.	Slope, droughty, depth to rock.
Tierra----------	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Droughty, soil blowing, percs slowly.	Slope, erodes easily soil blowing.	Slope, erodes easily droughty.
111---------- Camarillo	Severe: seepage.	Severe: piping.	Favorable-----	Wetness, soil blowing, excess salt.	Wetness, soil blowing.	Favorable.
112---------- Camarillo	Moderate: seepage.	Severe: piping.	Deep to water	Excess salt---	Favorable-----	Favorable.
113, 114---------- Capistrano	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing	Favorable.
115, 116---------- Chamise	Severe: slope.	Slight---------	Deep to water	Droughty, percs slowly, slope.	Slope---------	Slope, droughty, percs slowly.
117---------- Chamise	Moderate: slope.	Slight---------	Deep to water	Droughty, percs slowly, slope.	Favorable-----	Droughty, percs slowly.
118*: Cieneba----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
118*: Kinkel Variant	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
119*: Cieneba	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
Millsap	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock	Slope, depth to rock percs slowly.	Slope, droughty, depth to rock.
120, 121 Concepcion	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
122, 123 Concepcion	Severe: slope.	Moderate: piping.	Deep to water	Percs slowly	Slope, percs slowly.	Slope, percs slowly.
124 Corralitos	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
125 Corralitos	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
126 Corralitos Variant	Severe: seepage.	Severe: seepage, piping.	Floods, cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
127 Cropley	Slight	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly.	Percs slowly	Percs slowly.
128 Cropley	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Percs slowly	Percs slowly.
129 Diablo	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Percs slowly	Percs slowly.
130*, 131*, 132*: Diablo	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Cibo	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Slow intake, percs slowly, depth to rock	Slope, large stones, depth to rock	Large stones, slope, depth to rock.
133*: Diablo	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Lodo	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
134*. Dune land						
135, 136 Elder	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
137---------- Elder	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, erodes easily soil blowing.	Slope, erodes easily.
138---------- Elder	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Erodes easily, soil blowing.	Erodes easily.
139---------- Elder	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
140---------- Garey	Moderate: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing.	Erodes easily, too sandy.	Erodes easily, droughty.
141, 142---------- Gaviota	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Droughty, depth to rock slope.	Slope, depth to rock erodes easily	Slope, erodes easily, droughty.
143*, 144*, 145*: Gazos----------	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily	Slope, depth to rock erodes easily	Slope, erodes easily, depth to rock.
Lodo----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
146*: Henneke----------	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty.	Slope, large stones, depth to rock	Large stones, slope, droughty.
Rock outcrop.						
147, 148, 149, 150---------- Lodo	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
151*, 152*: Lodo----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
Rock outcrop.						
153*, 154*: Lompico----------	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
McMullin----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock	Large stones, slope, depth to rock.
155, 156---------- Lopez	Severe: depth to rock.	Severe: thin layer, seepage.	Deep to water	Droughty, depth to rock	Depth to rock	Droughty, depth to rock.
157*: Lopez----------	Severe: depth to rock.	Severe: thin layer, seepage.	Deep to water	Droughty, depth to rock	Depth to rock	Droughty, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
158---------- Los Osos	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock slope.	Depth to rock, erodes easily	Erodes easily, depth to rock.
159, 160, 161----- Los Osos	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock slope.	Slope, depth to rock erodes easily	Slope, erodes easily depth to rock.
162*: Los Osos----------	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock slope.	Depth to rock, erodes easily	Erodes easily, depth to rock.
Diablo----------	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Percs slowly	Percs slowly.
163*, 164*, 165*: Los Osos----------	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock slope.	Slope, depth to rock erodes easily	Slope, erodes easily, depth to rock.
Diablo----------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
166*, 167*: Los Osos----------	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock slope.	Slope, depth to rock erodes easily	Slope, erodes easily. depth to rock.
Lodo----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
168---------- Los Osos Variant	Severe: slope.	Moderate: piping.	Deep to water	Percs slowly, slope.	Slope---------	Slope, percs slowly.
169---------- Marimel	Slight---------	Severe: piping.	Floods--------	Wetness, floods.	Erodes easily, wetness.	Erodes easily.
170---------- Marimel	Slight---------	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
171---------- Millsap	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock	Slope, depth to rock percs slowly.	Slope, droughty, depth to rock.
172*: Millsap----------	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock	Slope, depth to rock percs slowly.	Slope, droughty, depth to rock.
Rock outcrop.						
173---------- Mocho	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing	Erodes easily, soil blowing.	Erodes easily.
174, 175---------- Mocho	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
176---------- Mocho Variant	Severe: seepage.	Severe: seepage.	Deep to water	Soil blowing	Too sandy, soil blowing.	Favorable.
177, 178, 179----- Nacimiento	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
180*, 181*, 182*: Nacimiento	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
Calodo	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock	Slope, depth to rock.
183*: Obispo	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock	Slope, depth to rock percs slowly.	Slope, depth to rock.
Rock outcrop.						
184 Oceano	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
185 Oceano	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
186 Perkins	Moderate: seepage, slope.	Slight	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
187 Perkins	Severe: slope.	Slight	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
188 Perkins	Severe: slope.	Slight	Deep to water	Droughty, percs slowly, slope.	Slope, percs slowly.	Slope, droughty, percs slowly.
189 Pismo	Severe: depth to rock, slope.	Severe: thin layer, seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock too sandy.	Slope, droughty, depth to rock.
190*: Pismo	Severe: depth to rock, slope.	Severe: thin layer, seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock too sandy.	Slope, droughty, depth to rock.
Rock outcrop.						
191*: Pismo	Severe: depth to rock, slope.	Severe: thin layer, seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock too sandy.	Slope, droughty, depth to rock.
Tierra	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Droughty, soil blowing, percs slowly.	Slope, erodes easily soil blowing.	Slope, erodes easily, droughty.
192*, 193*: Psamments.						
Fluvents.						
194*. Riverwash						

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
195*: Rock outcrop. Lithic Haploxerolls.						
196--- Salinas	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
197--- Salinas	Slight---	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
198--- Salinas	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily	Erodes easily	Erodes easily.
199--- San Simeon	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Droughty, percs slowly, depth to rock	Depth to rock	Droughty, depth to rock.
200, 201, 202--- San Simeon	Severe: slope.	Severe: piping.	Deep to water	Droughty, percs slowly, depth to rock	Slope, depth to rock	Slope, droughty, depth to rock.
203, 204--- Santa Lucia	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock slope.	Slope, depth to rock	Slope, droughty, depth to rock.
205--- Santa Lucia	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock slope.	Depth to rock	Droughty, depth to rock.
206, 207--- Santa Lucia	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock slope.	Slope, depth to rock	Slope, droughty, depth to rock.
208--- Still	Severe: slope.	Severe: piping.	Deep to water	Slope---	Slope---	Slope.
209--- Still	Moderate: seepage.	Severe: piping.	Deep to water	Favorable---	Favorable---	Favorable.
210--- Still	Moderate: slope.	Severe: piping.	Deep to water	Slope---	Favorable---	Favorable.
211--- Still	Severe: slope.	Severe: piping.	Deep to water	Slope---	Slope---	Slope.
212--- Suey	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily	Erodes easily	Erodes easily.
213, 214, 215--- Suey	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily	Slope, erodes easily	Slope, erodes easily.
216--- Tierra	Moderate: slope.	Moderate: thin layer, piping.	Deep to water	Droughty, soil blowing, percs slowly.	Erodes easily, soil blowing.	Erodes easily, droughty.
217, 218--- Tierra	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Percs slowly	Slope, erodes easily	Slope, erodes easily.
219, 220--- Tujunga	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
221*: Xererts. Xerolls. Urban land.						
222*, 223*. Xerorthents						
224, 225, 226, 227---------- Zaca	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--ENGINEERING INDEX PROPERTIES

[The symbol > means greater than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
101*. Aquolls											
102, 103---------- Arnold	0-33	Loamy sand--------	SM	A-2	0	90-100	85-100	50-80	20-35	---	NP
	33-59	Sand, loamy sand	SP-SM, SM	A-1, A-2, A-3	0	90-100	85-100	40-80	5-30	---	NP
	59	Weathered bedrock	---	---	---	---	---	---	---	---	---
104, 105, 106---- Baywood	0-13	Fine sand---------	SP-SM, SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
	13-90	Fine sand, sand	SP-SM, SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
107*. Beaches											
108---------- Briones	0-26	Loamy sand--------	SP-SM, SM	A-1, A-2, A-3	0	90-100	85-100	40-80	5-30	---	NP
	26-32	Sand, loamy sand	SP-SM, SM	A-1, A-2, A-3	0	90-100	85-100	40-80	5-30	---	NP
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
109*: Briones----------	0-26	Loamy sand--------	SP-SM, SM	A-1, A-2, A-3	0	90-100	85-100	40-80	5-30	---	NP
	26-32	Sand, loamy sand	SP-SM, SM	A-1, A-2, A-3	0	90-100	85-100	40-80	5-30	---	NP
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
Pismo----------	0-19	Loamy sand--------	SM	A-2	0	100	100	50-75	15-30	---	NP
	19	Weathered bedrock	---	---	---	---	---	---	---	---	---
110*: Briones----------	0-26	Loamy sand--------	SP-SM, SM	A-1, A-2, A-3	0	90-100	85-100	40-80	5-30	---	NP
	26-32	Sand, loamy sand	SP-SM, SM	A-1, A-2, A-3	0	90-100	85-100	40-80	5-30	---	NP
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tierra----------	0-11	Sandy loam--------	SM-SC, SM	A-4	0	90-100	80-100	55-75	35-50	15-25	NP-10
	11-42	Clay, clay loam, sandy clay.	CH, CL	A-6, A-7	0	100	85-100	70-100	50-95	35-55	15-30
	42-60	Clay loam, sandy clay loam.	CL, SC	A-6	0	95-100	80-100	70-95	45-75	25-40	10-20
111---------- Camarillo	0-12	Sandy loam--------	SM	A-2, A-4	0	95-100	95-100	60-70	30-50	10-20	NP-5
	12-84	Stratified loamy fine sand to silty clay loam.	CL-ML, SM-SC, SC, CL	A-4, A-6	0	95-100	95-100	85-95	45-65	15-25	5-15
112---------- Camarillo	0-12	Loam----------	ML, CL-ML	A-4	0	95-100	95-100	65-75	50-60	20-30	NP-10
	12-84	Stratified loamy fine sand to silty clay loam.	CL-ML, SM-SC, CL, SC	A-4, A-6	0	95-100	95-100	85-95	35-65	15-25	5-15
113, 114--------- Capistrano	0-37	Sandy loam--------	SM	A-2, A-4	0	95-100	95-100	50-85	25-45	15-25	NP-5
	37-60	Fine sandy loam, sandy loam, coarse sandy loam.	SM	A-2, A-4	0	95-100	95-100	50-85	25-50	15-25	NP-5

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
115---------- Chamise	0-12	Shaly loam-------	SM-SC, SC, GC, GM-GC,	A-2, A-4, A-6	0	60-85	50-75	40-60	25-45	25-40	5-15
	12-22	Very shaly clay, very shaly clay loam.	GC,SC	A-2, A-7	0	50-80	30-50	25-45	20-40	40-60	15-35
	22-60	Very shaly clay loam, shaly sandy clay loam, shaly clay loam.	GC, SC	A-2, A-6	0	50-90	30-65	25-50	25-45	30-40	10-20
116---------- Chamise	0-12	Shaly loam-------	SM-SC, SC, GC, GM-GC	A-2, A-4, A-6	0	60-85	50-75	40-60	25-45	25-40	5-15
	12-22	Very shaly clay	GC, SC	A-2, A-7	0	50-80	30-50	25-45	25-40	45-60	20-35
	22-60	Very shaly clay loam, shaly sandy clay loam, shaly clay loam.	GC, SC	A-2, A-6	0	50-90	30-65	25-50	25-45	30-40	10-20
117---------- Chamise	0-12	Shaly sandy clay loam.	SM-SC, SC, GC, GM-GC	A-2, A-4, A-6	0	60-85	50-75	40-60	25-45	25-40	5-15
	12-22	Very shaly clay	GC, SC	A-2, A-7	0	50-80	30-50	25-45	25-40	45-60	20-35
	22-60	Very shaly clay loam, shaly sandy clay loam, shaly clay loam.	GC, SC	A-2, A-6	0	50-90	30-65	25-50	25-45	30-40	10-20
118*:											
Cieneba----------	0-11	Loam----------	SM, ML	A-4	0	90-100	75-95	60-80	45-60	20-25	NP-5
	11	Weathered bedrock	---	---	---	---	---	---	---	---	---
Kinkel Variant--	0-8	Loam----------	CL-ML	A-4	0-5	85-100	85-95	75-95	55-75	20-30	5-10
	8-19	Cobbly loam------	SM-SC	A-4	25-35	75-85	70-80	55-70	40-50	20-30	5-10
	19-41	Very cobbly loam	GM-GC, SM-SC, SM, GM	A-2, A-4	50-60	65-75	50-65	35-50	30-40	25-35	5-10
	41-52	Very gravelly loam, very gravelly sandy loam.	GP-GC	A-2	5-10	20-25	10-20	5-10	5-10	20-30	5-10
	52	Weathered bedrock	---	---	---	---	---	---	---	---	---
119*:											
Cieneba----------	0-11	Loam----------	SM, ML	A-4	0	90-100	75-95	60-80	45-60	20-25	NP-5
	11	Weathered bedrock	---	---	---	---	---	---	---	---	---
Millsap----------	0-8	Loam----------	CL-ML, ML	A-4	0	95-100	75-95	60-90	50-65	25-35	5-10
	8-19	Clay loam, clay, silty clay.	CL, CH	A-7	0	95-100	75-100	70-100	65-95	40-60	20-35
	19-27	Very gravelly clay loam, very gravelly clay, very gravelly silty clay.	GC	A-7, A-2	0	50-65	35-50	35-45	25-40	40-60	20-35
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
120, 121, 122, 123---------- Concepcion	0-19	Loam----------	ML	A-4	0	100	100	85-90	60-75	25-35	NP-10
	19-47	Clay, clay loam, sandy clay.	CH, CL	A-7	0	100	100	90-100	50-95	45-60	20-30
	47-63	Clay loam, sandy clay loam.	CL	A-6, A-7	0	100	100	80-100	50-80	30-45	10-20
124, 125---------- Corralitos	0-24	Sand----------	SM, SP-SM	A-1, A-2, A-3	0	95-100	75-100	40-75	5-25	---	NP
	24-60	Sand, fine sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	75-100	40-75	5-25	---	NP

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
126----------	0-13	Loamy sand-------	SM	A-1, A-2	0	95-100	75-100	45-90	15-35	---	NP
Corralitos Variant	13-60	Stratified sand to loamy sand.	SM, SP-SM	A-1, A-2, A-3	0	95-100	75-100	40-75	5-30	---	NP
127, 128---------	0-36	Clay-------------	CL, CH	A-7	0	100	95-100	80-100	70-95	40-60	20-35
Cropley	36-60	Clay loam, silty clay loam, clay.	CL, CH	A-7	0	100	95-100	80-100	70-95	40-60	20-35
129----------	0-38	Clay-------------	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
Diablo	38-58	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---
130*, 131*, 132*:											
Diablo----------	0-38	Clay-------------	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
	38-58	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cibo----------	0-31	Clay-------------	CH	A-7	0-25	95-100	95-100	90-100	75-90	50-65	30-40
	31-39	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-90	40-65	20-40
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
133*:											
Diablo----------	0-38	Clay-------------	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
	38-58	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---
Lodo----------	0-12	Clay loam--------	CL	A-6	0-5	90-100	85-100	70-95	60-80	25-35	10-20
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
134*.											
Dune land											
135, 136, 137----	0-37	Sandy loam-------	SM	A-2, A-4	0	80-100	75-100	50-70	30-50	10-20	NP-5
Elder	37-60	Sandy loam, fine sandy loam, loam.	SM	A-2, A-4	0	80-100	75-100	50-70	30-50	10-20	NP-5
138, 139---------	0-12	Sandy loam-------	SM	A-2, A-4	0	80-100	75-100	50-70	30-50	10-20	NP-5
Elder	12-60	Sandy loam, fine sandy loam, loam.	SM	A-2, A-4	0	80-100	75-100	50-70	30-50	10-20	NP-5
140----------	0-36	Sandy loam-------	SM	A-4	0	100	95-100	75-90	35-50	20-30	NP-5
Garey	36-64	Sandy loam, loamy sand, loam.	SM	A-4, A-2	0	100	100	60-95	30-50	20-30	NP-5
	64-75	Loamy sand, sand	SM	A-2	0	100	100	50-65	10-30	---	NP
141----------	0-13	Sandy loam-------	SM	A-4, A-2	0-5	75-100	70-100	55-70	30-50	20-30	NP-5
Gaviota	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
142----------	0-13	Fine sandy loam	SM	A-4, A-2	0-5	75-100	70-100	55-70	30-50	20-30	NP-5
Gaviota	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
143*, 144*, 145*:											
Gazos----------	0-30	Clay loam--------	CL	A-6	0	90-100	75-100	70-85	50-70	30-40	10-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lodo----------	0-12	Clay loam--------	CL	A-6	0-5	90-100	85-100	70-95	60-80	25-35	10-20
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--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	
146*:											
Henneke	0-8	Very cobbly clay loam.	GC	A-2	30-70	40-50	35-45	30-40	25-35	40-60	15-35
	8-19	Very cobbly clay, very cobbly clay loam.	GC	A-2	30-50	55-65	50-60	30-40	25-35	40-60	15-35
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
147, 148, 149, 150	0-12	Clay loam	CL	A-6	0-5	90-100	85-100	70-95	60-80	25-35	10-20
Lodo	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
151*, 152*:											
Lodo	0-12	Clay loam	CL	A-6	0-5	90-100	85-100	70-95	60-80	25-35	10-20
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
153*, 154*:											
Lompico	0-17	Loam	CL-ML	A-4	0-5	90-100	80-100	70-95	50-75	20-30	5-10
	17-32	Clay loam, sandy clay loam, loam.	CL, SC	A-6	0-5	75-100	75-100	65-95	45-70	20-40	10-20
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
McMullin	0-15	Gravelly loam	SM	A-4, A-2	0-25	70-80	65-75	45-65	25-50	20-30	NP-5
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
155, 156	0-18	Very shaly clay loam.	GM	A-1, A-2	0-15	25-40	20-35	20-30	15-30	30-50	5-15
Lopez	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
157*:											
Lopez	0-18	Very shaly clay loam.	GM	A-1, A-2	0-15	25-40	20-35	20-30	15-30	30-50	5-15
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
158, 159, 160, 161	0-14	Loam	ML, CL-ML	A-4	0	95-100	90-100	70-100	60-95	25-35	5-10
Los Osos	14-32	Silty clay, clay loam, clay.	CL, CH	A-7	0	95-100	90-100	75-100	55-90	45-60	20-30
	32-39	Sandy loam, loam, clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	90-100	75-100	50-90	35-60	25-35	5-15
	39	Weathered bedrock	---	---	---	---	---	---	---	---	---
162*, 163*, 164*, 165*:											
Los Osos	0-14	Loam	ML, CL-ML	A-4	0	95-100	90-100	70-100	60-95	25-35	5-10
	14-32	Silty clay, clay loam, clay.	CL, CH	A-7	0	95-100	90-100	75-100	55-90	45-60	20-30
	32-39	Sandy loam, loam, clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	90-100	75-100	50-90	35-60	25-35	5-15
	39	Weathered bedrock	---	---	---	---	---	---	---	---	---
Diablo	0-38	Clay	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
	38-58	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
166*, 167*:											
Los Osos	0-14	Loam	ML, CL-ML	A-4	0	95-100	90-100	70-100	60-95	25-35	5-10
	14-32	Silty clay, clay loam, clay.	CL, CH	A-7	0	95-100	90-100	75-100	55-90	45-60	20-30
	32-39	Sandy loam, loam, clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	90-100	75-100	50-90	35-60	25-35	5-15
	39	Weathered bedrock	---	---	---	---	---	---	---	---	---
Lodo	0-12	Clay loam	CL	A-6	0-5	90-100	85-100	70-95	60-80	25-35	10-20
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
168	0-12	Clay loam	CL	A-6	0	95-100	95-100	85-95	70-90	30-40	10-20
Los Osos Variant	12-27	Clay	CL, CH	A-7	0	95-100	95-100	85-100	75-95	45-60	20-30
	27-60	Clay loam	CL	A-7, A-6	0	95-100	95-100	85-95	70-80	30-50	10-25
169	0-16	Sandy clay loam	SC	A-6	0	90-100	80-90	70-90	35-50	30-40	10-20
Marimel	16-60	Stratified loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	90-100	90-100	80-100	50-85	25-40	5-20
170	0-16	Silty clay loam	CL	A-6	0	90-100	90-100	80-100	75-85	30-40	10-20
Marimel	16-60	Stratified loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	90-100	90-100	80-100	50-85	25-40	5-20
171	0-8	Loam	CL-ML, ML	A-4	0	95-100	75-95	60-90	50-65	25-35	5-10
Millsap	8-19	Clay loam, clay, silty clay.	CL, CH	A-7	0	95-100	75-100	70-100	65-95	40-60	20-35
	19-27	Very gravelly clay loam, very gravelly clay, very gravelly silty clay.	GC	A-7, A-2	0	50-65	35-50	35-45	25-40	40-60	20-35
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
172*:											
Millsap	0-8	Loam	CL-ML, ML	A-4	0	95-100	75-95	60-90	50-65	25-35	5-10
	8-19	Clay loam, clay, silty clay.	CL, CH	A-7	0	95-100	75-100	70-100	65-95	40-60	20-35
	19-27	Very gravelly clay loam, very gravelly clay, very gravelly silty clay.	GC	A-7, A-2	0	50-65	35-50	35-45	25-40	40-60	20-35
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
173	0-18	Fine sandy loam	SM	A-2, A-4	0	80-100	75-100	50-70	25-50	20-30	NP-5
Mocho	18-45	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	80-100	75-100	70-100	60-85	25-40	5-20
	45-60	Stratified sand to gravelly sand.	SP-SM	A-1	0	60-90	50-85	25-50	5-10	---	NP
174	0-18	Loam	CL-ML, CL	A-4, A-6	0	80-100	75-100	70-95	60-80	20-40	5-15
Mocho	18-60	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	80-100	75-100	70-100	65-85	25-40	5-20

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
175---------- Mocho	0-18	Silty clay loam	CL	A-6	0	80-100	75-100	70-100	70-85	30-40	10-20
	18-38	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	80-100	75-100	50-70	25-50	20-30	NP-5
	38-45	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	80-100	75-100	70-100	60-85	25-40	5-20
	45-60	Stratified sand to gravelly sand.	SP-SM	A-1	0	60-90	50-85	25-50	5-10	---	NP
176---------- Mocho Variant	0-15	Fine sandy loam	SM	A-4	0	90-100	75-100	50-70	35-50	20-30	NP-5
	15-33	Very fine sandy loam.	SM, ML	A-4	0	90-100	75-100	75-90	40-60	20-30	NP-5
	33-64	Stratified sand to gravelly sand.	SP-SM	A-1	0	60-90	50-85	25-50	5-10	---	NP
177, 178, 179---- Nacimiento	0-19	Silty clay loam	CL, ML	A-6, A-7	0	80-100	75-100	70-95	65-85	35-45	10-20
	19-39	Clay loam, silty clay loam, loam.	CL, ML	A-6, A-7	0	80-100	75-100	70-95	65-85	35-45	10-20
	39	Weathered bedrock	---	---	---	---	---	---	---	---	---
180*, 181*, 182*: Nacimiento------	0-19	Silty clay loam	CL, ML	A-6, A-7	0	80-100	75-100	70-95	65-85	35-45	10-20
	19-39	Clay loam, silty clay loam, loam.	CL, ML	A-6, A-7	0	80-100	75-100	70-95	65-85	35-45	10-20
	39	Weathered bedrock	---	---	---	---	---	---	---	---	---
Calodo----------	0-16	Loam----------	CL-ML, CL	A-4, A-6	0-5	85-95	80-95	70-90	55-75	25-35	5-15
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
183*: Obispo----------	0-11	Clay----------	CL, CH	A-7	0-5	90-100	75-100	70-95	65-90	45-60	20-35
	11-18	Weathered bedrock	---	---	---	---	---	---	---	---	---
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
184, 185---------- Oceano	0-29	Sand----------	SP-SM, SM	A-2, A-3	0	100	100	50-65	5-25	---	NP
	29-60	Sand, loamy sand	SP-SM, SM	A-2, A-3	0	100	100	50-65	5-25	---	NP
186, 187---------- Perkins	0-17	Fine sandy loam	SM	A-4	0-5	80-100	75-95	50-75	35-50	20-30	NP-5
	17-32	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	80-100	75-95	60-85	60-75	25-40	5-15
	32-47	Gravelly clay loam, gravelly clay.	GC, SC, CL	A-7	0-5	55-80	50-75	50-70	45-60	40-50	20-25
	47-84	Stratified very gravelly sandy loam to very gravelly clay loam.	GM-GC, GC	A-1, A-2	5-20	30-60	25-50	20-50	15-35	20-40	5-15
188---------- Perkins	0-17	Gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-10	55-80	50-75	35-60	20-40	20-30	NP-5
	17-32	Gravelly loam, gravelly clay loam.	SM-SC, GM-GC, GC, CL	A-4, A-6	0-10	55-80	50-75	50-70	35-55	25-40	5-15
	32-47	Gravelly clay loam, gravelly sandy clay loam.	GC, SC, CL	A-6	0-10	55-80	50-75	50-70	35-55	25-40	10-20
	47-84	Stratified very gravelly sandy loam to very gravelly clay loam.	GM-GC, GC	A-1, A-2	5-20	30-60	25-50	20-50	15-35	20-40	5-15

See footnote at end of table.

TABLE 12.--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	
189----------	0-19	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
Pismo	19	Weathered bedrock	---	---	---	---	---	---	---	---	---
190*:											
Pismo----------	0-19	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	19	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
191*:											
Pismo----------	0-19	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	19	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tierra----------	0-11	Sandy loam-------	SM-SC, SM	A-4	0	90-100	80-100	55-75	35-50	15-25	NP-10
	11-42	Clay, clay loam, sandy clay.	CH, CL	A-6, A-7	0	100	85-100	70-100	50-95	35-55	15-30
	42-60	Clay loam, sandy clay loam.	CL, SC	A-6	0	95-100	80-100	70-95	45-75	25-40	10-20
192*, 193*:											
Psamments.											
Fluvents.											
194*.											
Riverwash											
195*:											
Rock outcrop.											
Lithic Haploxerolls.											
196----------	0-29	Loam----------	ML	A-4	0	100	95-100	90-100	60-80	25-35	NP-10
Salinas	29-72	Stratified sandy loam to clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	100	95-100	60-100	35-70	20-40	5-20
197, 198----------	0-29	Silty clay loam	CL	A-6	0	100	95-100	90-100	70-85	30-40	10-20
Salinas	29-72	Stratified loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	100	95-100	90-100	60-85	25-40	5-20
199, 200, 201, 202----------	0-24	Sandy loam-------	SM	A-4	0	90-100	75-95	50-80	35-50	20-30	NP-5
San Simeon	24-34	Clay, sandy clay	CH, CL	A-7	0	100	100	90-100	50-95	45-60	20-30
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
203, 204----------	0-17	Shaly clay loam	GC, CL, CH	A-6, A-7	0-5	55-80	50-75	45-70	35-60	35-55	15-25
Santa Lucia	17-36	Very shaly clay loam, very shaly clay.	GC	A-2	0-5	30-65	25-50	20-45	10-35	35-55	15-25
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
205, 206, 207----	0-17	Very shaly clay loam.	GC	A-2	0-5	30-65	25-50	20-45	10-35	35-55	15-25
Santa Lucia	17-36	Very shaly clay loam, very shaly clay.	GC	A-2	0-5	30-65	25-50	20-45	10-35	35-55	15-25
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
208---------- Still	0-23	Gravelly loam----	SC, SM-SC, GC, GM-GC	A-4, A-6	0	55-80	50-75	40-65	35-50	20-35	5-15
	23-64	Stratified gravelly clay loam to gravelly loam.	GC, CL, GM-GC, CL-ML	A-4, A-6	0	55-80	50-75	40-70	35-55	20-40	5-20
209---------- Still	0-40	Gravelly sandy clay loam.	SC, CL, GC	A-6	0	55-80	50-75	45-70	35-55	25-40	10-20
	40-64	Gravelly sand----	SM, SP-SM	A-1	0	60-80	50-75	35-50	5-15	---	NP
210, 211--------- Still	0-23	Gravelly sandy clay loam.	SC, CL, GC	A-6	0	55-80	50-75	45-70	35-55	25-40	10-20
	23-64	Stratified gravelly clay loam to gravelly loam.	GC, CL, GM-GC, CL-ML	A-4, A-6	0	55-80	50-75	40-70	35-55	20-40	5-20
212, 213, 214, 215---------- Suey	0-21	Silt loam--------	ML	A-4	0	100	100	90-100	75-95	25-35	NP-10
	21-40	Silt loam, very fine sandy loam.	ML	A-4	0	100	100	90-100	75-95	25-35	NP-10
	40-80	Fine sandy loam, very fine sandy loam, silt loam.	ML	A-4	0	100	100	80-100	50-90	25-35	NP-10
216---------- Tierra	0-11	Sandy loam-------	SM-SC, SM	A-4	0	90-100	80-100	55-75	35-50	15-25	NP-10
	11-42	Clay, clay loam, sandy clay.	CH, CL	A-6, A-7	0	100	85-100	70-100	50-95	35-55	15-30
	42-60	Clay loam, sandy clay loam.	CL, SC	A-6	0	95-100	80-100	70-95	45-75	25-40	10-20
217, 218--------- Tierra	0-11	Loam----------	CL, CL-ML	A-4, A-6	0	95-100	80-100	70-95	50-65	20-35	5-15
	11-42	Clay, clay loam, sandy clay.	CH, CL	A-6, A-7	0	100	85-100	70-100	50-95	35-55	15-30
	42-60	Clay loam, sandy clay loam.	CL, SC	A-6	0	95-100	80-100	70-95	45-75	25-40	10-20
219, 220--------- Tujunga	0-11	Loamy sand-------	SW-SM, SM, SP-SM	A-1, A-2, A-3	0-5	90-100	75-95	40-70	5-25	---	NP
	11-31	Loamy sand, fine sand, sand.	SW-SM, SM, SP-SM	A-1, A-2, A-3	0-5	90-100	75-95	40-70	5-25	---	NP
	31-82	Stratified gravelly sand to gravelly loamy sand.	SP, SW-SM, SM, SP-SM	A-1	0-5	60-80	50-75	20-50	0-20	---	NP
221*: Xererts.											
Xerolls.											
Urban land.											
222*, 223*. Xerorthents											
224, 225, 226, 227---------- Zaca	0-36	Clay----------	CH	A-7	0	100	100	90-100	75-95	50-60	30-35
	36-54	Silty clay-------	CH	A-7	0	100	100	95-100	90-95	50-60	30-35
	54	Weathered bedrock	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less 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 <2mm	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	Pct	In/hr	In/in	pH					Pct
101*. Aquolls										
102, 103---------- Arnold	0-33	0-10	6.0-20	0.07-0.09	5.1-6.5	Low----------	0.15	4	2	.5-1
	33-59	0-10	6.0-20	0.05-0.09	5.1-6.5	Low----------	0.15			
	59	---	---	---	---	----------	----			
104, 105, 106---- Baywood	0-13	0-5	6.0-20	0.05-0.07	5.1-7.3	Low----------	0.15	5	1	1-4
	13-90	0-5	6.0-20	0.04-0.05	5.1-7.3	Low----------	0.15			
107*. Beaches										
108---------- Briones	0-26	0-5	6.0-20	0.05-0.08	5.6-6.5	Low----------	0.15	2	2	.5-1
	26-32	0-5	6.0-20	0.05-0.08	5.6-6.5	Low----------	0.15			
	32	---	---	---	---	----------	----			
109*: Briones----------	0-26	0-5	6.0-20	0.05-0.08	5.6-6.5	Low----------	0.15	2	2	.5-1
	26-32	0-5	6.0-20	0.05-0.08	5.6-6.5	Low----------	0.15			
	32	---	---	---	---	----------	----			
Pismo----------	0-19	0-5	6.0-20	0.06-0.08	5.1-6.5	Low----------	0.10	1	2	<1
	19	---	---	---	---	----------	----			
110*: Briones----------	0-26	0-5	6.0-20	0.05-0.08	5.6-6.5	Low----------	0.15	2	2	.5-1
	26-32	0-5	6.0-20	0.05-0.08	5.6-6.5	Low----------	0.15			
	32	---	---	---	---	----------	----			
Tierra----------	0-11	10-20	0.6-2.0	0.09-0.13	5.1-6.5	Low----------	0.32	1	3	1-5
	11-42	35-50	<0.06	0.02-0.04	5.6-7.3	High----------	0.28			
	42-60	25-35	0.06-0.2	0.15-0.18	5.6-8.4	Moderate-----	0.37			
111---------- Camarillo	0-12	8-20	2.0-6.0	0.10-0.13	7.9-8.4	Low----------	0.32	5	3	1-4
	12-84	18-30	0.6-2.0	0.13-0.17	7.9-8.4	Low----------	0.32			
112---------- Camarillo	0-12	10-27	0.6-2.0	0.13-0.15	7.4-8.4	Low----------	0.32	5	4L	1-4
	12-84	18-30	0.6-2.0	0.13-0.17	7.4-8.4	Low----------	0.32			
113, 114---------- Capistrano	0-37	8-18	2.0-6.0	0.10-0.12	5.6-6.5	Low----------	0.24	5	3	1-3
	37-60	8-18	2.0-6.0	0.10-0.13	6.1-7.3	Low----------	0.28			
115---------- Chamise	0-12	20-25	0.6-2.0	0.10-0.14	5.1-6.5	Moderate-----	0.24	5	8	2-7
	12-22	35-55	<0.06	0.05-0.08	4.5-6.0	Moderate-----	0.17			
	22-60	20-35	0.2-0.6	0.07-0.14	4.5-6.0	Moderate-----	0.17			
116, 117---------- Chamise	0-12	20-25	0.6-2.0	0.10-0.14	5.1-6.5	Moderate-----	0.24	5	8	2-7
	12-22	40-55	<0.06	0.05-0.07	4.5-6.0	Moderate-----	0.17			
	22-60	20-35	0.2-0.6	0.07-0.14	4.5-6.0	Moderate-----	0.17			
118*: Cieneba----------	0-11	7-18	2.0-6.0	0.11-0.14	5.1-7.3	Low----------	0.24	1	6	<1
	11	---	---	---	---	----------	----			
Kinkel Variant--	0-8	10-15	0.6-2.0	0.13-0.15	5.1-6.0	Low----------	0.28	1	5	<1
	8-19	10-15	0.6-2.0	0.11-0.14	5.1-6.0	Low----------	0.28			
	19-41	18-25	0.6-2.0	0.08-0.12	4.5-5.0	Low----------	0.28			
	41-52	10-20	0.6-2.0	0.03-0.06	4.5-6.0	Low----------	0.24			
	52	---	---	---	---	----------	----			
119*: Cieneba----------	0-11	7-18	2.0-6.0	0.11-0.14	5.1-7.3	Low----------	0.24	1	6	<1
	11	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	Pct	In/hr	In/in	pH					Pct
119*:										
Millsap	0-8	20-27	0.6-2.0	0.13-0.16	5.1-6.5	Low	0.32	2	8	.5-1
	8-19	35-60	<0.06	0.06-0.08	5.6-7.3	High	0.28			
	19-27	35-60	<0.06	0.03-0.04	5.6-7.3	Moderate	0.20			
	27	---	---	---	---	---	---			
120, 121, 122, 123	0-19	12-25	0.6-2.0	0.15-0.18	5.1-6.0	Low	0.32	1	6	1-3
Concepcion	19-47	35-60	<0.06	0.05-0.07	5.1-8.4	High	0.20			
	47-63	25-40	0.06-0.2	0.16-0.18	6.6-8.4	Moderate	0.32			
124, 125	0-24	0-5	6.0-20	0.05-0.08	5.6-6.5	Low	0.17	5	1	.5-1
Corralitos	24-60	0-5	6.0-20	0.05-0.08	5.6-6.5	Low	0.17			
126	0-13	0-5	6.0-20	0.06-0.08	7.9-8.4	Low	0.28	5	2	.5-1
Corralitos Variant	13-60	0-5	6.0-20	0.06-0.08	7.9-8.4	Low	0.17			
127, 128	0-36	40-60	0.06-0.2	0.13-0.17	6.6-8.4	High	0.24	5	8	1-3
Cropley	36-60	35-60	0.06-0.2	0.10-0.12	6.6-8.4	High	0.28			
129	0-38	35-60	0.06-0.2	0.14-0.19	6.1-8.4	High	0.24	3	8	1-4
Diablo	38-58	35-60	0.06-0.2	0.14-0.19	6.6-8.4	High	0.24			
	58	---	---	---	---	---	---			
130*, 131*, 132*:										
Diablo	0-38	35-60	0.06-0.2	0.14-0.19	6.1-8.4	High	0.24	3	8	1-4
	38-58	35-60	0.06-0.2	0.14-0.19	6.6-8.4	High	0.24			
	58	---	---	---	---	---	---			
Cibo	0-31	40-50	0.06-0.2	0.14-0.17	6.1-7.3	High	0.20	2	4	1-2
	31-39	35-50	0.06-0.2	0.14-0.17	6.1-7.3	High	0.17			
	39	---	---	---	---	---	---			
133*:										
Diablo	0-38	35-60	0.06-0.2	0.14-0.19	6.6-8.4	High	0.24	3	8	1-4
	38-58	35-60	0.06-0.2	0.14-0.19	6.6-8.4	High	0.24			
	58	---	---	---	---	---	---			
Lodo	0-12	18-35	0.6-2.0	0.14-0.18	6.1-7.3	Moderate	0.28	1	6	1-6
	12	---	---	---	---	---	---			
134*.										
Dune land										
135, 136, 137	0-37	8-18	2.0-6.0	0.10-0.14	6.1-7.3	Low	0.32	5	3	1-4
Elder	37-60	8-18	2.0-6.0	0.10-0.14	6.1-7.3	Low	0.32			
138, 139	0-12	8-18	2.0-6.0	0.10-0.14	6.1-7.3	Low	0.32	5	3	1-4
Elder	12-60	8-18	2.0-6.0	0.10-0.14	6.1-7.3	Low	0.32			
140	0-36	5-10	0.6-2.0	0.10-0.12	5.1-6.5	Low	0.37	5	3	.6-1
Garey	36-64	5-15	0.2-0.6	0.05-0.09	5.1-7.3	Low	0.43			
	64-75	0-5	2.0-6.0	0.06-0.08	5.1-7.3	Low	0.28			
141, 142	0-13	10-18	2.0-6.0	0.07-0.12	6.1-7.3	Low	0.43	1	5	<1
Gaviota	13	---	---	---	---	---	---			
143*, 144*, 145*:										
Gazos	0-30	27-30	0.2-0.6	0.17-0.19	6.1-7.3	Moderate	0.37	2	7	1-5
	30	---	---	---	---	---	---			
Lodo	0-12	18-35	0.6-2.0	0.14-0.18	6.1-7.3	Moderate	0.28	1	6	1-6
	12	---	---	---	---	---	---			
146*:										
Henneke	0-8	27-45	0.2-0.6	0.05-0.07	6.6-8.4	Moderate	0.24	1	8	2-7
	8-19	35-50	0.2-0.6	0.05-0.07	7.4-8.4	Moderate	0.24			
	19	---	---	---	---	---	---			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	Pct	In/hr	In/in	pH					Pct
146*:										
Rock outcrop.										
147, 148, 149, 150----------	0-12	18-35	0.6-2.0	0.14-0.18	6.1-7.3	Moderate-----	0.28	1	6	1-6
Lodo	12	---	---	---	---	---	---			
151*, 152*:										
Lodo----------	0-12	18-35	0.6-2.0	0.14-0.18	6.1-7.3	Moderate-----	0.28	1	6	1-6
	12	---	---	---	---	---	---			
Rock outcrop.										
153*, 154*:										
Lompico---------	0-17	10-25	2.0-6.0	0.13-0.16	6.1-7.3	Low----------	0.28	2	6	1-3
	17-32	20-35	0.6-2.0	0.15-0.18	4.5-6.0	Moderate-----	0.17			
	32	---	---	---	---	---	---			
McMullin--------	0-15	20-27	0.6-2.0	0.10-0.15	5.6-6.5	Low----------	0.17	1	8	1-3
	15	---	---	---	---	---	---			
155, 156---------	0-18	20-35	0.6-2.0	0.06-0.12	5.6-7.3	Low----------	0.10	1	8	2-10
Lopez	18	---	---	---	---	---	---			
157*:										
Lopez----------	0-18	20-35	0.6-2.0	0.06-0.12	5.6-7.3	Low----------	0.10	1	8	2-10
	18	---	---	---	---	---	---			
Rock outcrop.										
158, 159, 160, 161----------	0-14	20-27	0.6-2.0	0.14-0.17	5.6-7.3	Moderate-----	0.37	2	8	2-4
Los Osos	14-32	35-50	0.06-0.2	0.12-0.16	5.6-6.5	High---------	0.28			
	32-39	15-30	0.2-0.6	0.09-0.15	6.6-7.8	Moderate-----	0.28			
	39	---	---	---	---	---	---			
162*, 163*, 164*, 165*:										
Los Osos-------	0-14	20-27	0.6-2.0	0.14-0.17	5.6-7.3	Moderate-----	0.37	2	8	2-4
	14-32	35-50	0.06-0.2	0.12-0.16	5.6-6.5	High---------	0.28			
	32-39	15-30	0.2-0.6	0.09-0.15	6.6-7.8	Moderate-----	0.28			
	39	---	---	---	---	---	---			
Diablo---------	0-38	35-60	0.06-0.2	0.14-0.19	6.1-8.4	High---------	0.24	3	8	1-4
	38-58	35-60	0.06-0.2	0.14-0.19	6.6-8.4	High---------	0.24			
	58	---	---	---	---	---	---			
166*, 167*:										
Los Osos--------	0-14	20-27	0.6-2.0	0.14-0.17	5.6-7.3	Moderate-----	0.37	2	8	2-4
	14-32	35-50	0.06-0.2	0.12-0.16	5.6-6.5	High---------	0.28			
	32-39	15-30	0.2-0.6	0.09-0.15	6.6-7.8	Moderate-----	0.28			
	39	---	---	---	---	---	---			
Lodo----------	0-12	18-35	0.6-2.0	0.14-0.18	6.1-7.3	Moderate-----	0.28	1	6	1-6
	12	---	---	---	---	---	---			
168----------	0-12	27-35	0.2-0.6	0.17-0.19	6.1-7.3	Moderate-----	0.32	5	8	2-4
Los Osos Variant	12-27	40-50	0.06-0.2	0.13-0.16	6.1-6.5	High---------	0.28			
	27-60	27-40	0.2-0.6	0.17-0.19	7.9-8.4	Moderate-----	0.32			
169----------	0-16	20-35	0.2-0.6	0.16-0.18	6.6-8.4	Moderate-----	0.20	5	7	2-4
Marimel	16-60	18-35	0.2-0.6	0.15-0.19	7.4-8.4	Moderate-----	0.37			
170----------	0-16	27-35	0.2-0.6	0.17-0.19	6.6-8.4	Moderate-----	0.24	5	7	2-4
Marimel	16-60	18-35	0.2-0.6	0.15-0.19	7.4-8.4	Moderate-----	0.37			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	Pct	In/hr	In/in	pH					Pct
171	0-8	20-27	0.6-2.0	0.13-0.16	5.6-6.5	Low	0.32	2	8	.5-1
Millsap	8-19	35-60	<0.06	0.06-0.08	6.1-7.3	High	0.28			
	19-27	35-60	<0.06	0.03-0.04	6.1-7.3	Moderate	0.20			
	27	---	---	---	---	---	---			
172*:										
Millsap	0-8	20-27	0.6-2.0	0.13-0.16	5.1-6.5	Low	0.32	2	8	.5-1
	8-19	35-60	<0.06	0.06-0.08	6.1-7.3	High	0.28			
	19-27	35-60	<0.06	0.03-0.04	6.1-7.3	Moderate	0.20			
	27	---	---	---	---	---	---			
Rock outcrop.										
173	0-18	10-20	2.0-6.0	0.10-0.13	7.4-8.4	Low	0.28	5	3	2-4
Mocho	18-45	18-35	0.2-0.6	0.14-0.19	7.4-8.4	Moderate	0.43			
	45-60	0-5	6.0-20	0.03-0.06	7.4-8.4	Low	0.15			
174	0-18	18-27	0.6-2.0	0.14-0.17	7.4-8.4	Low	0.43	5	4	2-4
Mocho	18-60	18-35	0.2-0.6	0.16-0.21	7.4-8.4	Moderate	0.43			
175	0-18	27-35	0.2-0.6	0.16-0.19	7.4-8.4	Moderate	0.37	5	4	2-4
Mocho	18-38	10-20	2.0-6.0	0.10-0.13	7.4-8.4	Low	0.28			
	38-45	18-35	0.2-0.6	0.14-0.19	7.4-8.4	Moderate	0.43			
	45-60	0-5	6.0-20	0.03-0.06	7.4-8.4	Low	0.15			
176	0-15	8-18	2.0-6.0	0.11-0.13	7.4-8.4	Low	0.28	5	3	1-2
Mocho Variant	15-33	10-18	2.0-6.0	0.13-0.16	7.4-8.4	Low	0.32			
	33-64	0-5	6.0-20	0.03-0.06	7.4-8.4	Low	0.15			
177, 178, 179	0-19	25-35	0.2-0.6	0.17-0.19	7.9-8.4	Moderate	0.32	2	7	2-5
Nacimiento	19-39	25-35	0.2-0.6	0.17-0.19	7.9-8.4	Moderate	0.32			
	39	---	---	---	---	---	---			
180*, 181*, 182*:										
Nacimiento	0-19	25-35	0.2-0.6	0.17-0.19	7.9-8.4	Moderate	0.32	2	7	2-5
	19-39	25-35	0.2-0.6	0.17-0.19	7.9-8.4	Moderate	0.32			
	39	---	---	---	---	---	---			
Calodo	0-16	20-27	0.2-0.6	0.15-0.18	7.9-8.4	Low	0.32	1	6	1-3
	16	---	---	---	---	---	---			
183*:										
Obispo	0-11	40-60	0.06-0.2	0.13-0.15	6.6-8.4	Moderate	0.24	1	8	1-3
	11-18	---	---	---	---	---	---			
	18	---	---	---	---	---	---			
Rock outcrop.										
184, 185	0-29	0-7	6.0-20.0	0.05-0.08	5.1-6.0	Low	0.10	5	1	.5-1
Oceano	29-60	0-7	6.0-20.0	0.05-0.08	5.1-6.0	Low	0.10			
186, 187	0-17	12-20	0.6-2.0	0.09-0.13	5.6-6.5	Low	0.32	5	4	1-4
Perkins	17-32	25-35	0.2-0.6	0.12-0.18	6.1-7.3	Moderate	0.32			
	32-47	35-45	0.06-0.2	0.08-0.15	6.1-7.3	Moderate	0.24			
	47-84	10-30	0.6-2.0	0.05-0.10	6.1-7.3	Low	0.28			
188	0-17	12-20	0.6-2.0	0.07-0.11	5.6-6.5	Low	0.28	5	8	1-4
Perkins	17-32	25-35	0.2-0.6	0.08-0.15	5.6-7.3	Low	0.28			
	32-47	25-35	0.06-0.2	0.10-0.15	5.6-7.3	Moderate	0.24			
	47-84	10-30	0.6-2.0	0.05-0.10	6.1-7.3	Low	0.28			
189	0-19	0-5	6.0-20	0.06-0.08	5.1-6.5	Low	0.10	1	2	<1
Pismo	19	---	---	---	---	---	---			
190*:										
Pismo	0-19	0-5	6.0-20	0.06-0.08	5.1-6.5	Low	0.10	1	2	<1
	19	---	---	---	---	---	---			
Rock outcrop.										

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	Pct	In/hr	In/in	pH					Pct
191*:										
Pismo	0-19	0-5	6.0-20	0.06-0.08	5.1-6.5	Low	0.10	1	2	<1
	19	---	---	---	---	---	---			
Tierra	0-11	10-20	0.6-2.0	0.09-0.13	5.1-6.5	Low	0.32	1	3	1-5
	11-42	35-50	<0.06	0.02-0.04	5.6-7.3	High	0.28			
	42-60	25-35	0.06-0.2	0.15-0.18	5.6-8.4	Moderate	0.37			
192*, 193*:										
Psamments.										
Fluvents.										
194*.										
Riverwash										
195*:										
Rock outcrop.										
Lithic Haploxerolls.										
196	0-29	15-27	0.6-2.0	0.15-0.17	6.6-8.4	Low	0.37	5	6	1-4
Salinas	29-72	18-35	0.2-0.6	0.12-0.18	7.4-8.4	Moderate	0.43			
197, 198	0-29	27-35	0.2-0.6	0.17-0.19	6.6-8.4	Moderate	0.37	5	7	1-4
Salinas	29-72	18-30	0.2-0.6	0.14-0.19	7.4-8.4	Moderate	0.43			
199, 200, 201, 202	0-24	10-20	0.6-2.0	0.10-0.12	5.1-6.5	Low	0.32	1	4	1-4
San Simeon	24-34	40-60	<0.06	0.05-0.07	4.5-6.5	High	0.20			
	34	---	---	---	---	---	---			
203, 204	0-17	35-40	0.6-2.0	0.10-0.14	5.1-6.5	Low	0.15	2	8	5-15
Santa Lucia	17-36	35-50	0.6-2.0	0.08-0.11	5.1-6.5	Low	0.10			
	36	---	---	---	---	---	---			
205, 206, 207	0-17	35-40	0.6-2.0	0.09-0.12	5.1-6.5	Low	0.10	2	8	5-15
Santa Lucia	17-36	35-50	0.6-2.0	0.08-0.11	5.1-6.5	Low	0.10			
	36	---	---	---	---	---	---			
208	0-23	20-27	0.6-2.0	0.10-0.13	6.1-7.3	Low	0.24	5	8	1-4
Still	23-64	20-35	0.2-0.6	0.10-0.13	6.1-8.4	Moderate	0.28			
209	0-40	25-35	0.2-0.6	0.12-0.16	6.1-7.3	Moderate	0.24	5	8	1-4
Still	40-64	0-5	6.0-20	0.03-0.06	6.1-8.4	Low	0.15			
210, 211	0-23	20-35	0.2-0.6	0.12-0.16	6.1-7.3	Moderate	0.24	5	8	1-4
Still	23-64	20-35	0.2-0.6	0.10-0.13	6.1-8.4	Moderate	0.28			
212, 213, 214, 215	0-21	17-25	0.6-2.0	0.15-0.17	6.1-7.3	Low	0.49	5	4L	2-4
Suey	21-40	18-25	0.6-2.0	0.14-0.17	6.1-7.8	Low	0.49			
	40-80	18-25	0.6-2.0	0.11-0.17	6.6-8.4	Low	0.43			
216	0-11	10-20	0.6-2.0	0.09-0.13	5.6-6.5	Low	0.32	1	3	1-5
Tierra	11-42	35-50	<0.06	0.02-0.04	5.6-7.3	High	0.28			
	42-60	25-35	0.06-0.2	0.15-0.18	5.6-8.4	Moderate	0.37			
217, 218	0-11	15-27	0.6-2.0	0.13-0.16	5.6-6.5	Low	0.37	1	6	1-5
Tierra	11-42	35-50	<0.06	0.02-0.04	5.6-7.3	High	0.28			
	42-60	25-35	0.06-0.2	0.15-0.18	5.6-8.4	Moderate	0.37			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
							K	T		
	In	Pct	In/hr	In/in	pH					Pct
219, 220----------	0-11	0-5	6.0-20	0.05-0.10	7.4-8.4	Low----------	0.20	5	2	<1
Tujunga	11-31	0-5	6.0-20	0.05-0.08	7.4-8.4	Low----------	0.20			
	31-82	0-5	6.0-20	0.04-0.07	7.4-8.4	Low----------	0.15			
221*:										
Xererts.										
Xerolls.										
Urban land.										
222*, 223*.										
Xerorthents										
224, 225, 226,										
227----------	0-36	40-60	0.06-0.2	0.14-0.17	7.9-8.4	High----------	0.24	4	8	2-4
Zaca	36-54	40-60	0.06-0.2	0.14-0.17	7.9-8.4	High----------	0.24			
	54	---	---	---	---	----------	----			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--SOIL AND WATER FEATURES

[See text for explanations of terms such as "brief," "occasional" and "apparent." The symbol < means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
101*. Aquolls											
102, 103---------- Arnold	B	None--------	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate.
104, 105, 106----- Baywood	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
107*. Beaches											
108---------- Briones	B	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
109*:											
Briones----------	B	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
Pismo----------	D	None--------	---	---	>6.0	---	---	8-20	Soft	Low------	Moderate.
110*:											
Briones----------	B	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
Tierra----------	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
111---------- Camarillo	C	Rare--------	---	---	2.0-3.5	Apparent	Jan-May	>60	---	High-----	Moderate.
112---------- Camarillo	C	None--------	---	---	5.0-6.0	Apparent	Jan-Dec	>60	---	High-----	Moderate.
113, 114---------- Capistrano	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low.
115, 116, 117----- Chamise	C	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
118*:											
Cieneba----------	C	None--------	---	---	>6.0	---	---	11-20	Soft	Moderate	Moderate.
Kinkel Variant---	C	None--------	---	---	>6.0	---	---	40-60	Soft	High-----	Moderate.
119*:											
Cieneba----------	C	None--------	---	---	>6.0	---	---	11-20	Soft	Moderate	Moderate.
Millsap----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
120, 121, 122, 123---------- Concepcion	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Low.
124, 125---------- Corralitos	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
126---------- Corralitos Variant	C	Occasional	Brief-----	Dec-Mar	2.0-3.0	Apparent	Dec-Mar	>60	---	Moderate	Moderate.
127, 128---------- Cropley	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Low.
129---------- Diablo	D	None--------	---	---	>6.0	---	---	45-58	Soft	High-----	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
130*, 131*, 132*: Diablo	D	None	---	---	>6.0	---	---	45-58	Soft	High	Low.
130*, 131*, 132*: Cibo	D	None	---	---	>6.0	---	---	20-40	Hard	High	Low.
133*: Diablo	D	None	---	---	>6.0	---	---	45-58	Soft	High	Low.
Lodo	D	None	---	---	>6.0	---	---	4-20	Hard	Moderate	Low.
134*. Dune land											
135, 136, 137----- Elder	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
138, 139---------- Elder	B	Occasional	Brief-----	Nov-Mar	>6.0	---	---	>60	---	Moderate	Moderate.
140---------- Garey	C	None	---	---	>6.0	---	---	>60	---	High	Moderate.
141, 142---------- Gaviota	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Low.
143*, 144*, 145*: Gazos	C	None	---	---	>6.0	---	---	22-38	Hard	Moderate	Low.
Lodo	D	None	---	---	>6.0	---	---	4-20	Hard	Moderate	Low.
146*: Henneke----------	D	None	---	---	>6.0	---	---	10-20	Hard	High	Moderate.
Rock outcrop.											
147, 148, 149, 150---------- Lodo	D	None	---	---	>6.0	---	---	4-20	Hard	Moderate	Low.
151*, 152*: Lodo----------	D	None	---	---	>6.0	---	---	4-20	Hard	Moderate	Low.
Rock outcrop.											
153*, 154*: Lompico----------	B	None	---	---	>6.0	---	---	20-40	Soft	High	High.
McMullin---------	D	None	---	---	>6.0	---	---	12-20	Hard	Moderate	Moderate.
155, 156---------- Lopez	D	None	---	---	>6.0	---	---	6-20	Hard	Moderate	Moderate.
157*: Lopez----------	D	None	---	---	>6.0	---	---	6-20	Hard	Moderate	Moderate.
Rock outcrop.											
158, 159, 160, 161---------- Los Osos	C	None	---	---	>6.0	---	---	20-40	Soft	High	Moderate.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
162*, 163*, 164*, 165*:											
Los Osos	C	None	---	---	>6.0	---	---	20-40	Soft	High	Moderate.
Diablo	D	None	---	---	>6.0	---	---	45-58	Soft	High	Low.
166*, 167*:											
Los Osos	C	None	---	---	>6.0	---	---	20-40	Soft	High	Moderate.
Lodo	D	None	---	---	>6.0	---	---	4-20	Hard	Moderate	Low.
168--- Los Osos Variant	C	None	---	---	>6.0	---	---	>60	---	High	Low.
169--- Marimel	D	Occasional	Brief	Nov-Mar	2.0-5.0	Apparent	Nov-Jul	>60	---	High	Low.
170--- Marimel	C	None	---	---	>6.0	---	---	>60	---	High	Low.
171--- Millsap	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
172*:											
Millsap	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Rock outcrop.											
173, 174, 175--- Mocho	B	None	---	---	>6.0	---	---	>60	---	High	Low.
176--- Mocho Variant	A	None	---	---	>6.0	---	---	>60	---	High	Low.
177, 178, 179--- Nacimiento	C	None	---	---	>6.0	---	---	20-40	Soft	High	Low.
180*, 181*, 182*:											
Nacimiento	C	None	---	---	>6.0	---	---	20-40	Soft	High	Low.
Calodo	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Low.
183*:											
Obispo	D	None	---	---	>6.0	---	---	8-20	Hard	High	Low.
Rock outcrop.											
184, 185--- Oceano	A	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
186, 187, 188--- Perkins	C	None	---	---	>6.0	---	---	>60	---	Moderate	Low.
189--- Pismo	D	None	---	---	>6.0	---	---	8-20	Soft	Low	Moderate.
190*:											
Pismo	D	None	---	---	>6.0	---	---	8-20	Soft	Low	Moderate.
Rock outcrop.											
191*:											
Pismo	D	None	---	---	>6.0	---	---	8-20	Soft	Low	Moderate.
Tierra	D	None	---	---	>6.0	---	---	>60	---	High	Moderate.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
192*, 193*: Psamments.											
Fluvents.											
194*. Riverwash											
195*: Rock outcrop.											
Lithic Haploxerolls.											
196, 197, 198----- Salinas	C	None--------	---	---	>6.0	---	---	>60	---	High-----	Low.
199, 200, 201, 202---------- San Simeon	D	None--------	---	---	>6.0	---	---	20-40	Soft	High-----	High.
203, 204, 205, 206, 207---------- Santa Lucia	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	High.
208, 209, 210, 211---------- Still	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low.
212, 213, 214, 215---------- Suey	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low.
216, 217, 218----- Tierra	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate
219---------- Tujunga	A	Occasional	Brief-----	Dec-Mar	>6.0	---	---	>60	---	Moderate	Low.
220---------- Tujunga	A	Frequent----	Brief-----	Dec-Mar	>6.0	---	---	>60	---	Moderate	Low.
221*: Xererts.											
Xerolls.											
Urban land.											
222*, 223*. Xerorthents											
224, 225, 226, 227---------- Zaca	D	None--------	---	---	>6.0	---	---	40-60	Soft	High-----	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--CLASSIFICATION OF THE SOILS

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

Soil name	Family or higher taxonomic class
*Arnold	Mixed, thermic Typic Xeropsamments
Baywood	Sandy, mixed, thermic Entic Haploxerolls
*Briones	Mixed, thermic Typic Xeropsamments
Calodo	Loamy, mixed, thermic, shallow Calcic Haploxerolls
Camarillo	Fine-loamy, mixed (calcareous), thermic Aquic Xerofluvents
Capistrano	Coarse-loamy, mixed, thermic Entic Haploxerolls
Chamise	Clayey-skeletal, mixed, thermic Ultic Palexerolls
Cibo	Fine, montmorillonitic, thermic Typic Chromoxererts
*Cieneba	Loamy, mixed, nonacid, thermic, shallow Typic Xerorthents
Concepcion	Fine, montmorillonitic, thermic Xeric Argialbolls
Corralitos	Mixed, thermic Typic Xeropsamments
Corralitos Variant	Mixed, thermic Aquic Xeropsamments
Cropley	Fine, montmorillonitic, thermic Chromic Pelloxererts
Diablo	Fine, montmorillonitic, thermic Chromic Pelloxererts
Elder	Coarse-loamy, mixed, thermic Cumulic Haploxerolls
Garey	Coarse-loamy, mixed, thermic Psammentic Haploxeralfs
Gaviota	Loamy, mixed, nonacid, thermic Lithic Xerorthents
Gazos	Fine-loamy, mixed, thermic Pachic Haploxerolls
Henneke	Clayey-skeletal, serpentinitic, thermic Lithic Argixerolls
Kinkel Variant	Loamy-skeletal, mixed, mesic Ultic Haploxeralfs
Lodo	Loamy, mixed, thermic Lithic Haploxerolls
Lompico	Fine-loamy, mixed, mesic Ultic Argixerolls
Lopez	Loamy-skeletal, mixed, thermic Lithic Ultic Haploxerolls
Los Osos	Fine, montmorillonitic, thermic Typic Argixerolls
Los Osos Variant	Fine, montmorillonitic,thermic Calcic Argixerolls
Marimel	Fine-loamy, mixed, thermic Cumulic Haploxerolls
McMullin	Loamy, mixed, mesic Lithic Ultic Haploxerolls
Millsap	Fine, mixed, thermic Typic Palexeralfs
Mocho	Fine-loamy, mixed, thermic Fluventic Haploxerolls
Mocho Variant	Coarse-loamy over sandy or sandy-skeletal, mixed, thermic Fluventic Haploxerolls
Nacimiento	Fine-loamy, mixed, thermic Calcic Haploxerolls
Obispo	Clayey, serpentinitic, thermic Lithic Haploxerolls
Oceano	Mixed, thermic Alfic Xeropsamments
Perkins	Fine-loamy, mixed, thermic Mollic Haploxeralfs
Pismo	Mixed, thermic, shallow Typic Xeropsamments
Salinas	Fine-loamy, mixed, thermic Pachic Haploxerolls
San Simeon	Fine, montmorillonitic, thermic Xeric Argialbolls
Santa Lucia	Clayey-skeletal, mixed, thermic Pachic Ultic Haploxerolls
Still	Fine-loamy, mixed, thermic Cumulic Haploxerolls
Suey	Fine-silty, mixed, thermic Pachic Haploxerolls
Tierra	Fine, montmorillonitic, thermic Mollic Palexeralfs
*Tujunga	Mixed, thermic Typic Xeropsamments
Zaca	Fine, montmorillonitic, thermic Vertic Haploxerolls

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