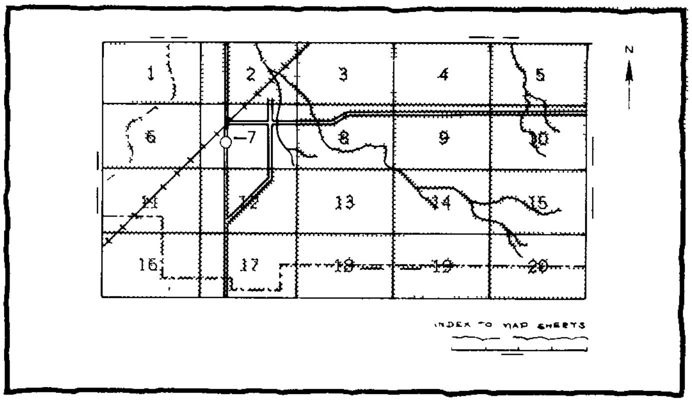
SOIL SURVEY OF

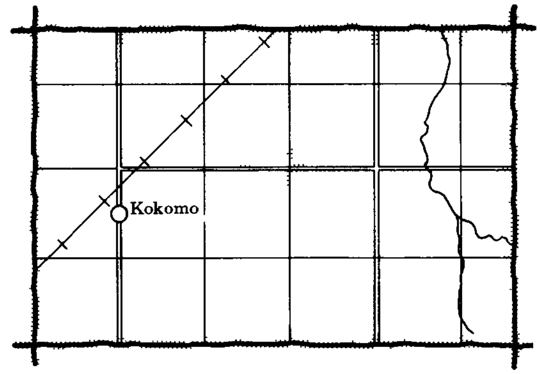
LOS ANGELES COUNTY, CALIFORNIA, WEST SAN FERNANDO VALLEY AREA

United States Department of Agriculture
Soil Conservation Service and
West Los Angeles County Resource Conservation District
in cooperation with
University of California Agricultural Experiment Station

HOW TO USE

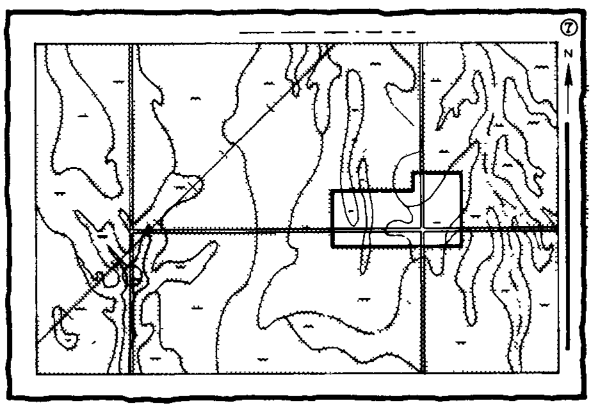
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

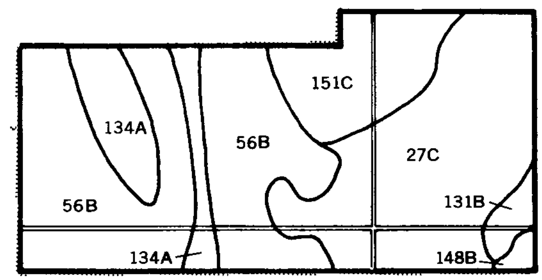




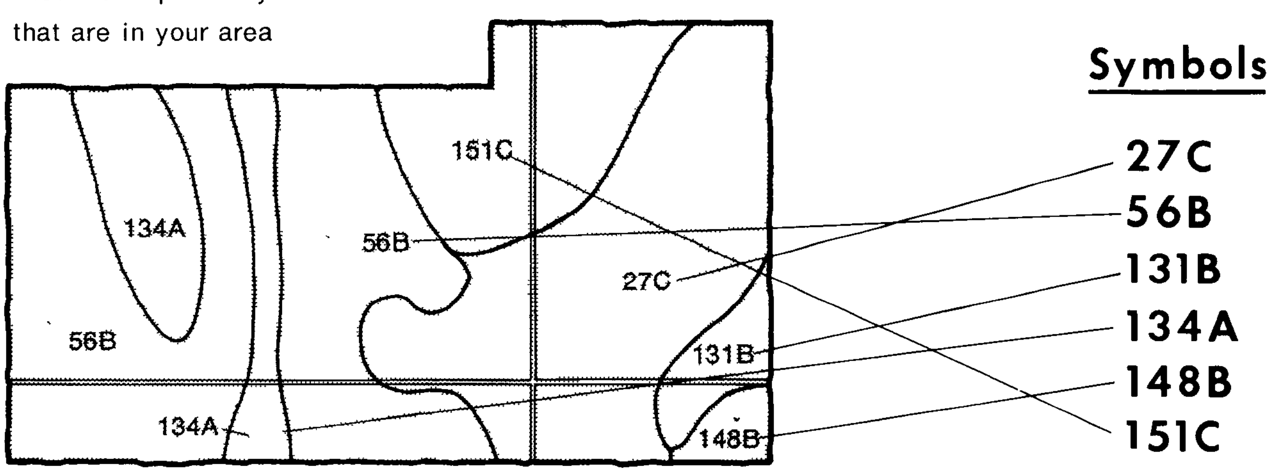
2. Note the number of the map sheet and turn to that sheet.

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



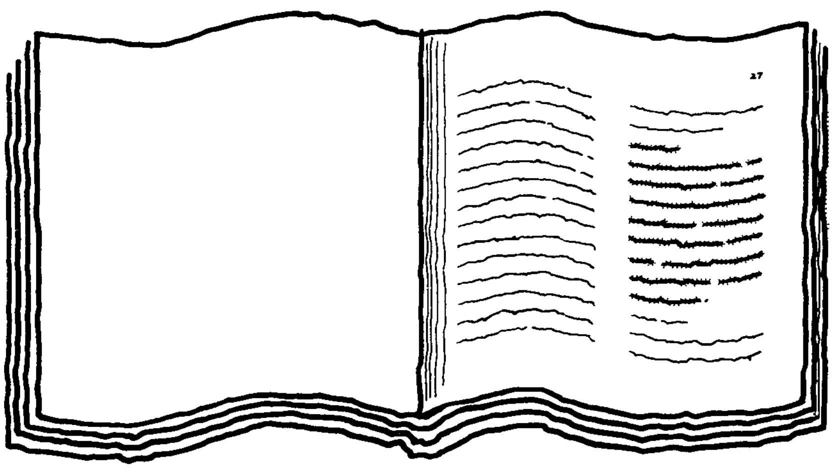


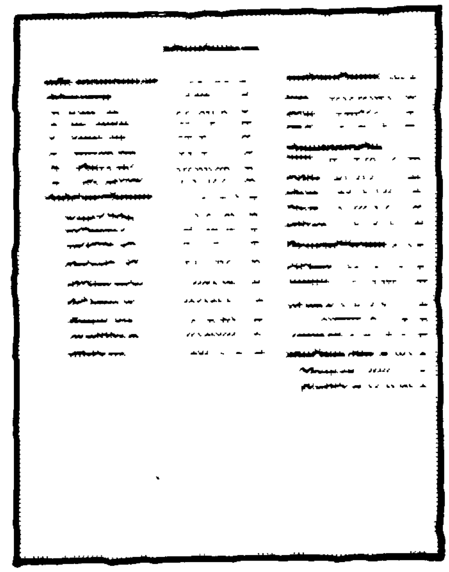
4. List the map unit symbols that are in your area



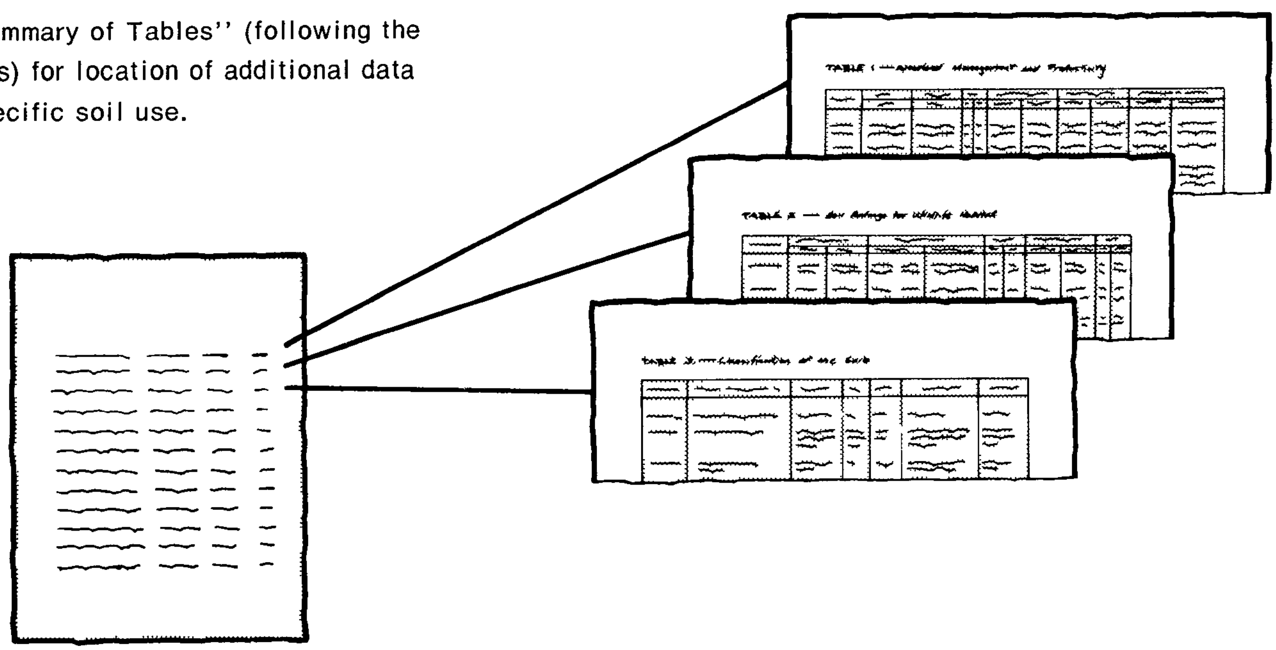
THIS SOIL SURVEY

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.





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



7. Consult "Contents" for parts of the publication that will meet your specific needs. This 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 is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. 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 completed in the period 1974 and 1975. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service, West Los Angeles County Resource Conservation District, and the University of California Agricultural Experiment Station.

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

Cover: View of San Fernando Valley with the Santa Susana and San Gabriel Mountains in the background. Conejo and Mocho soils are dominant in the Valley. These soils are being rapidly developed for urban use. Balcom and Gazos soils are dominant in the Mountains. (Photo courtesy of Los Angeles Department of Airports.)

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Issued January 1980

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Summary of Tables

Foreword

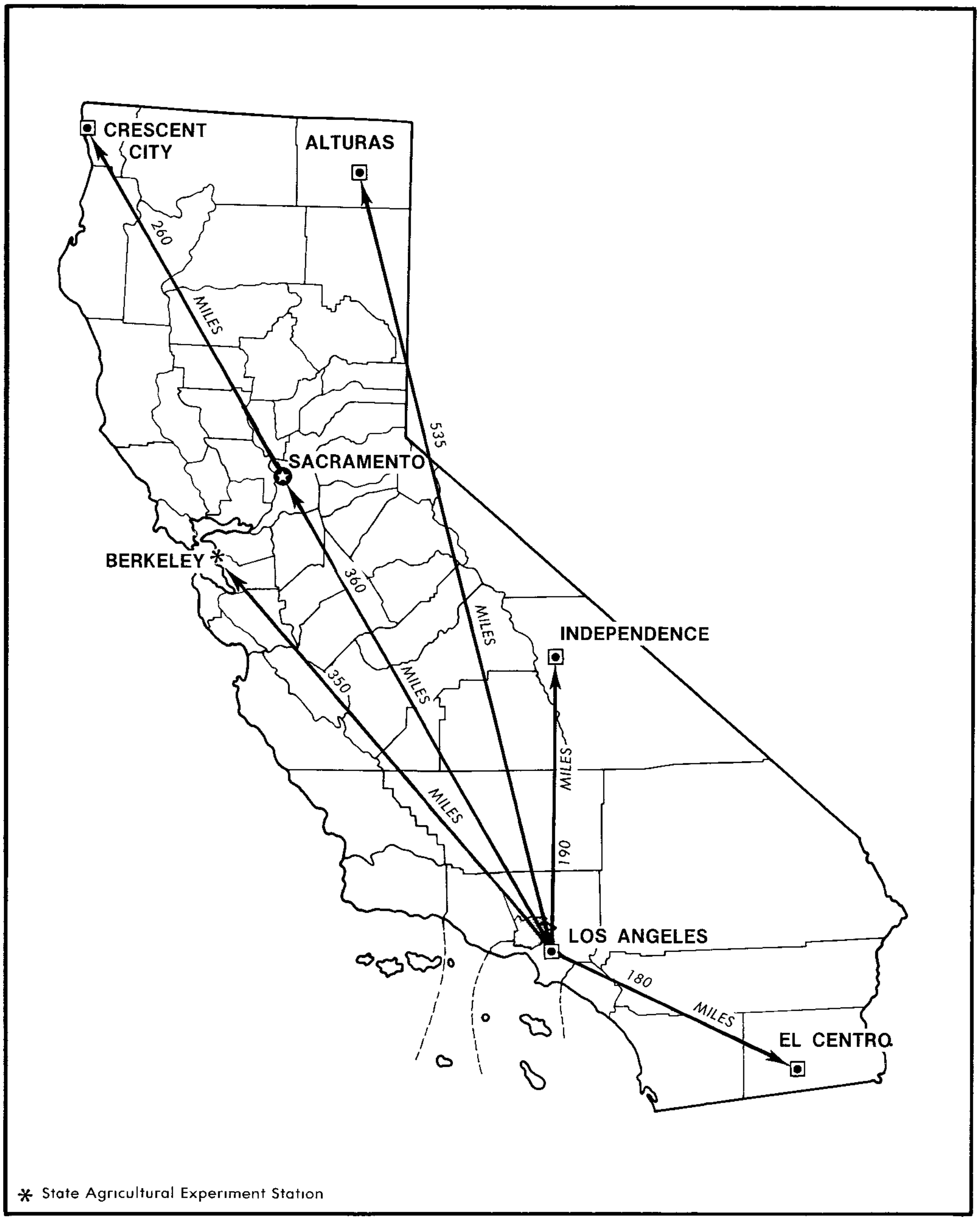
The Soil Survey of Los Angeles County, California, West San Fernando Valley Area contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.



Location of Los Angeles County, West San Fernando Valley Area, in California.

SOIL SURVEY OF LOS ANGELES COUNTY, CALIFORNIA, WEST SAN FERNANDO VALLEY AREA

By Lewis Leifer, West Los Angeles County Resource Conservation District, and Daniel F. Rabey, Soil Conservation Service

Soils surveyed by Daniel F. Rabey, Soil Conservation Service, and Colin A. Hogan and Bruce Stoneman, West Los Angeles County Resource Conservation District

United States Department of Agriculture, Soil Conservation Service, and West Los Angeles County Resource Conservation District in cooperation with University of California Agricultural Experiment Station

LOS ANGELES COUNTY, CALIFORNIA, WEST SAN FERNANDO VALLEY AREA is in the southwestern part of California. (See facing page.) It has a land area of 113,180 acres, or about 177 square miles. Most of the survey area is urbanized and is within the corporate boundaries of Los Angeles.

The southern boundary of the survey area approximately follows the crest of the Santa Monica Mountains. The western and northwestern parts are bounded by the San Fernando Valley watershed boundary, which winds along the crest of the Simi Hills and the Santa Susana Mountains. The northeastern part is bounded by Angeles National Forest in the San Gabriel Mountains. The southeastern part is bounded by the city of San Fernando, Pacoima Wash, and Sepulveda Boulevard.

Most of the survey area consists of coalescing recent alluvial fans deposited by streams from the hills and mountains that surround the San Fernando Valley. The fans and small tributary valleys have an elevation that ranges from a high of about 1,500 feet to a low of 675 feet where the Los Angeles River exits the survey area at the Sepulveda Flood Control Basin. Elevation in the hills and mountains ranges from about 1,500 feet near Calabasas to more than 3,700 feet on Oat Mountain. A very small portion of the survey area consists of terraces and low hills of old alluvium at an elevation of about 1,000 feet mostly along the northern edge of the Valley.

Climate

The survey area has a Mediterranean climate characterized by warm, dry summers and cool, moist winters. Climatic data are recorded at the San Fernando Station and the Aliso Canyon-Oat Mountain Station(*8*). The San Fernando Station is on the Valley floor just outside the survey area, and the Aliso Canyon-Oat Mountain Station is at the highest elevation in the survey area.

At the city of San Fernando the average annual temperature is 63.6 degrees F. The lowest average monthly temperature is 54.2 degrees in January, and the highest average monthly temperature is 74.6 degrees in August. The growing season generally is 300 to 330 days, but in some years it extends throughout the year. Average annual rainfall is 16.12 inches. Rainfall is heaviest in January, when it averages 3.39 inches, and is lightest in July, when it averages 0.02 inches. The rainy season extends from November to May.

At the Aliso Canyon-Oat Mountain Station, average annual rainfall is 22.5 inches. Rainfall is heaviest in January, when it averages 4.82 inches, and is lightest in July, when it averages 0.01 inches. The rainy season in this part of the survey area extends from November through April.

History and development

Spanish explorers discovered the San Fernando Valley in 1769. Before this time the Valley was inhabited by Indians. In 1795 Mission San Fernando Rey was constructed. Mission padres introduced cultivation to the Indians of the area. The padres planted garden crops, grapes, figs, and olives, but only a very small acreage was cultivated or used for pasture at that time.

Spanish rule was superseded by the Mexican government in 1822, and at this time the mission lands became privately owned. During this period cattle raising became the main farm enterprise. Land in the Valley and surrounding foothills was grazed heavily.

American rule began in 1847. Cattle grazing remained the main farm enterprise in the Valley until the drought of 1860-62. After the drought ended, dryland farming expanded in acreage until nearly all of the land in the Valley and the smoother slopes in the foothills bordering the Valley were cultivated. Wheat and barley were the main crops grown. Sheep raising for wool production was also an important farm enterprise. As the population increased, several small towns were founded.

In 1913 the Owens Valley Aqueduct was completed. It carried water to the San Fernando Valley from the Owens River 250 miles away. This aqueduct provided the first large supply of water available for irrigation in the area. Dryland farms were then subdivided into smaller farms, and small grain crops were replaced by peaches, apricots, walnuts, citrus, grapes, melons, alfalfa, beans, and sugar beets and by other field and garden crops.

As farm production was increased and transporation in the area was improved, the population also increased and larger towns soon were established. By the mid-1930's irrigation and intensive farming expanded across the entire Valley. Urban and industrial development also expanded rapidly, especially after the end of World War II. At present most of the nearly level land in the Valley is urbanized, and urban development is expanding rapidly into the foothills adjacent to the Valley.

How this survey was made

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

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

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

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. Test data for samples taken from this survey area and adjoining survey areas are available (*6*).

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 is readily available to different groups of users, among them managers, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit 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. Terms for texture used in the descriptive heading of each map unit refer to the surface layer of the major soils unless otherwise indicated.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of an individual tract of land or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

Soils on alluvial plains, alluvial fans, and terraces

Five map units are in this group, and they make up about 55 percent of the survey area. The soils in this group are dominantly at the lower elevations in the survey area, where slopes are nearly level to moderately sloping. Elevation ranges from about 2,000 feet in areas adjacent to the San Gabriel Mountains to about 700 feet near the Sepulveda Flood Control Basin in the southeastern part of the survey area.

The soils in this group are very deep and are well drained to excessively drained. The surface layer ranges from sand to clay.

Average annual precipitation is about 16 inches, and mean annual temperature is about 61 degrees F. The average frost-free season is about 330 days on the alluvial plains in the Valley and is about 300 days on the alluvial fans and terraces at higher elevations.

The soils in this group are used mainly for urban development. In a few areas the soils are too sandy for urban development and are used for recreational purposes or as a source of sand and gravel.

1. Soboba-Tujunga

Very deep, nearly level to moderately sloping, somewhat excessively drained and excessively drained sands and gravelly loamy sands on alluvial fans and plains

This map unit is on toe slopes and in canyons at the base of the San Gabriel Mountains in the northeastern corner of the survey area. Elevation ranges from 1,100 to 2,000 feet. The soils in this map unit formed in coarse textured alluvium derived from granitic rock.

This map unit makes up about 2 percent of the survey area. About 39 percent of the map unit is Soboba soils, and 28 percent is Tujunga soils. The rest is soils and miscellaneous areas of minor extent.

Soboba soils are excessively drained. They consist of stratified gravelly loamy sand and very gravelly sand. Coarse fragments make up as much as 75 percent of the underlying material. Cobbles and large stones are throughout the profile. The surface layer is slightly acid. Slopes range from 0 to 9 percent.

Tujunga soils are somewhat excessively drained. They consist of sand throughout the profile. In some areas these soils have strata that consist of as much as 25 percent coarse fragments. The surface layer is slightly acid or neutral. Slopes range from 0 to 2 percent.

Soils and miscellaneous areas of minor extent are Xerorthents, Anacapa and Capistrano soils, and Urban land. Land covered by stream channels is also in this map unit. Anacapa soils are well drained and are sandy in most of the profile. Capistrano soils are also well drained and are fine sandy loam in most of the profile.

This map unit is used mainly for recreational purposes, for example, hiking and horseback riding. In a few areas it is used as a source of sand and gravel. Flood control structures are built in a few of these areas. Some areas previously were used for citrus but now are used for urban development; the Kagel Canyon area is an example. Because the major soils in this map unit have very low available water capacity, they are difficult to manage and the choice of plants that can successfully be grown is limited.

2. Urban land-San Emigdio-Capistrano

Urban land and very deep, nearly level to moderately sloping, well drained fine sandy loams and sandy loams on alluvial fans and plains

This map unit is throughout the San Fernando Valley and in narrow valleys that extend into the foothills. Elevation ranges from 700 to 1,200 feet. The soils in this map unit formed in moderately coarse textured alluvium derived from sedimentary and granitic rock.

This map unit makes up about 21 percent of the survey area. Urban land makes up about 29 percent of the map unit, San Emidigo soils make up about 25 percent, and Capistrano soils make up about 20 percent. The rest is soils of minor extent.

Urban land consists of areas covered by roads, parking lots, and houses and of other paved or covered areas. The soils underlying these structures are similar to San Emigdio or Capistrano soils, except where grading has been extensive or fill material has been added.

San Emigdio soils are well drained. They consist of stratified sandy loam, coarse sandy loam, and loamy sand. The surface layer and the upper part of the underlying material are sandy loam and are moderately alkaline. These soils are calcareous throughout the profile. Slopes range from 0 to 2 percent.

Capistrano soils are well drained. They consist of fine sandy loam throughout most of the profile. The underlying material is somewhat stratified loam. The surface layer is slightly acid or neutral. These soils are noncalcareous to a depth of 60 inches or more. Slopes range from 0 to 9 percent.

Soils of minor extent are Anacapa, Mocho, and Conejo soils and Xerorthents. These soils are well drained. Anacapa soils are sandy loam in most of the profile. Mocho soils are loam in most of the profile, and Conejo soils are clay loam in most of the profile. Soil texture of the Xerorthents varies greatly.

The soils in this map unit are used mainly as homesites and for other urban developments. They are well suited to a wide variety of plants. These soils formerly were used for farming and were among the most productive soils in the Valley. Soil properties are favorable for the construction of roads and houses and for other urban developments.

3. Urban land-Mocho-Conejo

Urban land and very deep, nearly level to moderately sloping, well drained loams and clay loams on alluvial fans and plains

This map unit is on alluvial fans and plains throughout the San Fernando Valley and on fans in small valleys that extend into the foothills. Elevation ranges from 700 to 1,100 feet. The soils in this map unit formed in medium textured and moderately fine textured, recent alluvium derived mainly from sedimentary rock.

This map unit makes up about 23 percent of the survey area. About 38 percent of the map unit is Urban land, 29 percent is Mocho soils, and 23 percent is Conejo soils. The rest is soils of minor extent.

Urban land consists of areas covered by roads, parking lots, and houses and of other paved or covered areas. The soils underlying these structures are similar to Mocho or Conejo soils, except where grading has been extensive or fill material has been added.

Mocho soils are well drained. They consist mainly of loam throughout the profile, but in some places they are stratified with coarser or finer textured material. The surface layer is moderately alkaline. These soils are calcareous throughout the profile. Slopes range from 0 to 9 percent.

Conejo soils are well drained. They consist of clay loam in most of the profile. The surface layer is slightly acid to mildly alkaline. These soils are noncalcareous to a depth of 60 inches or more. Slopes range from 0 to 9 percent.

Soils of minor extent are Xerorthents and San Emigdio soils. These soils are well drained. The soil texture of Xerorthents varies greatly because of cutting and filling for urban development. San Emigdio soils consist mainly of sandy loam.

The soils in this map unit are used mainly as homesites and for other urban developments. They are well suited to a wide variety of plants. These soils have few serious soil-related problems for construction of roads and other urban developments.

4. Cropley-Urban land

Very deep, nearly level to moderately sloping, well drained clays and Urban land on alluvial fans and terraces and in basins on alluvial plains

The largest areas of this map unit are on alluvial fans and in basins in the southern part of the San Fernando Valley. The rest are on low alluvial fans and terraces in the northern part of the Valley. Elevation ranges from about 700 feet in the southern part of the Valley to about 1,000 feet in the northern part. The soils in this map unit formed mainly in fine textured alluvium derived from sedimentary rock.

This map unit makes up about 4 percent of the survey area. About 47 percent of the map unit is Cropley soils, and 36 percent is Urban land. The rest is soils of minor extent.

Cropley soils are well drained. They are on alluvial fans and in basins. They consist of clay to a depth of 60 inches or more. The surface layer is mildly alkaline or moderately alkaline. Slopes range from 0 to 9 percent.

Urban land consists of areas covered by roads, parking lots, and houses and of other paved or covered areas. The soils underlying these structures are similar to Cropley soils, except where grading has been extensive or fill material has been added.

Soils of minor extent are Danville soils and Xerorthents. These soils are well drained and consist of clay or silty clay loam.

The soils in this map unit are used mainly as homesites and for other urban developments. Because of the high content of clay, the soils are difficult to till and water enters the soil slowly. As a result, gardening and landscaping are difficult. High shrink-swell potential is a limitation if the Cropley soils are used for roads or as homesites.

5. Chualar-Urban land

Very deep, gently sloping and moderately sloping, well drained sandy loams that have a sandy clay loam subsoil and Urban land on low dissected terraces

This map unit is on low terraces along the northern edge of the San Fernando Valley and on isolated remnants of terraces on the Valley floor that are surrounded by bottomland. Elevation ranges from about 700 to 1,500 feet. The soils in this map unit formed in old alluvium derived from sandstone and granitic rock.

This map unit makes up about 5 percent of the survey area. Chualar soils make up about 55 percent of the map unit, and Urban land makes up about 25 percent. Soils of minor extent make up the rest.

Chualar soils are well drained. They have a sandy loam surface layer and a sandy clay loam subsoil. They have a substratum that is stratified and that ranges from sandy loam to clay loam. The surface layer is slightly acid or neutral. Slopes range from 2 to 9 percent.

Urban land consists of areas covered by roads, parking lots, and buildings and of other covered areas. The soils underlying these structures are similar to Xerorthents because of extensive cutting and filling for urban development.

Soils of minor extent are Xerorthents and soils that are similar to Chualar soils except the subsoil is reddish brown rather than brown; sandstone bedrock is at a depth of 40 to 60 inches; or lime segregations are in the lower part of the subsoil. The texture of Xerorthents varies greatly because of cutting and filling for urban development.

The soils in this map unit are used mainly as homesites and for other urban developments. A few open plots are used for recreation purposes, gardens, and pasture. The frost hazard is lower on these terrace soils than on soils on the Valley floor. These soils have a moderately fine textured subsoil that restricts the root development of trees and shrubs and the deep penetration of water.

Tillage is difficult where the subsoil is exposed by cutting and filling operations.

Soils on foothills and mountains

Four map units are in this group, and they make up about 45 percent of the survey area. They are in areas along the northern, southern, and western boundaries of the San Fernando Valley. Slopes range from moderately sloping to very steep. Elevation ranges from 800 to 3,700 feet but is mostly more than 1,100 feet.

This group consists mainly of moderately deep to shallow soils that are well drained or somewhat excessively drained. The surface layer ranges from gravelly sandy loam to clay loam and silty clay loam.

Average annual precipitation is about 18 inches, and mean annual temperature is about 61 degrees F. The average frost-free season ranges from about 300 days on the lower parts of the foothills to 275 days on the highest mountains.

The soils in this group are used mainly for recreational purposes and watershed. In some areas they are used for urban development. Some areas are undisturbed and have scenic value.

6. Balcom-Xerorthents-Urban land

Moderately deep, strongly sloping to very steep, well drained silty clay loams; moderately sloping and strongly sloping areas of disturbed soils; and Urban land on hills and mountains

This map unit is in the Santa Monica Mountains, Simi Hills, and Santa Susana Mountains. It is in the southwestern, western, and northwestern parts of the survey area. Elevation ranges from 800 to 3,700 feet. The soils in this unit formed in residuum from shale and sandstone.

This map unit makes up about 29 percent of the survey area. Balcom soils make up about 40 percent of the map unit, Xerorthents make up about 15 percent, Urban land makes up about 15 percent, and Gazos soils make up about 13 percent. Soils and miscellaneous areas of minor extent make up the rest.

Balcom soils are well drained. They consist of calcareous clay loam and silty clay loam to a depth of 23 to 40 inches. The surface layer is dominantly silty clay loam and is moderately alkaline. Slopes range from 9 to 75 percent.

Xerorthents are disturbed soils that result from excavating, cutting, and filling operations and can support plants. Soil properties, for example, texture, depth, and reaction, vary greatly. Slopes range from 5 to 30 percent.

Urban land consists of areas covered by roads, parking lots, and houses and of other paved or covered areas. The soils underlying these structures generally are similar to Balcom and Gazos soils, except where grading has been extensive or fill material has been added.

Gazos soils are well drained. They consist of clay loam and silty clay loam to a depth of 24 to 40 inches. The surface layer is dominantly silty clay loam and is dominantly medium acid. Slopes range from 9 to 50 percent.

Soils and miscellaneous areas of minor extent are Lopez soils and Badland. Lopez soils are somewhat excessively drained and consist of shaly clay loam. They are 6 to 20 inches deep to hard shale or sandstone. The soil properties of Badland vary greatly.

The soils in this unit are used mainly for watershed, wildlife habitat, recreational purposes, and urban development. In small areas they are used for pasture.

Steep slopes and moderate to shallow depth to bedrock are serious limitations to intensive land uses and to urban development.

7. Gaviota-Rock outcrop

Shallow, strongly sloping to very steep, somewhat excessively drained sandy loams and Rock outcrop on hills and mountains

This map unit is mainly in the Simi Hills and Santa Susana Mountains in the northwestern part of the survey area. Elevation ranges from 900 to 3,500 feet. The soils in this map unit formed in residuum from hard sandstone.

This map unit makes up about 6 percent of the survey area. Gaviota soils make up about 59 percent of the map unit, and Rock outcrop makes up about 38 percent. Soils and miscellaneous areas of minor extent make up the rest.

Gaviota soils are somewhat excessively drained. They consist of sandy loam or fine sandy loam that overlies hard sandstone at a depth of 10 to 20 inches. The surface layer is dominantly sandy loam and is slightly acid. Slopes ranges from 9 to 75 percent.

Rock outcrop consists of long narrow bands of tilted rock formations and areas covered by large sandstone boulders and stones.

Miscellaneous areas and soils of minor extent are Urban land and Soper soils. The soil properties of Urban land vary greatly. Soper soils are well drained; they have a surface layer of gravelly sandy loam and a subsoil of cobbly sandy clay loam. They are 24 to 40 inches deep to weathered conglomerate.

The soils in this map unit are used mainly for recreational purposes, watershed, wildlife habitat, and urban development. The shallow depth to bedrock, steep slopes, and presence of Rock outcrop are severe limitations to the use of these soils.

8. Friant-Vista

Shallow and moderately deep, moderately steep to very steep, well drained fine sandy loams and coarse sandy loams on hills and mountains

This map unit is in the Santa Monica Mountains along the southern boundary of the survey area and in the San Gabriel Mountains in the northeastern part. Elevation ranges from 1,000 to 2,700 feet. The soils in this map unit formed in residuum from slate and granitic rock.

This map unit makes up about 3 percent of the survey area. Friant soils make up about 46 percent of the map unit, and Vista soils make up about 32 percent. Soils and miscellaneous areas of minor extent make up the rest.

Friant soils are well drained. They consist of sandy loam, fine sandy loam, and light loam and overlie hard slate bedrock at a depth of 6 to 20 inches. The surface layer is dominantly fine sandy loam and is medium acid or slightly acid. Slopes range from 15 to 75 percent.

Vista soils are well drained. They consist of coarse sandy loam and overlie weathered granitic rock at a depth of 20 to 40 inches. The surface layer is dominantly coarse sandy loam and is neutral or slightly acid. Slopes range from 30 to 50 percent.

Soils and miscellaneous areas of minor extent are Soper soils, Soper Variant soils, Xerorthents, Rock outcrop, and Urban land. Soper soils are well drained. They have a surface layer of gravelly or cobbly sandy loam or loam and a subsoil of cobbly sandy clay loam. Soper Variant soils are well drained. They have a surface layer of sandy loam or loam and a subsoil of sandy clay loam. The properties of Xerorthents, Rock outcrop, and Urban land vary greatly.

The soils in this map unit are used mainly for watershed, wildlife habitat, recreational purposes, and urban development. Some areas have scenic value. The shallow to moderate depth to bedrock and steep slopes are severe limitations to the use of these soils.

9. Saugus-Soper-Millsholm

Deep, moderately deep, and shallow, moderately steep and steep, well drained loams and gravelly sandy loams on hills and mountains

This map unit is mainly in the Santa Susana and San Gabriel Mountains in the northeastern part of the survey area. A small acreage is on foothills in the western part of the Valley. Elevation ranges from 900 to 2,600 feet. The soils in this map unit formed in residuum from soft to hard sandstone, shale, and conglomerate.

This map unit makes up about 7 percent of the survey area. Saugus soils make up about 42 percent of the map unit, Soper soils make up about 25 percent, and Millsholm soils make up about 17 percent. Soils and miscellaneous areas of minor extent make up the rest.

Saugus soils are well drained. They consist of sandy loam, fine sandy loam, and loam and overlie soft shale and sandstone at a depth of 40 to 60 inches. The surface layer is dominantly loam and is slightly acid or neutral. Slopes range from 15 to 50 percent.

Soper soils are well drained. They have a surface layer of gravelly or cobbly sandy loam and a subsoil of gravelly or cobbly sandy clay loam. They overlie weathered conglomerate or sandstone at a depth of 24 to 40 inches. The surface layer is dominantly gravelly sandy loam and is slightly acid. Slopes range from 15 to 50 percent.

Millsholm soils are well drained. They consist of loam and silty clay loam and overlie hard sandstone and shale at a depth of 10 to 20 inches. The surface layer is dominantly loam and is medium acid. Slopes range from 30 to 50 percent.

Soils and miscellaneous areas of minor extent are Balcom, Gaviota, and Gazos soils, Xerorthents, and Urban land. Balcom soils are well drained. They are silty clay loam and clay loam and are 23 to 40 inches deep to bedrock. Gaviota soils are somewhat excessively drained. They are sandy loam or fine sandy loam and are 10 to 20 inches deep. Gazos soils are well drained. They are silty clay loam and are 24 to 40 inches deep. The soil properties of Urban land and Xerorthents vary greatly.

The soils in this map unit are used mainly for watershed, wildlife habitat, recreational purposes, urban development, and pasture.

Steep slopes and depth to bedrock are serious limitations to intensive land uses and to urban development.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for landscaping and construction; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Tujunga series, for example, was named for the town of Tujunga in Los Angeles County.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Soboba gravelly loamy sand, 0 to 2 percent slopes, is one of several phases within the Soboba series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes, soil associations, and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Gazos-Balcom complex, 30 to 50 percent slopes, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. No soil associations are in this survey area.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. No undifferentiated groups are in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Badland is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 1, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

At the end of each map unit description, the gardening and landscaping group in which the soils are placed is given. These groups are described in the section "Gardening and landscaping groups."

Soil descriptions and potentials

100—Anacapa sandy loam, 2 to 9 percent slopes. This gently sloping and moderately sloping soil is well drained and is on alluvial fans and in narrow valleys. Elevation ranges from 800 to 1,200 feet. This soil formed in young alluvium derived mostly from sandstone and shale. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is grayish brown, mildly alkaline sandy loam about 24 inches thick. The underlying material is brown and pale brown, calcareous sandy loam to a depth of 48 inches and is stratified, pale brown, calcareous loamy sand and gravelly coarse sandy loam to a depth of 72 inches. A few small lime segregations are below a depth of 24 inches. Permeability is moderately rapid, and available water capacity is 5 to 7 inches. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Effective rooting depth is 60 inches or more.

Included with this soil in mapping are areas too small to be mapped separately at the scale used. About 5 percent of this map unit is Mocho loam, and about 10 percent is Capistrano fine sandy loam; these soils have slopes of 2 to 9 percent. About 5 percent is small areas of gravelly soils that are mostly along streams. Gravel makes up 30 percent, by volume, of these soils to a depth of 50 inches and about 50 percent below this depth. A few cobbles are scattered throughout the profile of these gravelly included soils to a depth of about 50 inches. About 10 percent of this map unit is Urban land. Also included are small areas in which a small amount of imported soil material has been mixed with the surface layer and small areas from which some soil material has been removed.

This soil is used mainly for citrus. In some areas it is used for special crops or for urban development.

This soil is well suited to citrus. Erosion is a problem in the more sloping areas, especially during the winter, but can be controlled by establishment of a temporary cover in winter. If the soil between the trees is not cultivated, a thin mulch of chipped woody prunings or other imported mulch can be applied. Accumulated runoff should be diverted to a waterway. Soil compaction is a problem between tree rows, but no corrective action is very effective. Some compaction can be prevented by minimizing vehicle traffic and by keeping off the soil when it is wet. Nitrogen is the main fertilizer needed for citrus crops. Application of potassium or phosphorous fertilizer generally is not needed.

If this soil is used for truck crops or other special crops, it should be kept friable and porous. Growing green manure crops in winter, returning all crop residue to the soil, and applying manure help to maintain and improve soil tilth and fertility. Erosion is a problem if the soil is left bare during the rainy season.

In undisturbed areas the Anacapa soil is fairly porous and is well aerated. In some areas compaction is moderate to severe because of foot and vehicle traffic, building activities, and past farming practices. To increase plant growth and water penetration, compacted soil should be broken up and lifted while it is dry or is only slightly moist. Keeping off the soil when it is wet prevents compaction. This soil is low in organic-matter content. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

This soil is neutral or mildly alkaline to a depth of 20 to 40 inches and is moderately alkaline and calcareous below this depth. This soil reaction is satisfactory for most plants, but acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content. The application of iron chelate can be beneficial to these plants.

Because this soil is on fans and in small valleys, some air drainage occurs. Frost occurs less frequently than on the Valley floor, but the growth of citrus and hibiscus is marginal. Frost damage is infrequent in some areas, but in other areas these plants may survive only if they are protected by buildings, covers, or heaters.

This soil retains about 1 1/5 to 1 4/5 inches of water per foot of soil after wetting. Lawn grasses and garden plants require application of about 1 inch of water at an interval of 4 or 5 days during summer. In periods of moderate temperature, watering these plants at an interval of about 7 to 10 days is sufficient. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between watering and the amount of water applied at a time can be doubled or tripled.

In places runoff from adjacent hills and small waterways causes erosion and deposition. Runoff from local sources, especially from paved areas and roofs, sometimes has volume and velocity that cause gullying and other damage. Erosion, runoff, and deposition are greatest when the natural vegetation is removed and grading for urban development is incomplete. Before the rainy season begins in winter, grading and trenching should be completed and a system of street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

If this soil is used as a building site, it has no serious soil limitations. It is free of stones and and is not limited by depth to bedrock or to a high water table. Trenching and grading can be done by standard procedures. The soil is relatively low in clay content and is low in organic-matter content. It has low shrink-swell potential. Gardening and landscaping group A.

101—Anacapa-Urban land complex, 0 to 2 percent slopes. This map unit is nearly level and is in scattered areas throughout the Valley. It is about 50 percent Anacapa sandy loam that has slopes of 0 to 2 percent, 25 percent Urban land, 10 percent Xerorthents, 7 percent Capistrano fine sandy loam that has slopes of 0 to 2 percent, 4 percent Mocho loam that has slopes of 0 to 2 percent, and 4 percent San Emigdio sandy loam that has slopes of 0 to 2 percent. The components of this map unit are too small in extent to be mapped separately at the scale used. Elevation ranges from 700 to 1,200 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Anacapa soil in this complex is in vacant lots, small fields, lawns, and gardens and in other areas that have not been disturbed by urban development. This Anacapa soil is well drained and formed in young alluvium derived mostly from sandstone and shale.

Typically, the surface layer of the Anacapa soil is grayish brown, mildly alkaline sandy loam about 24 inches thick. The underlying material is brown and pale brown, calcareous sandy loam to a depth of 48 inches and is somewhat stratified, pale brown, calcareous coarse sandy loam and gravelly coarse sandy loam to a depth of 72 inches. A few small lime segregations are below a depth of 24 inches. In places the surface layer has been modified by the addition of a thin layer of imported soil material or by the spreading of gravelly material over the surface. Permeability is moderately rapid, and available water capacity is 5 to 7 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

Urban land consists of areas covered by roads, parking lots, houses, and other buildings and of other paved and covered areas that are not suitable for plants. Before structures were built in these areas, minor grading was done. Fill material consisting of sand, gravel, crushed rock, or other imported mineral material was added in some areas. Additions of soil material and modifications to the original Anacapa soil are mostly 12 to 20 inches thick. Except for these additions and modifications, the soil material has a profile similar to that of the Anacapa soil.

The Xerorthents in this complex are nearly level, altered soils. In most places soil and other earthy material have been spread over the Anacapa soil to a depth of more than 20 inches. In some places layers of the

Anacapa soil have been removed, overturned, or mixed so that the resulting soil material no longer resembles the Anacapa soil. Approximately 20 acres along March Boulevard, between Roscoe Boulevard and Stagg Street, is covered by crushed calcareous shale and other soil material to a depth of 24 inches or more. The soil properties of these Xerorthents are somewhat similar to those of the Anacapa soil in this complex. Permeability is moderately rapid to moderately slow, and available water capacity is 6 to 8 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

Small areas of soils in which gravel makes up as much as 30 percent of the profile are also in this map unit.

The Anacapa soil in this map unit has many favorable features and has no serious limitations to use for urban development. A wide variety of trees, shrubs, flowers, fruits, and ground covers grow well.

In undisturbed areas the Anacapa soil is fairly porous and is well aerated. In some areas compaction is moderate to severe because of foot and vehicle traffic, building activities, and past farming practices. To increase plant growth and water penetration, compacted soil should be broken up and lifted while it is dry or is only slightly moist. Keeping off the soil when it is wet prevents compaction. The Anacapa soil is naturally low in organic-matter content. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Anacapa soil is neutral or mildly alkaline to a depth of 20 to 40 inches and is moderately alkaline and calcareous below this depth. This soil reaction is satisfactory for most plants, but acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content. Application of iron chelate can be beneficial to these plants.

This map unit is on the sides and floor of the Valley. In winter, cold air settles to the ground and frost-sensitive plants are damaged or killed. Growth of some plants, for example, citrus and hibiscus, is marginal. These plants may be damaged or killed if they are not protected from frost. Local variation in temperature or the protection afforded by caves, buildings, and large trees may enable these plants to survive.

The Anacapa soil retains about 1 1/4 to 1 1/2 inches of water per foot of soil after wetting. Shallow-rooted plants and lawn grasses require application of about 1 inch of water at an interval of 4 or 5 days during periods of warm, long days. In periods of moderate temperature, these plants require watering at an interval of about 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between waterings and the amount of water applied at a time can be doubled or tripled.

This map unit is nearly level. A plant cover or mulch is not needed to control erosion and runoff. However, lawns, ground covers, and other plants that enhance the scenery can be planted to protect the soil.

If the Anacapa soil is used as a building site, it has no serious soil limitations. It is free of stones and is not limited by depth to bedrock or to a high water table. Trenching and grading can be done by standard procedures. The Anacapa soil is relatively low in clay content and is low in organic-matter content. It has low shrink-swell potential. Gardening and landscaping group: Anacapa part in group A, and Urban land part not assigned.

102—Badland. This map unit consists of steep and very steep escarpments and of less sloping barren areas adjacent to these escarpments. Badland has very little vegetation or is barren. The underlying geologic material is mainly weakly consolidated shale and sandstone. Most areas of Badland are at the head of drainageways, and slopes are mostly south facing. Erosion occurs so rapidly that plants do not become established and a soil mantle does not form.

Surface runoff is very rapid, and the erosion hazard is very high. A large amount of silt and debris washes from areas of Badland.

Included with this unit in mapping are soils and areas of Rock outcrop that are too small in extent to be mapped separately at the scale used. About 10 percent of the map unit has a soil mantle less than 10 inches thick; 5 percent, on smoother slopes, has a soil mantle 10 to 30 inches thick. About 5 percent consists of outcrops of several kinds of hard rock. A sparse to dense cover of brush grows in the areas that have a soil mantle.

Areas of Badland are not suited to plants. They are used for watershed.

Badland erodes very rapidly, and any activity on or near Badland tends to increase erosion and sedimentation. Fire should be excluded from Badland and from headwaters near Badland. Land downstream from Badland is hazardous because of flooding, deposition, and shifting channels. Gardening and landscaping group D.

103—Balcom silty clay loam, 9 to 15 percent slopes. This strongly sloping soil is well drained and is on foothills and ridgetops in the western and northwestern parts of the survey area. Elevation ranges from 800 to 2,100 feet. This soil formed in material that was weathered in place from soft shale and sandstone. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is light brownish gray, calcareous silty clay loam about 16 inches thick. The underlying material, to a depth of 37 inches, is light brownish gray, calcareous silty clay loam. White, calcareous shale is at a depth of 37 inches. Permeability is moderately slow, and available water capacity is about 5 to 7 inches. Surface runoff is medium, and the erosion hazard is moderate. Effective rooting depth is 26 to 40 inches.

Included with this soil in mapping are areas that are too small to be mapped separately at the scale used. About 2 percent of the map unit is Urban land. About 8 percent is dark gray clay that is about 40 inches deep to hard shale, and 5 percent is Gazos clay loam. Chualar sandy loam and San Emigdio sandy loam each make up 2 percent of the unit.

This soil is mostly in a cover of annual grasses and forbs. In most areas it is idle or is used for horse pasture. Some areas of this soil previously were used for citrus.

Because the slope and other soil features are sufficiently favorable, a large variety of crops can be grown. Because of urban expansion in the Valley and the isolated location of some areas, however, use of this soil for cultivated crops is unlikely.

If this soil is used for pasture, about half of the annual forage production should be left to protect the soil. If all of the forage is eaten or the plants are trampled by grazing animals, forage grows more slowly and is less abundant in succeeding years. If overgrazing is continued undesirable plants become established, the quality of forage is poor, and the hazard of erosion increases.

This soil is friable when moist and is hard when dry. Gardening and landscaping achieve better results if the soil is kept friable and porous. Keeping off the soil when it is wet and adding organic matter help to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

This soil is calcareous, and its content of lime varies considerably in different areas. Perennial plants and trees such as citrus may develop lime-induced chlorosis. Other lime-sensitive plants, for example, gardenias and azaleas, grow very poorly unless an imported acid soil that has a high content of organic matter is used. In some places these plants may need to be grown in containers.

Because this soil is on foothills, in most areas air drainage is good and frost occurs less frequently than on the Valley floor. Frost-sensitive plants, for example, citrus and hibiscus, survive in most areas.

After this soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing.

This soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days or of about 1 1/2 inches at an interval of 10 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

The hazards of erosion and siltation are moderate. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, and storm drains should be installed to remove runoff. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

This soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. During grading and trenching, shale and sandstone bedrock generally is encountered at a depth of 26 to 40 inches. Excavation of the bedrock is somewhat difficult. This soil has moderate shrink-swell potential and develops cracks when it dries. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group Bs.

104—Balcom silty clay loam, 15 to 30 percent slopes. This moderately steep soil is well drained and is on hills in the western part of the Valley. Elevation ranges from about 800 to 2,100 feet. This soil formed in material that was weathered in place from soft shale and sandstone. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is light brownish gray, calcareous silty clay loam about 16 inches thick. The underlying material, to a depth of 37 inches, is light brownish gray, calcareous silty clay loam that has a few fragments of weathered shale. White, calcareous shale is at a depth of 37 inches. Permeability is moderately slow, and available water capacity is about 5 to 7 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 23 to 40 inches.

Included with this soil in mapping are areas too small to be mapped separately at the scale used. About 3 percent of the map unit is Urban land. About 5 percent is Balcom silty clay loam, 9 to 15 percent slopes, on ridgetops and toe slopes. About 10 percent is dark gray clay that is about 40 inches deep to hard shale, and 5 percent is Gazos silty clay loam, 15 to 30 percent slopes.

This soil is used for watershed, wildlife habitat, and urban development.

In undisturbed areas this soil has a cover of annual grasses and forbs and, in places, native shrubs and trees. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if the cover was brush and heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, about half of the annual forage production should be left to protect the soil. If most of the forage is eaten or the plants are trampled by grazing animals, forage grows more slowly and is less abundant in succeeding years. Continued overgrazing increases the hazard of erosion.

This soil contains a moderately large amount of clay and is very hard when dry. Gardening and landscaping achieve better results if the soil is kept friable and porous. Keeping off the soil when it is wet and adding organic matter help to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

This soil is calcareous, and its content of lime varies considerably in different areas, especially where trenching and grading have left a large amount of lime near the surface. Perennial plants and trees such as citrus may develop lime-induced chlorosis. Other lime-sensitive plants, for example, gardenias and azaleas, grow very poorly unless an imported acid soil that has a high content of organic matter is used. In some places these plants may need to be grown in containers.

Because this soil is on foothills, in most areas air drainage is good and frost occurs less frequently than on the Valley floor. In most areas frost-sensitive plants, for example, citrus and hibiscus, are not seriously damaged.

In undisturbed areas this soil generally is about 23 to 40 inches deep to shale. However, after this soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing.

This soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days or of about 1 1/2 inches at an interval of 10 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

The hazards of erosion and siltation are high. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, and storm drains should be installed to remove runoff. Lawns, ivy, or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. A permanent inorganic mulch, for example, gravel, can be used along property boundaries. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

This soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. During grading and trenching, shale and sandstone bedrock generally is encountered at a depth of 23 to 40 inches. Excavation of the bedrock is somewhat difficult. This soil has moderate shrink-swell potential. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group Bs.

105—Balcom silty clay loam, 30 to 50 percent slopes. This steep soil is well drained and is on hills around the Valley. Elevation ranges mainly from 1,100 to 2,600 feet. This soil formed in material that was weathered in place from soft shale and sandstone. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 275 to 300 days.

Typically, the surface layer is light brownish gray, calcareous silty clay loam about 16 inches thick. The underlying material, to a depth of 37 inches, is light brownish gray, calcareous silty clay loam that has a few fragments of weathered shale. White, calcareous shale is at a depth of 37 inches. Permeability is moderately slow, and available water capacity is about 5 to 7 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 23 to 37 inches.

Included with this soil in mapping are areas too small to be mapped separately at the scale used. About 2 percent of this map unit is Urban land. About 5 percent is dark gray clay that is about 40 inches deep to hard shale; this clayey soil mainly has slopes of less than 30 percent and is on saddles and toe slopes. About 5 percent is Gazos clay loam, and 5 percent is a soil that is similar to Gazos clay loam but is underlain by soft shale. About 5 percent is a very shallow, severely eroded, steep soil on south-facing slopes; areas of this soil are indicated on the maps by a special symbol. Also included are a few areas of Balcom soils that have slopes of 50 to 65 percent.

This soil is used for watershed, wildlife habitat, and urban development.

Almost all areas of this soil have a cover of annual grasses and forbs and, in places, native shrubs and trees. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if the cover was brush and heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, about half of the annual forage production should be left to protect the soil. If all of the forage is eaten or the plants are trampled by grazing animals, forage grows more slowly and is less abundant in succeeding years. Continued overgrazing increases the hazard of erosion. Care should be taken to prevent gullying of paths and trails.

This soil has some properties that limit its use for urban development. Because of steep slopes, a large amount of imported material is needed for the construction of closely spaced roads and for leveling of building sites. Cut and fill slopes generally are excessively steep. Measures to control runoff need to be designed with considerable care because of the steep slopes. Structures and plant cover that are used to control runoff require careful maintenance. If measures to control runoff are minimal, only a low density of roads and houses can be constructed on this soil. Construction and revegetation should be completed before the rainy season begins.

This soil contains a moderately large amount of clay and is very hard when dry. Gardening and landscaping achieve better results if the soil is kept friable and porous. Keeping off the soil when it is wet and adding organic matter help to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

This soil is calcareous, and its content of lime varies considerably in different areas, especially where trenching and grading have left a large amount of lime near the surface. Perennial plants and trees such as citrus may develop lime-induced chlorosis, especially in the limy spots. Other lime-sensitive plants, for example, gardenias and azaleas, grow very poorly unless an imported acid soil that has a high content of organic matter is used. In some places these plants may need to be grown in containers.

Because this soil is on steep hills, in most areas air drainage is good and frost occurs less frequently than on the Valley floor. Frost-sensitive plants, for example, citrus and hibiscus, survive in most areas.

After this soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing. However, deep-rooted trees and shrubs can be grown successfully in bench areas where the fill material is thick.

This soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days or of about 1 1/2 inches at an interval of 10 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

Because of steep slopes, the hazards of erosion and siltation are high. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, and storm channels should be installed to remove runoff. Lawns, ivy, or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance. Provisions for fire control must be included in planning for urban development in fire-prone areas.

This soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. During grading and trenching, shale and sandstone bedrock generally is encountered at a depth of 23 to 37 inches. Excavation of the bedrock is somewhat difficult. Because of moderate shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group Bs.

106—Balcom silty clay loam, 50 to 75 percent slopes. This very steep soil is well drained and is on hills in the western part of the Valley. Elevation ranges from about 1,200 to 2,600 feet. This soil formed in material that was weathered in place from soft shale and sandstone. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 275 to 300 days.

Typically, the surface layer is light brownish gray, calcareous silty clay loam about 16 inches thick. The underlying material, to a depth of 37 inches, is light brownish gray, calcareous silty clay loam that has a few fragments of weathered shale. White, calcareous shale is at a depth of 37 inches. Permeability is moderately slow, and available water capacity is about 4 to 5 inches. Surface runoff is very rapid, and the erosion hazard is very high. Effective rooting depth is 23 to 40 inches.

Included with this soil in mapping are areas too small to be mapped separately at the scale used. About 5 percent of this map unit is Soper Variant sandy loam, 50 to 75 percent slopes, and 5 percent is Badland. About 10 percent is a steep, very shallow, severely eroded soil on south-facing slopes; areas of this soil are indicated on the maps by a special symbol.

This soil is used for watershed, wildlife habitat, and recreational purposes.

Because this soil is very steep, it is not suited to urban development in most areas. Limited development is feasible, however, on ridgetops and on toe slopes adjacent to less sloping soils.

This soil has a cover of annual grasses, forbs, and native shrubs and trees. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if the cover was brush and heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil. Gardening and landscaping group Bs.

107—Capistrano-Urban land complex, 0 to 2 percent slopes. This map unit is nearly level and is on the Valley floor. It is about 45 percent relatively undisturbed Capistrano fine sandy loam that has slopes of 0 to 2 percent, 30 percent Urban land, 10 percent Xerorthents, 5 percent Anacapa sandy loam that has slopes of 0 to 2 percent, 5 percent Conejo clay loam that has slopes of 0 to 2 percent, 3 percent Mocho loam that has slopes of 0 to 2 percent, and 2 percent Capistrano soils that are gravelly throughout the profile. The gravelly Capistrano soils are mainly along the western side of Pacoima Wash. Elevation ranges from about 700 to 1,000 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Capistrano fine sandy loam in this complex is in vacant lots, playing fields, small orchards, lawns, and gardens and in other relatively undisturbed areas. This Capistrano soil is well drained and formed in young alluvium derived from mixed rock sources.

Typically, the surface layer of the Capistrano soil is about 41 inches thick. It is grayish brown, slightly acid and neutral fine sandy loam in the upper 20 inches and is brown, neutral fine sandy loam in the lower 21 inches. The underlying material, to a depth of 72 inches, is somewhat stratified, pale brown, mildly alkaline loam. In places the surface layer has been modified by the addition of imported soil material, gravel, organic matter, and miscellaneous debris. These modifications to the surface layer are less than 20 inches thick, and the characteristics of modified soil are not greatly different from those of undisturbed Capistrano soil. Permeability is moderately rapid, and available water capacity is 6 to 9 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, parking lots, houses, and other buildings and of other paved and covered areas that are not suitable for plants. Before structures were built in these areas, generally minor grading was done. Fill consisting of sand, gravel, crushed rock, or other imported mineral material was added in some areas. Modifications to the original soil are mostly 12 to 20 inches thick. The soil underlying urban structures is generally similar to Capistrano fine sandy loam. Surface runoff is mainly very rapid, but ponding occurs for brief periods in a few small areas.

The Xerorthents in this complex are nearly level, altered soils. In some places a layer of soil or earthy material more than 20 inches thick has been imported and spread over the original Capistrano soil. In other places layers of the Capistrano soil have been overturned, mixed, or removed; properties of this altered soil material vary greatly within a short distance. Some of the soil properties of Xerorthents are similar to those of the Capistrano soil. Permeability is moderately rapid to moderately slow, and available water capacity is about 6 to 8 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

Nearly all areas of this map unit are used for urban development.

The Capistrano soil in this complex has slight limitations if it is used for urban development. A wide variety of trees, shrubs, flowers, fruits, and ground covers grow well.

In undisturbed areas the Capistrano soil is fairly porous and is well aerated. In some areas compaction is moderate to severe because of foot and vehicle traffic, building activities, and past farming practices. To increase plant growth and water penetration, compacted soil should be broken up and lifted while it is dry or is only slightly moist. Keeping off the soil when it is wet prevents compaction. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Capistrano soil is slightly acid or neutral to a depth of about 40 inches and is mildly alkaline to a depth of more than 60 inches. It lacks free lime to a depth of more than 60 inches. Lime-induced chlorosis is not a problem. Acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content.

Most areas of this map unit are on the Valley floor. In winter the cold air settles to the ground and causes frost damage to some plants. Growth of sensitive plants, for example, citrus and hibiscus, is marginal or the plants are severely damaged, depending upon local variations in temperature and the amount of protection afforded by buildings or other protective cover.

The Capistrano soil retains about 1 1/4 to 1 1/2 inches of water per foot of soil after wetting. Shallow-rooted plants and lawn grasses require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 1 inch of water at an interval of 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between waterings and the amount of water applied at a time can be doubled or tripled.

Because this map unit is nearly level, plant cover or mulch is not essential to control erosion. However, lawns, shrubs, trees, and other ground covers have esthetic value and also help to protect the soil.

If the Capistrano soil is used as a building site, it has no significant soil limitations. It is free of stones and is not limited by depth to bedrock or to a high water table. Trenching and grading can be done by standard procedures. The Capistrano soil is relatively low in clay content and is low in organic-matter content. It has low shrink-swell potential. Gardening and landscaping group: Capistrano part in group A, and Urban land part not assigned.

108—Capistrano-Urban land complex, 2 to 9 percent slopes. This gently sloping to moderately sloping map unit is in small narrow valleys and on the sides of the main Valley. It is about 45 percent relatively undisturbed Capistrano fine sandy loam that has slopes of 2 to 9 percent, 30 percent Urban land, 10 percent Xerorthents, 10 percent Anacapa sandy loam, 2 to 9 percent slopes, 3 percent Mocho loam that has slopes of 2 to 9 percent, and 2 percent Conejo clay loam that has slopes of 2 to 9 percent. Elevation ranges from about 700 to 1,200 feet.

The Capistrano fine sandy loam in this complex is in vacant lots, playing fields, small orchards, lawns, and gardens and in other relatively undisturbed areas that are suitable for plants. This soil is well drained and formed in young alluvium from mixed rock sources.

Typically, the surface layer of the Capistrano soil is about 41 inches thick. It is grayish brown, slightly acid and neutral fine sandy loam in the upper 20 inches and is brown, neutral fine sandy loam in the lower 21 inches. The underlying material, to a depth of 72 inches, is somewhat stratified, pale brown, mildly alkaline loam. Permeability is moderately rapid, and available water capacity is 6 to 9 inches. Surface runoff is slow and medium, and the erosion hazard is slight and moderate. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, parking lots, and buildings and of other paved and covered areas that are not suitable for plants. Most cuts and fills in graded areas are shallow. Some areas have a blanket of sand, gravel, crushed rock, or other imported mineral material. Modifications to the soil are mostly 12 to 20 inches thick. Surface runoff is very rapid.

The Xerorthents in this map unit are altered soils that lack consistent soil characteristics. In places a layer of imported soil or earthy material more than 20 inches thick has been spread over the original Capistrano soil. In other places, the upper layers of the Capistrano soil have been overturned, mixed, or removed or material has been added so that soil characteristics vary greatly within a short distance. Enough of the original Capistrano soil remains so that soil properties can be estimated. Permeability is moderately rapid to moderately slow, and available water capacity is about 5 to 8 inches. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Effective rooting depth is 60 inches or more.

Most areas of this map unit are used for urban development. A few areas are in vacant lots and small fields.

The Capistrano soil in this map unit has many favorable features and has no serious limitations to urban use. A wide variety of trees, shrubs, flowers, fruits, and ground covers grow well.

In undisturbed areas the Capistrano soil is fairly porous and is well aerated. In some areas compaction is moderate to severe because of foot and vehicle traffic, building activities, and past farming practices. To increase plant growth and water penetration, compacted soil should be broken up and lifted while it is dry or is only slightly moist. Keeping off the soil when it is wet prevents compaction. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Capistrano soil is neutral or mildly alkaline to a depth of 20 to 40 inches and is moderately alkaline and calcareous below this depth. This soil reaction is satisfactory for most plants, but acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content. Application of iron chelate is beneficial to some of these plants.

This map unit is on fans and in small valleys. In winter the cold air settles in these low places. The frost hazard varies considerably in different areas. Growth of plants such as hibiscus and citrus is marginal, and these plants commonly are damaged unless they have the protection afforded by covers and house projections.

The Capistrano soil retains about 1 1/4 to 1 1/2 inches of water per foot of soil after wetting. Shallow-rooted plants and lawn grasses require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature, these plants require application of water at an interval of 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between waterings and the amount of water applied at a time can be doubled or tripled.

This map unit receives runoff from adjacent hills and small waterways and from roofs, paved areas, and yards. Slope gradient is sufficient to give runoff water a velocity that causes erosion and deposition. A lawn or other ground cover is needed to control erosion. The accumulating runoff should be collected and removed by a system of street gutters, paved channels, and storm drains.

If the Capistrano soil is used as a building site, it has no significant soil limitations. It is free of stones and is not limited by depth to bedrock or to a high water table. Trenching and grading can be done by standard procedures. The Capistrano soil is relatively low in content of clay and organic matter. It has low shrink-swell potential. Gardening and landscaping group: Capistrano part in group A, and Urban land part not assigned.

109—Chualar-Urban land complex, 2 to 9 percent slopes. This gently sloping and moderately sloping map unit is on low terraces on the northwestern and northern sides of the Valley. It is about 55 percent Chualar sandy loam that has slopes of 2 to 9 percent, 25 percent Urban land, 10 percent Xerorthents, and 10 percent included soils. The components of this complex are closely intermingled on the landscape and are too small in extent to be mapped separately at the scale used. Elevation ranges from 700 to 1,500 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Chualar sandy loam part of this complex is in vacant lots, small fields used for special crops, lawns and landscaped areas. This Chualar soil is well drained and formed in old alluvium derived mainly from sandstone and granitic rock.

Typically, the surface layer of the Chualar soil is brown, neutral sandy loam about 19 inches thick. The subsoil is brown, mildly alkaline sandy clay loam about 51 inches thick. The substratum is brown, mildly alkaline clay loam to a depth of 82 inches. In places the surface layer has been modified by the removal of soil material or by the addition of imported soil material. These modifications are 4 to 20 inches thick. Permeability is moderately rapid in the surface layer and moderately slow in the subsoil. Available water capacity is about 9 to 10 inches, but moisture is removed slowly from the lower part of the profile. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, parking lots, buildings and of other covered areas not suitable for plants. During construction, paving, and grading operations, the original Chualar soil was cut and moved about and was mixed with other material. Gravel and other imported fill materials were added. The soil material underlying Urban land is similar to Xerorthents in this complex. Surface runoff is very rapid.

The Xerorthents in this complex are gently sloping and consist mostly of soil material from the Chualar soil. The original surface layer and part of the subsoil of the Chualar soil have been overturned, transported, and mixed, or the Chualar soil has been covered by a layer of imported soil material 2 feet thick or more. A small amount of gravel and other fill materials have been added in some areas. In most places the lower horizons of the Chualar soil remain undisturbed. The soil properties of these Xerorthents are somewhat similar to those of the Chualar soil. Permeability is moderately slow or slow, and available water capacity is 9 to 10 inches. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Effective rooting depth commonly is about 60 inches. Rooting depth and available water capacity vary greatly from place to place.

Included with this complex in mapping are soils that are similar to this Chualar soil. These included soils consist of nearly equal proportions of places where the subsoil is reddish brown, where sandstone bedrock is at a depth of 40 to 60 inches, and where the lower part of the subsoil has lime segregations.

This map unit is used for urban development, lawns, gardens, pasture, and recreational purposes.

The Chualar soil in this map unit has many favorable soil features and has no serious limitations to urban use. The subsoil has a moderate amount of clay and moderately slow permeability. A wide variety of trees, shrubs, flowers, fruits, and ground covers grow well except in small spots where the subsoil is exposed.

In undisturbed areas the surface layer of the Chualar soil is fairly porous and is well aerated. In some areas the soil has been moderately to severely compacted by foot and vehicle traffic, building activities, and past farming practices. To increase plant growth and water penetration, compacted soil should be broken up and lifted while it is dry or only slightly moist. Keeping off the soil when it is wet helps to prevent compaction. Where grading operations, construction activities, or erosion have exposed the subsoil, the soil is very hard when dry and is sticky when wet. Adding organic matter to the soil improves soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability. Adding a large amount of organic matter is particularly important in areas where the subsoil is exposed so that the soil is more favorable for plants and is easier to manage.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The surface layer of the Chualar soil is slightly acid or neutral. The subsoil is slightly acid to mildly alkaline but is not calcareous. This soil reaction is satisfactory for most plants, but acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content.

This map unit is on low hills and short slopes. The frost hazard varies considerably from place to place, but most frost-sensitive plants, for example, citrus and hibiscus, rarely are severely damaged.

The Chualar soil retains about 1 1/4 to 1 1/2 inches of water per foot of soil after wetting. Shallow rooted plants and lawn grasses require application of about 1 inch of water at an interval of 4 or 5 days during periods of warm, long days. In periods of moderate temperature, these plants require application of water at an interval of about 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between watering and the amount of water applied at a time can be doubled.

The velocity of runoff water is sufficient to cause erosion and siltation if the surface is not protected. Erosion and runoff are not difficult to control, except where runoff is concentrated from a large area. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, paved channels, and storm drains should be installed to remove runoff. Grading needs to be properly planned. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

The Chualar soil has no serious limitations if it is used as a homesite or for roads, utilities, and other urban developments. Grading and trenching can be done by standard procedures. The surface layer of the Chualar soil is relatively low in clay content and has low shrink-swell potential. The rest of the profile has a moderately large amount of clay and has moderate shrink-swell potential. Concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group: Chualar part in group Bc, and Urban land part not assigned.

110—Conejo-Urban land complex, 0 to 2 percent slopes. This nearly level map unit is on fans and in small valleys. It is about 50 percent Conejo clay loam that has slopes of 0 to 2 percent, 35 percent Urban land, 8 percent Xerorthents, and 7 percent included soils. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 700 to 1,000 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Conejo clay loam in this complex is in lawns, vacant lots, landscaped areas, and small fields. This Conejo soil is well drained and formed in young alluvium from mixed rock sources.

Typically, the surface layer of the Conejo soil is about 35 inches thick. It is grayish brown, slightly acid clay loam in the upper 20 inches and is brown, mildly alkaline clay loam in the lower 15 inches. The underlying material, to a depth of 75 inches, is somewhat stratified, pale brown, moderately alkaline clay loam and loam. Below a depth of 62 inches, the soil is calcareous and has lime segregations. In places the surface layer has been modified by the removal of soil or by the addition of imported earthy material. These modifications are less than 20 inches thick. Permeability is moderately slow, and available water capacity is about 10 to 11 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, parking lots, and buildings and of other covered areas not suitable for plants. Before structures were built and areas were paved, mostly shallow cuts and fills were made. Some areas were covered by sand, gravel, crushed rock, or other imported mineral material. Most of the modifications to the original soil are 12 to 20 inches thick. Surface runoff generally is very rapid, but some small areas are subject to shallow ponding for brief periods.

The Xerorthents in this complex consist of nearly level soils that have been graded and mixed to a depth of about 2 to 4 feet. In places a layer of imported soil material about 2 or 3 feet thick has been spread over the original soil. Some of the imported soil material is sandy or gravelly. Composition of these Xerorthents varies from place to place. Because much of the soil material is from areas of the Conejo soil, most soil properties, for example, effective rooting depth, are similar to those of the Conejo soil.

Included with this complex in mapping are areas of Mocho loam and San Emigdio sandy loam. These included soils have slopes of 0 to 2 percent.

Most areas of this map unit are used for urban development. Some areas are used for field crops and truck crops.

The Conejo soil in this complex has many favorable features for urban development and is suited to a wide variety of plants.

The Conejo soil is moderately high in clay content and is naturally low in organic-matter content. It is hard when dry. Compaction from vehicle and foot traffic increases the hardness and density of the soil. To increase plant growth and water penetration, compacted soil should be broken up when it is dry or is only slightly moist. Keeping off the soil when it is wet helps to prevent compaction. Adding organic matter to the soil improves soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, peat moss, sawdust, wood chips, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers generally is good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Conejo soil is slightly acid to mildly alkaline in the upper part of the profile and is mildly alkaline or moderately alkaline in the lower part. It is noncalcareous to a depth of 60 inches or more. Acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content. Other plants, for example, citrus, are not susceptible to chlorosis on this soil.

This map unit is mostly in the lower parts of the Valley where cold air tends to settle. The frost hazard is greater in these areas than on the foothills. Survival of plants such as hibiscus is marginal or these plants are severely damaged, depending on variations in temperature, the protection provided by building projections, or protective measures that are applied.

The Conejo soil retains about 1 3/4 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses, require application of about 1 to 1 1/2 inches of water at an interval of 5 days in summer. In periods of moderate temperature and daylength, these plants require application of about 3/4 to 1 inch of water at an interval of about 7 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between watering and the amount of water applied at a time can be doubled or tripled. Well-established, drought-resistant ground covers and shrubs require watering much less frequently than lawns, but the soil should be thoroughly wetted about once a month during summer.

Because the erosion hazard is slight and runoff is slow, a plant cover is not essential. However, lawns and landscape plantings help to protect the soil and also enhance the scenery.

The Conejo soil has moderate limitations if it is used as a homesite or for roads, utilities, and other urban developments. Grading and trenching can be done by standard procedures. This Conejo soil has moderate shrink-swell potential and develops cracks when it dries. Because of shrink-swell potential, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group: Conejo part in group Bc, and Urban land part not assigned.

111—Conejo-Urban land complex, 2 to 9 percent slopes. This gently sloping and moderately sloping map unit is in small narrow valleys and along the edge of the main Valley. It is about 50 percent Conejo clay loam that has slopes of 2 to 9 percent, 35 percent Urban land, 10 percent Xerorthents, and 5 percent included soils. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 700 to 1,100 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Conejo clay loam part of this complex is in lawns, vacant lots, landscaped areas, and small fields. This Conejo soil is well drained and formed in young alluvium from mixed rock sources.

Typically, the surface layer of the Conejo soil is about 35 inches thick. It is grayish brown, slightly acid clay loam in the upper 20 inches and is brown, mildly alkaline clay loam in the lower 15 inches. The underlying material, to a depth of 75 inches, is somewhat stratified, pale brown, moderately alkaline clay loam and loam. Below a depth of 62 inches, the soil is calcareous and has lime segregations. In places the surface layer has been modified by the addition of imported soil material, sand, or gravel and by the removal of some material. These modifications are less than 20 inches thick. Permeability is moderately slow, and available water capacity is about 10 to 12 inches. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, parking lots, and buildings and of other covered areas not suitable for plants. Before structures and pavement were placed in these areas, shallow to deep cuts and fills were made. Fill material consisting of sand, gravel, crushed rock, and other imported mineral material has been added in some areas. Much of the soil material underlying Urban land retains many of the characteristics of the original Conejo soil. Surface runoff is very rapid.

The Xerorthents in this complex consist of gently sloping soils that resulted from the grading and mixing of the Conejo soil and from the addition of imported soil and earthy material. The modifications to the original Conejo soil range from about 20 to 48 inches thick. The composition of these Xerorthents varies in different areas; but most of the soil properties are similar to those of the original Conejo soil, including permeability, available water capacity, runoff, erosion hazard, and effective rooting depth.

Included with this complex in mapping are areas of Mocho loam and San Emigdio sandy loam. These included soils have slopes of 2 to 9 percent.

Most areas of this map unit are used for urban developments. A few small areas are used for special crops.

The Conejo soil has many favorable features for urban development and is suited to a wide variety of plants.

The Conejo soil is moderately high in clay content and is low in organic-matter content. It is hard when dry. Compaction from foot and vehicle traffic increases the hardness and density of the soil. To increase plant growth and water penetration, compacted soil should be broken up when it is dry or only slightly moist. Keeping off the soil when it is wet helps to prevent compaction. Adding organic matter to the soil improves soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, peat moss, sawdust, wood chips, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers generally is good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Conejo soil is slightly acid to mildly alkaline in the upper part of the profile and is mildly alkaline or moderately alkaline to a depth of 60 inches or more. It is noncalcareous to a depth of 60 inches or more. Acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content. Other plants, for example, citrus, are not susceptible to chlorosis on this soil.

This map unit is mostly in the lower parts of the Valley where cold air tends to settle. Plants such as citrus require protection from frost during winter in some years.

The Conejo soil retains about 1 3/4 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 to 1 1/2 inches of water at an interval of 5 days during summer. In periods of moderate temperature and daylength, these plants require application of about 3/4 to 1 inch of water at an interval of 7 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between watering and the amount of water applied at a time can be doubled. Well-established, drought-resistant ground covers and shrubs require watering much less frequently than lawns, but the soil should be thoroughly wetted about once a month.

This map unit receives runoff from roofs, paved and planted areas, adjacent hillsides, and waterways. The slope gradient in most areas is sufficient that runoff causes erosion. At times debris and soil material are deposited downstream. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, paved channels, and storm drains should be installed to remove runoff. Grading needs to be properly planned. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

The Conejo soil has moderate limitations if it is used as a homesite or for roads, utilities, and other urban developments. Grading and trenching can be done by standard procedures. The Conejo soil has moderate shrink-swell potential and develops cracks when it dries. Because of shrink-swell potential, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group: Conejo part in group Bc, and Urban land part not assigned.

112—Cropley-Urban land complex, 0 to 2 percent slopes. This nearly level map unit is in the southwestern part of the Valley floor. It is about 45 percent Cropley clay that has slopes of 0 to 2 percent, 35 percent Urban land, 8 percent Xerorthents, and 12 percent included soils. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 700 to 800 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Cropley clay part of this complex is relatively undisturbed and is in fields, vacant lots, pastureland, lawns, and landscaped areas. This Cropley soil is well drained and formed in fine textured alluvium derived from shale.

Typically, the surface layer of the Cropley soil is dark gray, moderately alkaline clay about 36 inches thick. Below a depth of 22 inches, the surface layer is calcareous and has lime segregations. The next layer extends to a depth of 60 inches and is dark grayish brown, calcareous clay that has a few lime segregations. The underlying material, to a depth of 65 inches, is dark grayish brown and grayish brown, calcareous clay. In places the surface layer has been modified by the addition of less clayey soil, organic matter, or a thin layer of fill material. Permeability is slow, and available water capacity is about 7 to 9 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more, but roots do not readily penetrate the clay.

The Urban land part of this complex consists of areas covered by roads, parking lots, and buildings and of other covered areas not suitable for plants. Before structures were placed in these areas, minor grading was done. In many areas fill material consisting of sand, gravel, and crushed rock and other imported material was added. The fill ranges from a few inches to many inches thick. Surface runoff generally is very rapid, but in some small areas shallow ponding occurs for brief periods.

The Xerorthents in this complex are nearly level areas in which the original Cropley soil has been covered by imported soil material. Most of the imported soil material contains less clay than the buried Cropley soil. This material varies greatly in texture; it is mostly loamy, but in some places it contains crushed shale or sandstone, hard rock fragments, sand, and gravel. Generally, the imported material has not been mixed with the underlying soil and is about 20 to 36 inches thick. Permeability, available water capacity, surface runoff, erosion hazard, and effective rooting depth of these Xerorthents are similar to those of the Cropley soil.

Included with this complex in mapping are soils that are similar to this Cropley soil, except they have a grayish brown or dark grayish brown surface layer and, in some small areas, are calcareous throughout the profile. A small area of these included soils below the Sepulveda Flood Control Basin is poorly drained. These included soils make up about 8 percent of the mapped acreage. Also included are areas of Conejo clay loam and Mocho loam; these soils have slopes of 0 to 2 percent and make up about 4 percent of the mapped acreage.

This map unit is used for urban development, field crops, lawns, and landscaping.

The Cropley soil has soil features that limit its use for landscaping and crops and as a building site. The main limitation of this soil is its high clay content.

Root penetration in the Cropley soil is less deep and less rapid than in more porous soils. The growth of some landscape plants is slow or is unsatisfactory. An informed nurseryman should be consulted before plant selection is made. Some young trees and shrubs require staking and bracing to protect them from windthrow during wet, windy periods.

Because the surface layer of the Cropley soil is very hard when dry and very sticky when wet, site preparation and planting are difficult. Working the soil when it is wet increases its hardness when it dries. Adding organic matter helps to make the soil more porous and easier to work. A large amount of organic matter should be applied annually to improve and maintain soil tilth. Suitable organic matter includes garden compost, steer manure, peat moss, sawdust, wood chips, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants and truck crops respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits and flowers generally is good even if no supplemental fertilizer is applied.

The Cropley soil is mildly alkaline or moderately alkaline and is noncalcareous to a depth of 20 to 30 inches. Below this depth the soil is moderately alkaline and is calcareous. Lime-induced chlorosis generally is not a problem unless the soil is wet for long periods. Acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content.

This map unit is on the Valley floor, where cold air settles. The soils are not suited to some plants, for example, citrus and hibiscus, unless they are protected from frost.

The Cropley soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during the summer. In periods of moderate temperature, these plants require application of about 3/4 to 1 inch of water at an interval of 7 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between watering and the amount of water applied at a time can be doubled.

If the Cropley soil is used for field and truck crops, water requirements are similar to those of lawns. Crops that are young in summer or that mature in spring and fall use about 0.1 to 0.15 inch of water per day. Allowing for an average water loss of about 16 percent, 3 to 4 inches of water should be applied at a 25- to 35-day interval. A crop that matures in summer requires application of a similar amount of water but at a 10- to 15-day interval. Adding crop residue and other organic matter to the soil helps to improve soil tilth, and porosity and to increase plant growth.

Soil erosion is not a hazard on the Cropley soil. Where runoff is obstructed by structures or by low ridges of soil, shallow ponding occurs for brief periods.

The Cropley soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. It has high shrink-swell potential and develops large, deep cracks when it dries. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Below a depth of 3 feet, moisture change is less and design requirements for foundations can be less stringent. Gardening and landscaping group: Cropley part in group Cc, and Urban land part not assigned.

113—Cropley-Urban land complex, 2 to 9 percent slopes. This gently sloping and moderately sloping map unit is along the southwestern side of the Valley. It is about 45 percent Cropley clay that has slopes of 2 to 9 percent, 40 percent Urban land, 10 percent Xerorthents, and 5 percent included soils. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 700 to 900 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Cropley clay part of this complex is relatively undisturbed. It is in open fields, vacant lots, pastureland, lawns, and landscaped areas. This Cropley soil is well drained and formed in fine textured alluvium derived from shale and sandstone.

Typically, the surface layer of the Cropley soil is dark gray, moderately alkaline clay about 36 inches thick. Below a depth of 22 inches, the soil is calcareous and has lime segregations. The next layer extends to a depth of 60 inches and is dark grayish brown, calcareous clay that has a few lime segregations. The underlying material, to a depth of 65 inches, is dark grayish brown and grayish brown, calcareous clay. In places the surface layer has been modified by the addition of organic matter or a thin layer of imported soil material. Permeability is slow, and available water capacity is about 7 to 9 inches. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. Effective rooting depth is 60 inches or more, but roots do not readily penetrate the clay.

The Urban land part of this complex consists of areas covered by roads, parking lots, and buildings and of other covered areas not suitable for plants. Before structures were placed in these areas, small areas were leveled by grading. In many areas fill consisting of sand, gravel, crushed rock, and other material was added to blanket the clay. The fill ranges from a few inches to many inches thick. Surface runoff is very rapid.

The Xerorthents in this complex are altered soils in areas adjacent to buildings, in parking strips, and in other landscaped areas. These soils consist wholly or partly of imported soil material to a depth of 20 inches or more. Texture of the imported material varies. It is mostly loamy but in places it is crushed shale, sandstone, sandy soil, rock fragments, and organic matter. Permeability, available water capacity, surface runoff, erosion hazard, and effective rooting depth of these Xerorthents are similar to those of the Cropley clay in this complex.

Included with this complex in mapping are soils that are similar to this Cropley soil, except they have a grayish brown or brown surface layer or are calcareous throughout the profile. Also included are areas of Mocho loam and Conejo clay loam; these soils have slopes of 2 to 9 percent.

This map unit is used mostly for urban development. A few small areas are used for field crops.

If the Cropley soil is used for landscaping and crops or as a building site, its main limitation is a high clay content.

Roots do not penetrate the Cropley soil so deeply or rapidly as roots in more porous soils. Growth of some landscape plants is slow or unsatisfactory. An informed nurseryman should be consulted before plant selection is made. Some young trees and shrubs require staking and bracing to prevent windthrow during wet, windy periods.

Because the surface layer of the Cropley soil is very hard when dry and very sticky when wet, site preparation and planting are difficult. Working the soil when it is wet and sticky increases its hardness after it dries. Adding organic matter helps to make the soil more porous and easier to work. A large amount of organic matter should be added each year to maintain and improve soil tilth. Suitable organic matter includes garden compost, steer manure, peat moss, sawdust, wood chips, and commercial organic soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants and truck crops respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits and flowers generally is good even if no supplemental fertilizer is applied.

The Cropley soil is mildly alkaline or moderately alkaline and is noncalcareous to a depth of 20 to 30 inches. Below this depth the soil is moderately alkaline and is calcareous. Lime-induced chlorosis generally is not a problem unless the soil is wet for long periods. Acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content.

This map unit is on fans in the lower part of the Valley, where cold air tends to settle. Frost-sensitive plants, for example, citrus and hibiscus, may be severely damaged by frost unless they are protected.

The Cropley soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during summer. In spring and fall these plants require application of about 3/4 to 1 inch of water at an interval of 7 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between watering and the amount of water applied at a time can be doubled or tripled.

If the Cropley soil is used for field and truck crops, water requirements are similar to those of lawn grasses. Crops that are young in summer or mature in spring and fall use about 0.1 to 0.15 inch of water per day. Allowing for an average water loss of about 16 percent, 3 to 4 inches of water should be applied at a 25- to 35-day interval. A crop that matures in summer requires application of a similar amount of water but at a 10- to 15-day interval. Adding crop residue and other organic material to the soil helps to improve soil tilth and porosity and to increase crop growth.

The velocity of runoff water is sufficient to erode loose soil and to cause deposition downslope. Rapid or careless irrigation can also cause erosion. The hazard of erosion is highest when the natural vegetation is removed and grading for urban development is incomplete. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, terraces, and storm channels should be installed to remove runoff. Only a small amount of compact, bare soil is eroded by minor sheet flow. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover generally can control sheet erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the hazard of erosion is slight but the plants require care and the structures require maintenance. On short, steep slopes between large leveled building sites, control of runoff is particularly important.

The Cropley soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. It has high shrink-swell potential and develops large, deep cracks when it dries. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Below a depth of 3 feet, moisture change is less and design requirements for foundations can be less stringent. Gardening and landscaping group: Cropley part in group Cc, and Urban land part. not assigned.

114—Danville-Urban land complex, 0 to 2 percent slopes. This nearly level map unit is in the north-central part of the Valley floor. It is about 40 percent Danville silty clay loam that has slopes of 0 to 2 percent, 35 percent Urban land, 10 percent Xerorthents, 8 percent Cropley clay that has slopes of 0 to 2 percent, and 7 percent included soils. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from 850 to 1,000 feet. Average annual precipitation is about 16 inches, mean annual air temperture is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Danville silty clay loam part of this complex is relatively undisturbed. It is in lawns, landscaped areas, vacant lots, and a few fields.

Typically, the surface layer of the Danville soil is dark grayish brown, moderately alkaline silty clay loam about 24 inches thick. The subsoil is about 26 inches thick. The upper 18 inches of the subsoil is dark grayish brown, moderately alkaline clay, and the lower 8 inches is brown, moderately alkaline, calcareous clay. The substratum is brown, calcareous clay loam to a depth of 60 inches. In places the surface layer has been modified to a depth of 6 to 12 inches by the addition of imported soil material, other earthy material, and organic matter. Permeability is moderately slow in the surface layer and slow in the subsoil. Available water capacity is about 9 to 10 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more, but only a few roots can penetrate the clay subsoil.

The Urban land part of this complex consists of areas covered by buildings, parking lots, roads, and driveways and of other covered areas not suitable for plants. Before structures were placed in these areas, minor grading was done. In many areas a blanket of sand, gravel, or crushed rock or other foundation base was added. Most blankets and fills are a few inches to many inches thick. Surface runoff generally is very rapid, but in some places shallow ponding occurs for brief periods.

The Xerorthents in this complex are nearly level soils covered by imported soil material. The imported material is mostly loamy, but some places have a large amount of crushed shale, sand, and gravel. In most places the imported material has not been significantly mixed with the original Danville soil. Depth to undisturbed soil is about 20 to 36 inches. Permeability, available water capacity, surface runoff, erosion hazard, and effective rooting depth of these Xerorthents are similar to those of the Danville soil.

Included with this complex in mapping are Conejo clay loam and a soil that is similar to a Mocho clay loam; these soils have slopes of 0 to 2 percent.

This map unit is used for urban development and landscape plants. A few areas are idle.

Because the surface layer of the Danville soil is moderately high in clay content, the soil is hard when dry and sticky when moist. Where the soil has been compacted or worked when moist, it is very hard when dry. Where the subsoil is exposed or is mixed with the surface layer, the hardness and density of the soil are increased. Keeping off the soil when it is wet prevents compaction. Frequent addition of a large amount of organic matter helps to make the soil more porous, more favorable for root development, and easier to work. Suitable organic matter includes garden compost, steer manure, peat moss, sawdust, wood chips, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers generally is good even if no supplemental fertilizer is applied.

In the upper part of the profile, the Danville soil is mildly alkaline or moderately alkaline and is noncalcareous. The substratum is calcareous or noncalcareous. Lime-induced chlorosis generally affects only those plants that are most sensitive to lime. However, the leaves of some plants become yellow and chlorotic if the soil is wet and cold for long periods. Acid-loving plants, for example, azaleas, require an imported acid soil that is high in organic-matter content.

This map unit is in the north-central part of the Valley floor, where cold air settles. Frost-sensitive plants, for example, citrus and hibiscus, are damaged by frost unless they are protected.

The Danville soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during summer. In periods of moderate temperature, these plants require application of about 3/4 to 1 inch of water at an interval of 7 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between waterings and the amount of water applied at a time can be doubled.

Soil erosion is not a problem, even where the soil is bare or has only a thin plant cover. Shallow ponding occurs for brief periods in places where runoff is obstructed by structures or by low ridges of soil.

The surface layer of the Danville soil develops cracks of moderate size when the soil dries. The subsoil is higher in clay content than the surface layer and has high shrink-swell potential. Foundations of many structures extend into the subsoil, and in places the subsoil is near the surface or is exposed because of grading. The shrink-swell potential should be considered in the design of foundations, pavements, and other concrete structures. In paved areas a base of crushed rock, sand, gravel, and a vapor barrier and high strength reinforced concrete should be used. Below a depth of about 4 feet, the soil dries more slowly and few roots are present to absorb moisture. Changes in soil volume decrease with increasing depth. Gardening and landscaping group: Danville part in group Cc, and Urban land part not assigned.

115—Friant fine sandy loam, 50 to 75 percent slopes. This very steep soil is somewhat excessively drained and is on mountains. This soil formed in material that was weathered in place from hard, fractured Santa Monica slate in the southern part of the survey area and from granitic rock in the northern part. Elevation ranges from 1,000 to 1,900 feet. Average annual precipitation is about 20 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 days.

Typically, the surface layer is dark grayish brown, medium acid and slightly acid fine sandy loam 19 inches thick that has some small rock fragments. Hard, fractured slate is at a depth of about 19 inches. Permeability is moderately rapid, and available water capacity is about 1 to 2 inches. Surface runoff is very rapid, and the erosion hazard is very high. Effective rooting depth is 6 to 20 inches.

Soper gravelly sandy loam, 30 to 50 percent slopes, and Soper Variant sandy loam, 50 to 75 percent slopes, each make up about 5 percent of this map unit. Rock outcrop makes up about 5 percent and is indicated on the map by a special symbol. About 10 percent of the map unit is soils that have slopes of less than 50 percent.

This soil is used for watershed, wildlife habitat, and recreational purposes.

Because this soil is very steep, urban development is nearly precluded. Some development is feasible on ridgetops and on toe slopes adjacent to less sloping soils.

Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if the cover was brush and heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil. Gardening and landscaping group Cs.

116—Gaviota sandy loam, 9 to 30 percent slopes. This strongly sloping and moderately steep soil is well drained and is in the Santa Susana Mountains. This soil formed in material that was weathered in place from hard sandstone. Elevation ranges from 900 to 3,000 feet. Average annual precipitation is about 17 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 275 to 300 days.

Typically, the surface layer is brown, slightly acid sandy loam that overlies very pale brown, hard sandstone at a depth of about 15 inches. Permeability is moderately rapid, and available water capacity is 1 to 2 inches. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. However, because slope is mostly 15 to 30 percent, in most areas runoff is rapid, and the erosion hazard is high. Effective rooting depth is 10 to 20 inches.

About 10 percent of this map unit is Urban land. About 5 percent is a soil that is dark grayish brown in the upper part of the profile, and 5 percent is a loamy sand soil that is 20 to 40 inches deep to soft sandstone and that is calcareous in places. In a few places the hard sandstone bedrock has calcareous seams. About 4 percent of this map unit is a soil that is 20 to 32 inches deep to hard sandstone. Boulders and rock outcrops cover about 5 percent of the surface of the unit.

This soil is used for watershed, recreational purposes and urban development.

In most areas this soil has a native plant cover of brush, annual grasses, and forbs. Occasionally, fire destroys much of the cover. The composition of the plant community in any year is closely related to the length of time since the last fire and to measures taken to control the growth of vegetation. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if the cover was brush and heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, plant growth generally is not vigorous. Even in favorable years about half of the annual forage production should be left to protect the soil. If all of the forage is eaten or the plants are trampled by grazing animals, forage grows more slowly and is less abundant in succeeding years. Continued overgrazing increases the hazard of erosion.

In undisturbed areas this soil is shallow; after the soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing. Landscape plants that are hardy and drought resistant should be selected. Careful management can partly offset the limitations of this soil for plants.

This soil is fairly sandy and is easy to till with hand tools. The organic-matter content is very low. Adding organic matter increases plant growth and slightly raises the available water capacity. Suitable organic matter includes steer manure, wood chips, sawdust, garden compost, and commercial soil conditioners.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is improved by the application of potassium and phosphorous fertilizer. Because this soil is shallow and has a low content of clay, its capacity to store nutrient elements and moisture is low. Too much salt from fertilizer, manure, and water can readily kill or damage the plants. An informed nurseryman should be consulted. Lime-induced chlorosis is not a problem on this soil.

This soil is on mountains. It has good air drainage, and the hazard of frost is low.

This soil retains about 1 1/4 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses, require application of about 1 1/4 inches of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 1 1/4 inches of water at an interval of about 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

The hazard of erosion is moderate, and runoff is medium to rapid. Erosion and runoff are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of paved gutters, storm drains, and paved channels should be installed to remove runoff. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

Shallow soil depth and the presence of boulders and rock outcrops cause difficulty in excavations for utilities and foundations and in grading for roads and buildings. Gardening and landscaping group Cs.

117—Gaviota sandy loam, 30 to 50 percent slopes. This steep soil is well drained and is in the Santa Susana Mountains and Simi Hills. This soil formed in material that was weathered in place from hard sandstone. Elevation ranges from 900 to 3,000 feet. Average annual precipitation is about 17 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 275 to 300 days.

Typically, the surface layer is brown, slightly acid sandy loam that overlies very pale brown, hard sandstone at a depth of about 15 inches. Permeability is moderately rapid, and available water capacity is 1 to 2 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is about 12 to 16 inches.

About 5 percent of this unit is Urban land, that is, areas covered by buildings or pavement. Boulders and rock outcrop cover, on the average, 5 percent of the surface. Also included in mapping and making up 3 to 5 percent of the map unit are soils that are dark grayish brown in the upper few inches or are more than 20 inches deep to soft sandstone that is calcareous in places. About 5 percent of the map unit is Soper gravelly sandy loam, 30 to 50 percent slopes. Small areas of Gaviota sandy loam that has slopes of 50 to 75 percent are also included.

This soil is used for watershed, recreational purposes, and urban development.

In most areas this soil has a cover of native vegetation consisting of brush, annual grasses, and forbs. Occasionally, fire destroys much of the cover, and the composition of the plant community in any year is closely related to the length of time since the last fire and to measures taken to control the growth of vegetation. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if the cover was brush and heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

Because the erosion hazard is high and forage is not abundant, little or no vegetation should be removed by grazing.

This soil is fairly sandy and is easy to till with hand tools. The organic-matter content is low, and adding organic matter increases plant growth and slightly raises available water capacity. Suitable organic matter includes wood chips, sawdust, steer manure, garden compost, and commercial soil conditioners.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is improved by the application of potassium and phosphorous fertilizer. Because this soil is shallow and has a low content of clay, its capacity to store fertilizer and moisture is low. Too much salt from fertilizer, manure, and water can readily kill or damage plants. Inexperienced gardeners should consult an informed nurseryman. Lime-induced chlorosis is not a problem on this soil.

This soil is on hills and mountains. Air drainage is good, and the frost hazard is fairly low.

Small areas of this soil in more favorable or accessible sites are used for urban development, and limited additional development is feasible. This soil has some moderate to severe limitations to urban uses.

In undisturbed areas this soil is shallow; after the soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing. Generally, landscape plants that are hardy and drought resistant should be selected. Careful management and additional site preparation can partly offset the shallow soil depth.

This soil retains about 1 1/4 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses, require application of about 1 1/4 inches of water at an interval of 5 days during periods of warm, long days. In spring and fall these plants require application of about 1 1/4 inches of water at an interval of about 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within about 15 days.

Erosion and runoff are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of paved gutters or storm drains should be installed to remove runoff. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until a dense plant cover is well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

Because this soil is steep and shallow and has boulders on the surface, installation of service trenches, roadbuilding, and site preparation are difficult. This soil has low shrink-swell potential. Gardening and landscaping group Cs.

118—Gazos silty clay loam, 15 to 30 percent slopes. This moderately steep soil is well drained and is on hills that border part of the Valley. This soil formed in material that was weathered in place from hard fractured shale. Elevation ranges from about 800 to 2,600 feet. Average annual precipitation is about 17 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 days.

Typically, the surface layer is about 28 inches thick. The upper part of the surface layer is grayish brown, medium acid and slightly acid silty clay loam 21 inches thick, and the lower part is grayish brown, neutral silty clay loam about 7 inches thick. Shale fragments make up 5 to 8 percent of the upper part and about 10 percent of the lower part. Hard, somewhat fractured shale is at a depth of 28 inches. Permeability is moderately slow, and available water capacity is about 4 to 8 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is about 24 to 40 inches.

Included with this soil in mapping are areas that are too small to be mapped at the scale used. About 10 percent of the acreage is Urban land, and about 10 percent is dark gray clay that is about 40 inches deep to shale. About 5 percent is Balcom silty clay loam, 15 to 30 percent slopes. Also included, on some toe slopes, is a soil that is similar to this Gazos soil but is 40 to 55 inches deep to shale. A soil on some ridgetops that is less than 20 inches deep to shale and areas of loam soils are also included.

This soil is used for watershed, wildlife habitat, and urban development.

In undisturbed areas this soil has a cover of annual grasses and forbs and, in places, native shrubs and trees. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if the cover was brush and heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, about half of the annual forage production should be left to protect the soil. If most of the forage is eaten or the plants are trampled by grazing animals, forage grows more slowly and is less abundant in succeeding years. Continued overgrazing increases the hazard of erosion.

This soil contains a moderately large amount of clay and is hard when dry. Gardening and landscaping achieve better results if the soil is kept friable and porous. Keeping off the soil when it is wet and adding organic matter help to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

This soil is neutral to medium acid, and lime-induced chlorosis is not a problem, except in small areas of included calcareous soils or where imported soil material has been added.

Because this soil is on foothills, in most areas air drainage is good and frost occurs less frequently than on the Valley floor. Frost-sensitive plants, for example, citrus and hibiscus, are not damaged in most areas.

After this soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing.

This soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

The hazards of erosion and siltation are high. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, terraces, and stabilized channels should be installed to remove runoff. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance. Provisions for fire control may be needed along property lines adjacent to areas of brush.

This soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. During grading and trenching, shale generally is encountered at a depth of 24 to 40 inches. Excavation of the bedrock is somewhat difficult. This soil has moderate shrink-swell potential. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group Bs.

119—Gazos silty clay loam, 30 to 50 percent slopes. This steep soil is well drained and is on hills and mountains bordering part of the Valley. This soil formed in material that was weathered in place from hard fractured shale. Elevation ranges from about 1,200 to 2,600 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 days.

Typically, the surface layer is about 28 inches thick. The upper part of the surface layer is grayish brown, medium acid and slightly acid silty clay loam 21 inches thick, and the lower part is grayish brown, neutral silty clay loam about 7 inches thick. Shale fragments make up 5 to 8 percent of the upper part and about 10 percent of the lower part. Hard, somewhat fractured shale is at a depth of 28 inches. Permeability is moderately slow, and available water capacity is about 4 to 7 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is about 24 to 40 inches.

Included with this soil in mapping are areas that are too small to be mapped separately at the scale used. About 5 percent of the acreage is Urban land. About 10 percent is dark gray clay that is about 40 inches deep to shale. This included soil is in swales, on toe slopes, and in other concave positions. About 8 percent is Balcom silty clay loam, 30 to 50 percent slopes. Some small areas of steep, shallow, severely eroded soils are also included and are indicated on the maps by a special symbol. Also included is a soil on ridgetops that is similar to this Gazos soil but is less than 20 inches deep to shale. A few areas of a soil that is similar to this Gazos soil but has lime in the lower part of the profile are also included.

This soil is used for pasture, wildlife habitat, watershed, and urban development.

Nearly all areas of this soil have a cover of annual grasses and forbs and, in places, native shrubs and trees. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, about half of the annual forage production should be left to protect the soil. If most of the forage is eaten or the plants are trampled by grazing animals, forage grows more slowly and is less abundant in succeeding years. Continued overgrazing increases the hazard of erosion.

Steep slopes are the major limitation to the use of this soil. A few homes and roads have been built on ridges and toe slopes that are adjacent to less sloping soils. Some additional urban development is feasible. If building density is low or very low, most of the soil and plant cover can remain undisturbed. A ground cover should be planted to control erosion. Paved channels, storm drains, and gutters can be installed to remove runoff water. If building density is increased, nearly all of the slope must be cut and graded; plantings to control erosion and systems to remove runoff will need to be more complex.

This soil contains a moderately large amount of clay and is hard when dry. Gardening and landscaping achieve better results if the soil is kept friable and porous. Keeping off the soil when it is wet and adding organic matter help to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

This soil is neutral to medium acid, and lime-induced chlorosis is not a problem except in areas of some of the included soils.

Because this soil is on foothills, in most areas air drainage is good and frost occurs less frequently than on the Valley floor. Frost-sensitive plants, for example, citrus and hibiscus, are not damaged in most areas.

After this soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing.

This soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

The hazards of erosion and siltation are high. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns, ivy, or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

This soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. During grading and trenching, shale generally is encountered at a depth of 22 to 36 inches. Excavation of the bedrock is somewhat difficult. This soil has moderate shrink-swell potential. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group Bs.

120—Gazos-Balcom complex, 30 to 50 percent slopes. This steep map unit is in uplands mostly in the northwestern part of the survey area. It is about 50 percent Gazos silty clay loam, 30 to 50 percent slopes, 35 percent Balcom silty clay loam, 30 to 50 percent slopes, and 15 percent included soils and Urban land. The components of this map unit are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from 800 to 3,000 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 days.

The Gazos soil is well drained and formed in material that was weathered in place from hard, fractured shale. Typically, the surface layer is about 28 inches thick. The upper part of the surface layer is grayish brown, medium acid and slightly acid silty clay loam 21 inches thick, and the lower part is grayish brown, neutral silty clay loam about 7 inches thick. Shale fragments make up 5 to 8 percent of the upper part and about 10 percent of the lower part. Hard, somewhat fractured shale is at a depth of 28 inches. Permeability is moderately slow, and available water capacity is about 4 to 7 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is about 24 to 40 inches.

The Balcom soil is well drained and formed in material that was weathered in place from soft shale and sandstone. Typically, the surface layer is light brownish gray, calcareous silty clay loam about 16 inches thick. The underlying material, to a depth of 37 inches, is light brownish gray, calcareous silty clay loam that has a few fragments of weathered shale. White, calcareous soft shale is at a depth of 37 inches. Permeability is moderately slow, and available water capacity is about 3 to 6 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is about 23 to 37 inches.

Included with this complex in mapping are small areas of dark gray clay that is about 40 inches deep to shale. This clay soil is in swales, on toe slopes, and in other concave positions. Also included are some small areas of Urban land and some areas of a soil on north-facing slopes that is similar to the Gazos soil but is 40 to 55 inches deep to shale. Also included are some small areas of Saugus loam, 30 to 50 percent slopes.

The soils in this complex are used for watershed, wildlife habitat, and urban development.

Much of the acreage of this complex has a cover of annual grasses and forbs and, in places, native shrubs and trees. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if the cover was brush and heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If these soils are used for pasture, about half of the annual forage production should be left to protect the soil. If all of the forage is eaten or the plants are trampled by grazing animals, forage grows more slowly and is less abundant in succeeding years. Continued overgrazing increases the hazard of erosion.

Steep slopes are the major limitation to the use of these soils for urban development. Only a small acreage is used for this purpose, mostly in areas on ridgetops and on toe slopes adjacent to less sloping soils. If building density is low, most of the soil and vegetation can remain undisturbed. A ground cover should be planted to control erosion, and a system of paved channels and street gutters should be installed to remove runoff. If building density is high, nearly all of the slope must be cut and graded, and plantings to control erosion and installation of structures to remove runoff water will need to be more complex.

These soils contain a moderately large amount of clay and are hard when dry. Gardening and landscaping achieve better results if the soil is kept friable and porous. Keeping off the soil when it is wet and adding organic matter help to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Balcom soil in this complex is calcareous. Grading for urban development tends to spread the soil and increase the amount of lime near the surface. The amount of lime varies considerably from place to place. Where trenching and grading have left much lime near the surface, perennial plants and trees such as citrus may develop lime-induced chlorosis. Other plants, for example, some azaleas, grow poorly unless they are planted in imported, acid-organic soil.

Because these soils are on foothills, in most areas air drainage is good and frost occurs less frequently than on the Valley floor. In most areas frost-sensitive plants, for example, citrus and hibiscus, are not damaged.

After these soils are graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing.

These soils retain about 1 1/2 to 2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

Because of steep slopes, the hazards of erosion and siltation are high. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns, ivy, or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

These soils have some limitations if they are used as a homesite or for roads, utilities, and other urban developments. During grading and trenching, shale bedrock generally is encountered at a depth of 23 to 37 inches. Hardness of the bedrock varies, and excavation in areas of the harder shale by light machinery is moderately difficult. These soils have moderate shrink-swell potential. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group Bs.

121—Lopez shaly clay loam, 30 to 50 percent slopes. This steep soil is somewhat excessively drained and is in the Santa Susana Mountains. This soil formed in material that was weathered in place from hard fractured shale and sandstone. Elevation ranges from about 1,500 to 3,700 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 275 to 300 days.

Typically, the surface layer is grayish brown, neutral and slightly acid shaly clay loam about 13 inches thick. Hard, somewhat fractured white shale is at a depth of 13 inches. Permeability is moderate, and available water capacity is 1 to 2 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 6 to 16 inches.

Included with this soil in mapping are areas that are too small to be mapped separately at the scale used. About 10 percent of the acreage is Lopez shaly clay loam that has slopes of 15 to 30 percent, and 8 percent is Lopez shaly clay loam that has slopes of 50 to 75 percent. About 5 percent is Gazos silty clay loam, 2 percent is Balcom silty clay loam, and 2 percent is Gaviota sandy loam; these soils have slopes of 30 to 50 percent. Rock outcrops and areas covered by boulders and stones make up 5 percent of the surface of the map unit.

This soil is used for wildlife habitat and watershed and, in small areas, for pasture.

Much care should be exercised to prevent fire from destroying the plant cover. Winter rains may cause severe erosion in burned areas and may cause deposition in valleys, especially if heavy rains occur before annual grasses and other plants can grow and provide some protection for the soil.

If this soil is used for pasture, forage should be left to protect the soil from erosion during the rainy season in winter. If the amount of seasonal rainfall is far below average or if other conditions cause poor growth, grazing should be deferred until a more favorable season. Even if season rainfall is average or above average, at least half of the forage produced should be left to protect the soil. Plant residue increases plant growth in the succeeding years by maintaining a large supply of moisture. Gardening and landscaping group Cs.

122—Millsholm loam, 30 to 50 percent slopes. This steep soil is well drained and is on hills in the Santa Monica Mountains and in the northern part of the survey area. This soil formed in material that was weathered in place from hard shale or sandstone. Elevation ranges from 1,100 to 2,600 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is brown, medium acid loam about 6 inches thick. The subsoil is brown, medium acid loam about 9 inches thick. Hard, somewhat fractured sandstone bedrock is at a depth of 15 inches. Permeability is moderate, and available water capacity is 2 to 3 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 10 to 20 inches.

Included with this soil in mapping are soils too small in extent to be mapped separately at the scale used. About 10 percent of the acreage is Millsholm loam that has slopes of 15 to 30 percent, and 10 percent is Balcom silty clay loam, 30 to 50 percent slopes. Also included on north-facing slopes, are small areas of Gazos shaly clay loam, 30 to 50 percent slopes, and small areas of soils that are similar to Friant soils. Areas where the underlying shale is soft instead of hard are also included.

This soil is used for watershed, wildlife habitat, pasture, and recreational purposes.

The main concern is maintaining the native vegetation. The amount of growth varies greatly because of annual differences in climate. Growth is poor in many years because the amount of rainfall commonly is average or below average. Much care should be exercised to prevent fire from destroying the plant cover. Winter rains may cause severe erosion in burned areas and may cause siltation in lower areas, especially if heavy rains occur before annual grasses and shrubs can grow and provide some protection for the soil.

If this soil is used for pasture, sufficient forage should be left to protect the soil and to increase growth in succeeding years. Plant residue left on the surface retains moisture so that forage grows more rapidly and is more abundant. In favorable years at least half of the forage produced should be left to protect the soil. In unfavorable years grazing should be deferred. Gardening and landscaping group Cs.

123—Mocho-Urban land complex, 0 to 2 percent slopes. This nearly level map unit is on the floor of the Valley. It is about 45 percent Mocho loam that has slopes of 0 to 2 percent, 40 percent Urban land, 7 percent Xerorthents and 8 percent included soils. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from 700 to 900 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Mocho loam in this complex is in vacant lots, playgrounds, lawns, and gardens. This Mocho soil is well drained and formed in young alluvium from mixed rock sources.

Typically, the surface layer of the Mocho soil is grayish brown, calcareous loam about 16 inches thick. The underlying material is pale brown, calcareous loam to a depth of 47 inches and is pale brown, slightly stratified, calcareous sandy clay loam and silty clay loam to a depth of 76 inches. In places the surface layer has been modified by the addition of imported soil material or organic matter or by the removal of some soil material. These modifications are less than 20 inches thick. Permeability is moderate, and available water capacity is 8 to 10 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, parking lots, and buildings and of other covered areas not suitable for plants. Before structures were placed in these areas, grading and other modifications to the soil were minor. In some areas a blanket of sand, gravel, crushed rock, or other imported mineral material was added. These modifications are mostly 12 to 20 inches thick. Surface runoff is mainly very rapid, but a few areas are subject to shallow ponding for brief periods.

The Xerorthents in this complex consist of altered soils that are suitable for plants. These soils resulted from digging, grading, importing of soil material, and mixing of soil layers. Determining the soil characteristics and origin generally requires onsite examination. Much of the soil material is loamy and has soil properties similar to those of the Mocho soil.

Included with this complex in mapping are areas of Conejo clay loam, Anacapa sandy loam, and San Emigdio sandy loam. These included soils have slopes of 0 to 2 percent and make up about 8 percent of the acreage.

Nearly all areas of this map unit are used for urban development.

The Mocho soil in this complex has many favorable features for urban uses. It is well suited to a wide variety of trees, shrubs, flowers, fruits, and ground cover plants.

In undisturbed areas the Mocho soil is fairly porous and is well aerated. In many areas compaction is moderate to severe because of foot and vehicle traffic, building activities, and past farming practices. To increase plant growth and water penetration, compacted soil should be broken up and lifted while it is dry or only slightly moist. Keeping off the soil when it is wet prevents compaction. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

Some plants, for example, citrus and gardenias, are susceptible to lime-induced chlorosis, especially if the soil is wet and poorly aerated or if material with a high lime content has been added to the soil. Affected plants can be treated with iron chelate and iron sulfate. Lime-sensitive plants, for example, some azaleas, require an imported acid soil that has a high content of organic matter.

In winter cold air settles to the ground and damages frost-sensitive plants. Survival of some plants, for example, citrus and hibiscus, is marginal or the plants are severely damaged, depending on local variations in temperature and the protection afforded by buildings, trees, and special measures.

The Mocho soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Shallow-rooted plants and lawn grasses require application of about 1 inch of water at an interval of 4 or 5 days during periods of warm, long days. In periods of moderate temperature, these plants require application of about 2 inches of water at an interval of about 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between waterings and the amount of water applied at a time can be doubled or tripled.

Because runoff is slow on the Mocho soil, plant cover and mulch are not needed to control erosion. However, a cover of lawns, shrubs, and trees and other ground cover plants help to enhance the scenery and conserve the soil.

If the Mocho soil is used as a building site, it has few significant soil limitations. It is free of stones and is not limited by depth to bedrock or by a high water table. Trenching and grading can be done by standard procedures. The Mocho soil has moderate shrink-swell potential. Because of shrink-swell potential, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group: Mocho part in group Bl, and Urban land part not assigned.

124—Mocho-Urban land complex, 2 to 9 percent slopes. This gently sloping and moderately sloping map unit is on fans on the Valley floor. It is about 45 percent Mocho loam that has slopes of 2 to 9 percent, 40 percent Urban land, 9 percent Xerorthents, 3 percent Anacapa sandy loam, 2 to 9 percent slopes, and 3 percent Conejo clay loam that has slopes of 2 to 9 percent. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 800 to 1,100 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Mocho loam part of this complex is in vacant lots, small fields, lawns, gardens, and other open areas suitable for plants. This Mocho soil is well drained and formed in young alluvium from mixed rock sources.

Typically, the surface layer of the Mocho soil is grayish brown, calcareous loam about 16 inches thick. The underlying material is pale brown calcareous loam to a depth of 47 inches and pale brown, slightly stratified, calcareous sandy clay loam and silty clay loam to a depth of 76 inches. In places the surface layer has been modified by the addition of a thin layer of imported soil material or by the removal of some soil material to a shallow depth. Permeability is moderate, and available water capacity is

8 to 10 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, parking lots, driveways, and buildings and of other covered areas not suitable for plants. Before structures were placed in these areas, mostly minor grading and movement of the original soil were done. In some areas a blanket of sand, gravel, crushed rock, or other imported mineral material was added. Modifications to the original soil are mostly 12 to 20 inches thick. Except for modifications to the surface, the soil underlying Urban land is similar to Mocho loam.

The Xerorthents in this complex consist of altered soils that are suitable for plants. They result from extensive grading, removal of soils, mixing of the original soil layers, and in places, importing of soil material. The original Mocho soil is the principal source of materials, and the soil properties of the Xerorthents are similar to those of the Mocho soil.

Nearly all areas of this map unit are used for urban development.

The Mocho soil has many favorable features for urban development, and it is well suited to a wide variety of trees, shrubs, flowers, fruits, and ground cover plants.

In undisturbed areas the Mocho soil is fairly porous and is well aerated. In many areas compaction is moderate to severe because of foot and vehicle traffic, building activities, and past farming practices. To increase plant growth and water penetration, compacted soil should be broken up and lifted while it is dry or only slightly moist. Keeping off the soil when it is wet prevents compaction. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

Some plants, for example, citrus and gardenias, are susceptible to lime-induced chlorosis, especially if the soil is wet and poorly aerated or if soil material with a high lime content is added to the soil. Affected plants can be treated with iron chelate and iron sulfate. Lime-sensitive plants, for example, some azaleas, require an imported acid soil that has a high content of organic matter.

This map unit is on fans and in small valleys, and some air drainage occurs. The frost hazard varies considerably from place to place. Frost-sensitive plants, for example, citrus and hibiscus, are damaged unless protected by covers or house projections.

The Mocho soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Shallow-rooted plants and lawn grasses require application of about 1 inch of water at an interval of 4 or 5 days during periods of warm, long days. In periods of moderate temperature, these plants require application of about 3/4 inch of water at an interval of about 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between waterings and the amount of water applied at a time can be doubled.

The velocity of runoff water is sufficient to cause erosion and deposition downslope unless the soil is protected. Control of erosion and runoff is fairly simple, except where runoff is concentrated from a large area. Erosion and runoff are highest when the natural vegetation is removed and grading for urban development is incomplete. Before the rainy season begins in winter, grading and trenching should be completed and a system of street gutters, lined channels, and storm drains should be installed to remove runoff. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

If the Mocho soil is used as a building site, it has few significant soil limitations. It is free of stones and is not limited by depth to bedrock or to a high water table. Trenching and grading can be done by standard procedures. The Mocho soil has moderate shrink-swell potential. Because of shrink-swell potential, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group: Mocho part in group Bl, and Urban land part not assigned.

125—Rock outcrop-Friant complex, 50 to 75 percent slopes. This very steep map unit is on foothills in the San Gabriel Mountains near the northern and eastern boundaries of the survey area. About 50 percent of the map unit is Rock outcrop, and 40 percent is Friant fine sandy loam, 50 to 75 percent slopes. The rest is portions of Vista coarse sandy loam that has slopes of 50 to 75 percent, Saugus sandy loam, 30 to 50 percent slopes, and Soper gravelly sandy loam, 30 to 50 percent slopes. Elevation ranges from 1,600 to 2,800 feet. Average annual precipitation is about 20 inches, mean annual air temperature is 60 degrees F, and the average frost-free season is about 270 to 300 days.

The Rock outcrop part of this complex consists of exposed bedrock and of stones on the surface. Vegetation is sparse, or the areas are barren.

The Friant soil in this complex is somewhat excessively drained and formed in material that was weathered in place from granitic and metamorphic rock. Typically, the surface layer is dark grayish brown, medium acid and slightly acid fine sandy loam that overlies hard, fractured bedrock at a depth of about 19 inches. Permeability is moderately rapid, and available water capacity is 1 to 2 inches. Surface runoff is very rapid, and the erosion hazard is very high. Effective rooting depth is 6 to 20 inches.

This map unit is used for watershed, wildlife habitat, and recreational purposes. Gardening and landscaping group: Rock outcrop part in group D, and Friant part in group Cs.

126—Rock outcrop-Gaviota complex, 30 to 75 percent slopes. This steep and very steep map unit is in the Santa Susana Mountains and on hills and mountains that border the northern side of the Valley (fig. 1). It consists of about 55 percent Rock outcrop, 35 percent Gaviota sandy loam that has slopes of 30 to 75 percent, and 10 percent included soils. The components of this map unit are so closely intermingled on the landscape that it was not feasible to map them separately at the scale used. Elevation ranges from 900 to 3,500 feet. Average annual precipitation is about 20 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 days.

The Rock outcrop part of this complex consists mostly of exposures of hard sandstone bedrock and areas where sandstone boulders and stones cover the surface. Some of the bedrock exposures are hard or soft shale. The exposures of soft bedrock physically resemble Badland. The outcrops commonly are long, narrow bands of tilted rock formations and are interspersed with small patches and narrow strips of soil. Except for sparse vegetation growing in these patches and strips of soil, the surface is barren.

The Gaviota soil in this complex is well drained and formed in material that was weathered in place from hard sandstone. Typically, the surface layer is brown, slightly acid sandy loam that overlies very pale brown, hard sandstone at a depth of about 15 inches. Permeability of the soil is moderately rapid, but the underlying bedrock is nearly impermeable. Available water capacity is 1 to 2 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 10 to 20 inches.

Included with this complex in mapping are some pockets of a soil that has a surface layer of brown sandy loam and a subsoil of reddish brown clay; this soil is 25 to 40 inches deep to bedrock. Also included are some areas of a sandy loam soil that is 2 to 10 inches deep to bedrock. Small areas of Soper gravelly sandy loam, Lopez shaly clay loam, and Balcom silty clay loam are also included; these soils have slopes of 30 to 75 percent.

This map unit is used for watershed and recreational purposes. Some areas are crossed by roads or are used as homesites.

The Gaviota soil has a very low capacity to hold water for plants. Runoff is very rapid. All of the vegetation is needed to protect the soil and to reduce runoff. Much care is needed to prevent fire from destroying the plant cover. Any activity that reduces the vigor of plants or disturbs the soil should be avoided. Gardening and landscaping group: Rock outcrop part in group D, and Gaviota part in group Cs.

127—San Emigdio-Urban land complex, 0 to 2 percent slopes. This nearly level map unit is on the floor of the Valley. It is about 60 percent San Emigdio sandy loam that has slopes of 0 to 2 percent, 30 percent Urban land, 7 percent Xerorthents, and 3 percent soils that are similar to the San Emigdio soils. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from 700 to 900 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The San Emigdio sandy loam part of this complex is in vacant lots, lawns, gardens, and playing fields. This soil is well drained and formed in young alluvium from mixed rock sources.

Typically, the surface layer of the San Emigdio soil is grayish brown, calcareous sandy loam about 19 inches thick. The underlying material is pale brown calcareous sandy loam to a depth of 48 inches and is somewhat stratified, calcareous sandy loam and loamy sand to a depth of 77 inches. Permeability is moderately rapid, and available water capacity is 6 to 7 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, parking lots, and buildings and of other covered areas not suitable for plants. Before structures were placed in these areas mostly shallow grading was done. In some areas a thin layer of fill consisting of sand, crushed rock, and other imported soil material was added Most of the modifications to the original San Emigdio soil are 12 to 20 inches thick. In most areas surface runoff is rapid, but in a few paved areas shallow ponding occurs for brief periods.

Nearly all areas of this map unit are used for urban development.

The San Emigdio soil has many favorable features and has no serious limitations for urban development. It is well suited to a wide variety of trees, shrubs, flowers, fruits, and ground cover plants.

In undisturbed areas the San Emigdio soil is fairly porous and is well aerated. In some areas compaction is severe because of foot and vehicle traffic, building activities, and past farming practices. To increase plant growth and water penetration, compacted soil should be broken up and lifted while it is dry or only slightly moist. Keeping off the soil when it is wet prevents compaction. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

This San Emigdio soil is calcareous throughout. However, unless the plants are overwatered the probability of lime-induced chlorosis is low because the soil is sandy, well drained, and well aerated. If chlorosis appears in plants such as citrus and gardenias, the plants can be treated with iron chelate or iron sulfate. Lime-sensitive plants, for example, some azaleas, require an imported acid soil that has a high content of organic matter.

In winter, cold air settles to the ground and frost-sensitive plants are damaged or killed. In most areas survival of plants such as citrus and hibiscus is marginal unless the plants are protected by eaves, buildings, or large trees or unless special protective measures are taken.

The San Emigdio soil retains about 1 1/4 to 1 1/2 inches of water per foot of soil after wetting. Shallow-rooted plants and lawn grasses require application of about 1 inch of water at an interval of 4 or 5 days during periods of warm, long days. In periods of moderate temperature, these plants require application of water at an interval of about 7 to 10 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days. Where well-established trees and shrubs are watered separately from lawns and flowerbeds, the interval between waterings and the amount of water applied at a time can be doubled.

Because runoff is slow on the San Emigdio soil, a plant cover or mulch is not needed to control erosion and to reduce runoff. However, lawns, ground covers, and other plants can be used to enhance the scenery and protect the soil.

If the San Emigdio soil is used as a building site, it has no serious soil limitations. It is free of stones and is not limited by depth to bedrock or to a high water table. Trenching and grading can be done by standard procedures. The San Emigdio soil is relatively low in content of clay and organic matter. It has low shrink-swell potential. Gardening and landscaping group: San Emigdio part in group A, and Urban land part not assigned.

128—Saugus loam, 15 to 30 percent slopes. This moderately steep soil is well drained and is in the Santa Susana Mountains and on foothills in the San Gabriel Mountains. It formed in material that was weathered in place from upturned beds of soft shale and sandstone. Elevation ranges from 900 to 2,100 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is brown, slightly acid and neutral loam about 19 inches thick. The underlying material, to a depth of 45 inches, is light yellowish brown, neutral and mildly alkaline loam. Weathered, soft shale and sandstone are at a depth of 45 inches. Permeability is moderate, and available water capacity is 4 to 8 inches. Surface runoff is medium, and the erosion hazard is moderate. Effective rooting depth is about 40 to 60 inches.

Included with this soil in mapping are soils too small in extent to be mapped separately at the scale used. About 6 percent of the map unit is Urban land, and about 3 percent is Saugus loam that has slopes of less than 15 percent. About 10 percent of the unit is nearly equal proportions of Gazos silty clay loam, Millsholm loam, and Soper gravelly sandy loam; these soils have slopes of 15 to 30 percent. Also included are places where underlying material is conglomerate and where many pebbles and cobbles are on the surface and scattered throughout the profile.

This soil is used mainly for pasture, watershed, and wildlife habitat. A small acreage of this soil is used for urban development.

In many areas this soil is relatively undisturbed and has a cover of annual grasses, forbs, and shrubs. Much care should be exercised to prevent fire from destroying the plant cover. If fire does not occur for a long period, this soil develops a dense cover of brush. Erosion from winter rains may be severe on burned slopes that had a dense cover of brush, especially if heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, at least half of the annual production of grasses and forbs should be left to protect the soil. A mulch of plant residue helps to retain moisture so that plants grow more rapidly and vigorously and water infiltration is increased. In years when rainfall is low and plant growth is poor, grazing should be deferred until a more favorable season. If overgrazing is continued for several years, the rate of runoff increases and plant growth decreases.

If this soil is used for urban development, it becomes compacted. Compaction reduces soil permeability and plant growth. Where plants are to be grown, the soil should not be worked when it is wet. Organic matter should be incorporated into the soil before planting and during renovation of landscaping. It can also be used as a mulch to protect the soil. Suitable organic matter includes garden compost, steer manure, peat moss, sawdust, wood chips, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

This soil is noncalcareous, and lime-induced chlorosis is not a problem unless limy imported soil material is added during urban development.

Because this soil is on foothills, in most areas air drainage is good and frost occurs less frequently than on the Valley floor. In most areas frost-sensitive plants, for example, citrus and hibiscus, generally are not damaged.

After this soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Most of the substratum is soft and can be ripped and crushed to form soil material.

This soil retains about 1 1/2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 4 or 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

The hazards of erosion and siltation are high. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns, ivy, or other close-growing ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

Slope is a severe limitation to the use of this soil as a homesite or for roads, utilities, and other urban developments. During grading and trenching, soft shale and sandstone bedrock generally is encountered at a depth of 40 to 60 inches. Most of the bedrock can be excavated with little difficulty because it crushes readily to form soil material. This soil has low shrink-swell potential. Gardening and landscaping group Bs.

129—Saugus loam, 30 to 50 percent slopes. This steep soil is well drained and is in the Santa Susana Mountains. It formed in material that was weathered in place from upturned beds of soft shale and sandstone. Elevation ranges from 900 to 2,100 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is brown, slightly acid and neutral loam about 19 inches thick. The underlying material, to a depth of 45 inches, is light yellowish brown, neutral and mildly alkaline loam. Weathered, soft shale and sandstone are at a depth of 45 inches. Permeability is moderate, and available water capacity is 4 to 8 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is about 40 to 56 inches.

Included with this soil in mapping are soils too small in extent to be mapped separately at the scale used. About 10 percent of this map unit is nearly equal proportions of Gaviota sandy loam, Gazos silty clay loam, Millsholm loam, and Soper gravelly sandy loam; these soils have slopes of 30 to 50 percent. About 5 percent is escarpments and exposed strata of sandstone, shale, and conglomerate. About 10 percent is a Saugus soil that is underlain by conglomerate and that has pebbles and cobbles on the surface and scattered throughout the profile. Also included, on some toe slopes, are soils that have slopes of 15 to 30 percent. A soil on some ridges that is similar to the Saugus loam but is less than 40 inches deep to soft shale and sandstone is also included.

This soil is used for pasture, watershed, and wildlife habitat.

On a small acreage, the surface layer of this soil has been disturbed by building activities. In undisturbed areas this soil has a cover of native or introduced grasses, forbs, and shrubs. Fire occasionally occurs in these areas. Much care should be exercised to prevent fire from destroying the plant cover. If fire does not occur for several years, this soil develops a dense cover of brush. Erosion from winter rains may be severe on burned slopes that had a dense cover of brush, especially if heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, at least half of the annual production of grasses and forbs should be left to protect the soil. Plant residue helps to retain moisture so that plants grow more rapidly and vigorously and water infiltration is increased. In years of low rainfall and poor plant growth, grazing should be deferred until a more favorable season. If overgrazing is continued for several years, the rate of runoff is increased and plant growth is increasingly poor.

Steep slope is a major limitation to the use of this soil for urban development. If the building density is low, most of the soil and vegetation on slopes can be left undisturbed and measures to control erosion and runoff are fairly simple to apply. A slightly higher building density requires extensive grading, and measures to control erosion and runoff need to be more complex. Grading generally results in a few very steep overcut slopes that are very difficult to vegetate.

Slope is a severe limitation to the use of this soil as a homesite or for roads, utilities, and other urban developments. During grading and trenching, soft shale and sandstone bedrock generally is encountered at a depth of 40 to 60 inches. Most of the bedrock can be excavated with little difficulty because it crushes readily to form soil material. This soil has low shrink-swell potential. Gardening and landscaping group Bs.

130—Soboba gravelly loamy sand, 0 to 2 percent slopes. This nearly level soil is excessively drained and is in the Little Tujunga and Pacoima drainage areas in the northeastern part of the Valley. This soil formed in coarse textured young alluvium derived mainly from granitic material that originated in the San Gabriel Mountains. Elevation ranges from 1,100 to 1,500 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 310 to 330 days.

Typically, the surface layer is pale brown, slightly acid gravelly loamy sand about 9 inches thick. The underlying material, to a depth of 60 inches, is very pale brown, neutral very gravelly sand. Permeability is very rapid, and available water capacity is about 1 to 3 inches. Surface runoff is very slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

Included with this soil in mapping are streambeds that are 3 to 10 feet lower in elevation than the Soboba soil. These streambeds lack vegetation and are reworked by running water after major storms. They make up 35 percent of this map unit. About 5 percent of the unit is a soil that is similar to the Soboba soil, except the surface layer is dark grayish brown and is 4 to 10 inches thick. About 5 percent is Tujunga sand, 2 percent is Capistrano fine sandy loam, and 3 percent is San Emigdio sandy loam; these soils have slopes of 0 to 2 percent. Also included are some large and small excavations and gravel pits.

This soil is used mostly for watershed and wildlife habitat. A few small areas previously were used for cultivated crops and urban development, but these uses have been abandoned. Flood control structures are in some areas. This soil is unsuited to pasture, because forage production is very low and the soil is droughty. It is not suited to urban development. In most areas this soil is rarely flooded; however, it is crossed by flood channels in many places, and is confined between canyon walls in some places. The site is hazardous because it is mainly part of a natural and manmade floodway. Gardening and landscaping group Cd.

131—Soboba gravelly loamy sand, 2 to 9 percent slopes. This gently sloping and moderately sloping soil is excessively drained and is in Limekiln Canyon in the northeastern part of the Valley. This soil formed in coarse textured young alluvium derived mainly from granitic material that originated in the San Gabriel Mountains. Elevation ranges from 1,500 to 2,000 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 310 to 330 days.

Typically, the surface layer is pale brown, slightly acid gravelly loamy sand about 9 inches thick. The underlying material, to a depth of 60 inches, is very pale brown, neutral very gravelly sand. Permeability is very rapid, and available water capacity is about 1 to 3 inches. Surface runoff is slow because water is absorbed rapidly into the soil, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

Included with this soil in mapping is a soil that has a dark grayish brown surface layer 4 to 10 inches thick. Cobblestones as much as 10 inches in diameter make up 3 to 15 percent of the profile of this included soil and stones more than 10 inches in diameter make up 2 to 10 percent. This included soil is stratified, but the fragments are poorly sorted.

This Soboba soil is not suited to pasture. Forage production is very low because the soil retains moisture very poorly. In some areas this soil previously was used for citrus, but it is no longer used for this purpose. This soil is rarely flooded, but because it is between canyon walls urban development is very hazardous. Gardening and landscaping group Cd.

132—Soper gravelly sandy loam, 15 to 30 percent slopes. This moderately steep soil is well drained and is on foothills that border the Valley. This soil formed in material that was weathered in place from conglomerate and sandstone. Elevation ranges from about 900 to 2,000 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is grayish brown, slightly acid gravelly sandy loam about 11 inches thick. The subsoil is brown, slightly acid cobbly and gravelly sandy clay loam about 20 inches thick. Yellowish brown, weathered conglomerate is at a depth of 31 inches. Permeability is moderate in the surface layer and moderately slow in the subsoil. Available water capacity is 2 to 5 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 28 to 40 inches.

Included with this soil in mapping are areas too small to be mapped separately at the scale used. About 10 to 12 percent of this map unit is Urban land. About 10 percent is a soil on toe slopes and north-facing slopes that is more than 40 inches deep. About 5 percent is Gaviota soils. Soils that lack gravel and cobbles are also included in some areas. Small areas of severely eroded soils that lack a surface layer and some or all of the subsoil are also included and are indicated on the map by a special symbol.

This soil is used mostly for pasture.

On a small acreage the surface layer has been altered by earthmoving equipment or tillage. In undisturbed areas this soil has a cover of native or introduced grasses, forbs, and native shrubs. The hazard of erosion is high if the plant cover is not maintained. Much care sould be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, at least half of the annual production of grasses and forbs should be left to protect the soil from erosion. Plant residue helps to retain moisture so that plants grow more rapidly and vigorously. In years of low rainfall and poor plant growth, plant residue may be insufficient to control runoff and grazing should be deferred until a more favorable season. If overgrazing is continued for several years, the rate of runoff increases and plant growth decreases.

Keeping the soil porous is a concern if this soil is used for lawn grasses and landscape plants. Construction activities and foot and vehicle traffic tend to cause severe compaction and to make the soil difficult to irrigate and unfavorable for plants. Working the soil when it is wet should be avoided. Organic matter should be added to the soil before planting or during renovation of landscape plants. Suitable organic matter includes garden compost, sawdust, wood chips, steer manure, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results. Because this soil is free of lime, lime-induced chlorosis is not a problem.

Because this soil is on foothills, in most areas air drainage is good and frost occurs less frequently than on soils of the Valley floor. Frost-sensitive plants, for example, citrus and hibiscus, generally are only slightly damaged.

The conglomerate and sandstone underlying this soil are moderately hard and do not readily crush to form soil material. The subsoil is unfavorable for plants, and where the subsoil is exposed management is especially difficult. After this soil is graded for urban development, onsite examination is required to determine soil depth. Deep-rooted shrubs and trees should not be planted unless onsite examination determines that soil properties are favorable.

This soil retains about 1 1/2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

The hazards of erosion and siltation are high. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns, ivy, or other close-growing ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

This soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. During grading and trenching, conglomerate and sandstone bedrock generally is encountered at a depth of 28 to 40 inches. Excavation of the bedrock is somewhat difficult. This soil has low shrink-swell potential in the surface layer and substratum and has moderate shrink-swell potential in the subsoil and develops cracks when it dries. Because of the shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group Bs.

133—Soper gravelly sandy loam, 30 to 50 percent slopes. This steep soil is well drained and is in the Santa Monica and Santa Susana Mountains. This soil formed in material that was weathered in place from conglomerate. Elevation ranges from 900 to 2,000 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is grayish brown, slightly acid gravelly sandy loam about 11 inches thick. The subsoil is brown, slightly acid cobbly and gravelly sandy clay loam about 20 inches thick. Yellowish brown, weathered conglomerate is at a depth of 31 inches. Permeability is moderate in the surface layer and moderately slow in the subsoil. Available water capacity is 2 to 5 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 30 to 36 inches.

Included with this soil in mapping are soils too small in extent to be mapped separately at the scale used. About 8 percent of this map unit is a soil on north-facing slopes and toe slopes that is similar to this Soper soil but is more than 40 inches deep. Gaviota sandy loam, 30 to 50 percent slopes, and Balcom silty clay loam, 30 to 50 percent slopes, each make up 2 or 3 percent. Also included is a Soper soil that has lime in the substratum or is free of gravel and cobbles. Also included are some places in which the soil has been severely eroded. In these places all of the original surface layer and part or all of the subsoil have been removed. These places are indicated on the map by a special symbol.

This soil is used mainly for pasture.

On a small acreage, the surface layer of this soil has been altered by earthmoving equipment or tillage. In undisturbed areas this soil has a cover of native or introduced grasses, forbs, and native shrubs. Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if heavy rains occur before annual grasses and forbs can grow and provide some protection for the soil.

If this soil is used for pasture, at least half of the annual production of grasses and forbs should be left to protect the soil from erosion. Plant residue helps to retain moisture so that plants grow more rapidly and vigorously. In years of low rainfall and poor plant growth, the amount of plant residue may be insufficient to control runoff and grazing should be deferred until a more favorable year. If overgrazing is continued for several years, the rate of runoff increases and plant growth decreases. Gardening and landscaping group Bs.

134—Soper Variant sandy loam, 50 to 75 percent slopes. This very steep soil is well drained and is in the Santa Monica Mountains. This soil formed in material that was weathered in place from granitic rock. Elevation ranges from 1,000 to 1,900 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is brown, medium acid sandy loam about 3 inches thick. The subsoil is brown and strong brown, strongly acid sandy clay loam about 22 inches thick. Strongly weathered granitic rock is at a depth of 25 inches. Permeability is moderately slow in the subsoil, and available water capacity is about 3 to 7 inches. Surface runoff is very rapid, and the erosion hazard is very high. Effective rooting depth is 20 to 40 inches.

Included with this soil in mapping are soils too small in extent to be mapped separately at the scale used. About 10 percent of this map unit is Friant fine sandy loam, 50 to 75 percent slopes, and 5 percent is Soper Variant sandy loam that has slopes of less than 50 percent.

This soil is used for watershed, wildlife habitat, and recreational purposes.

Because the erosion hazard is very high and slopes are very steep, urban development on this soil generally is not practical. However, roads have been built on ridgetops.

Much care should be exercised to prevent fire from destroying the plant cover. Erosion from winter rains may be severe in burned areas, especially if heavy rains occur before plants can grow and provide some protection for the soil.

This soil is not suited to pasture, because insufficient forage that is suitable for grazing is produced. The native vegetation should be maintained to protect the soil and to control runoff. Gardening and landscaping group Bs.

135—Tujunga-Urban land complex, 0 to 2 percent slopes. This nearly level map unit is in the northeastern part of the survey area near the community of Sylmar. It is about 65 percent Tujunga sand that has slopes of 0 to 2 percent, 25 percent Urban land, 4 percent Xerorthents, and 6 percent included soils. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from 1,100 to 1,500 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

The Tujunga soil in this complex is in landscaped areas, vacant lots, and olive and citrus groves. This soil is somewhat excessively drained and formed in sandy young alluvium mostly from dioritic and granitic formations.

Typically, the surface layer of the Tujunga soil is pale brown, slightly acid sand about 12 inches thick. The underlying material, to a depth of 60 inches, is very pale brown, neutral sand. Below a depth of 42 inches, the soil material is somewhat stratified and is 5 percent pebbles and cobbles. Permeability is rapid, and available water capacity is about 3 to 5 inches. Surface runoff is slow, and the erosion hazard is slight. Effective rooting depth is 60 inches or more.

The Urban land part of this complex consists of areas covered by roads, streets, and buildings and of other covered areas that are not suitable for plants. The soil material underlying structures and roads has been graded and moved about. However, because the original sandy Tujunga soil is similar throughout the profile, changes in the properties of this underlying soil from grading and soil mixing are minor. Surface runoff generally is very rapid, but in a few places shallow ponding occurs for brief periods.

The Xerorthents in this complex consist mainly of different kinds of imported soil material. This material has been spread over the original Tujunga soil and generally is about 20 to 36 inches thick. Most of the imported material is loamy or sandy.

Included with this complex in mapping are nearly equal proportions of Anacapa sandy loam, Capistrano fine sandy loam, and Soboba gravelly loamy sand; these soils have slopes of 0 to 2 percent.

The Tujunga soil has some limitations if it is used for landscape plants. Because this soil holds little moisture, plants should be selected that are hardy and drought-resistant. Adding organic matter increases the available water capacity only slightly unless a very large volume is added. Organic matter needs to be finely divided. Suitable organic matter includes garden compost, sawdust, steer manure, and commercial soil conditioners. If steer manure is used, only a small amount should be added at a time.

Garden and landscape plants respond favorably to the application of nitrogen, potassium, and phosphorous fertilizers. Large single applications of soluble fertilizer and manure should not be used, because the Tujunga soil has low storage capacity and plants are readily burned. Lime-induced chlorosis is not a problem.

Because of the position of this map unit on the landscape, cold air settles. Frost damage to citrus and hibiscus is moderate to severe in winters of below average temperature unless the plants are protected.

The Tujunga soil retains about 1/2 inch of water per foot of soil after wetting. Shallow-rooted plants, for example, lawn grasses, require application of about 3/4 inch of water at an interval of 3 or 4 days during periods of warm, long days. Robust, deep-rooted grasses or some other drought-resistant ground cover should be selected. In periods of moderate temperature and daylength, plants require application of about 3/4 inch of water at an interval of 4 or 5 days. During winter nearly all plants require watering if significant rainfall does not occur within 10 days. Well established trees and shrubs require application of about 2 1/2 to 3 inches of water at an interval of 8 to 10 days in summer and of 12 to 14 days in spring and fall.

Because the erosion hazard is slight on the Tujunga soil, a ground cover is not needed to protect the soil but can be used to enhance the scenery.

If the Tujunga soil is used as a building site, it has few significant soil limitations. It is free of stones and is not limited by depth to bedrock or to a high water table. Excavation is not difficult, but the sides of deep trenches are subject to caving. The Tujunga soil has extemely low shrink-swell potential. Gardening and landscaping group: Tujunga part in group Cd, and Urban land part not assigned.

136—Urban land-Xerorthents-Friant complex, 15 to 30 percent slopes. This moderately steep map unit is on mountains that border the southern part of the Valley. It is about 44 percent Urban land, 38 percent Xerorthents, 12 percent Friant sandy loam, and 6 percent Rock outcrop. The components of this map unit are too small in extent to be mapped separately at the scale used. Elevation ranges from about 1,000 to 1,900 feet. Average annual precipitation is about 20 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 days.

Before the original soils were graded and used for urban development, slopes were mostly 30 to 75 percent. Now the slopes are mostly 15 to 30 percent, and cut slopes are very steep.

The Urban land part of this complex consists of areas covered by roads, houses, and parking lots and of other paved and covered areas. The material underlying structures and roads is hard, somewhat fractured bedrock, local soil material, and blankets of crushed rock or sand.

The Xerorthents in this complex are altered soils of mixed origin that can support landscape plants. Most of the soil material is derived from the original Friant fine sandy loam, which was graded or was used as cut and fill material. Some of the material is crushed rock from local sources, imported soil material, and organic matter. The thickness of the altered soil ranges from a few inches to several feet and varies greatly within a short distance. Onsite investigation is needed to determine the composition and soil properties of these Xerorthents. Runoff is rapid, and the erosion hazard is high.

The Friant soil in this complex is on short, steep slopes between streets and in small areas that were not altered by cutting and filling. It is well drained and formed in material that was weathered in place from slate.

Typically, the surface layer of the Friant soil is dark grayish brown, medium acid and slightly acid fine sandy loam 19 inches thick and has some small rock fragments. Hard, fractured slate is at depth of 19 inches. Permeability is moderately rapid, and available water capacity is 1 to 3 inches. Surface runoff is rapid and very rapid, and the erosion hazard is high and very high. Effective rooting depth is 6 to 20 inches.

All areas of this map unit are used for urban development.

In undisturbed areas the Friant soil is fairly porous and is friable. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers can be improved by the application of potassium and phosphorous fertilizer. Because the Friant soil is shallow, plants are readily damaged or killed if too much fertilizer is applied at a time. An informed nurseryman should be consulted. Lime-induced chlorosis is not a problem.

Because of the position of this map unit on the landscape, air drainage is good and frost occurs less frequently than on the Valley floor. Local variations in temperature are caused by differences in elevation and in the protection afforded to plants by buildings. Frost-sensitive plants, for example, hibiscus, generally are only slightly damaged by frost.

In undisturbed areas the Friant soil is shallow; after the soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil, and the trees require staking and bracing. Landscape plants that are hardy and drought resistant should be selected. Careful management can partly offset the shallow soil depth.

The Friant soil retains about 1 to 1 1/2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 1/4 to 1 1/2 inches of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 1 inch of water at an interval of about 7 days. During winter nearly all plants require watering if significant rainfall does not occur within 15 days. Because the Friant soil is shallow and well drained, the period during which soil moisture is adequate is very brief and water should be applied frequently.

Because runoff is rapid and very rapid on the Friant soil and Xerorthents, a ground cover or other landscape planting is needed in exposed areas. A system of paved channels, storm drains, and street gutters is needed to remove runoff. Protective plantings require care, and structures to control runoff require maintenance.

The Friant soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. Grading, excavating, and trenching are difficult because of the shallow depth to bedrock. The Friant soil has low shrink-swell potential. Gardening and landscaping group: Urban land part not assigned, and Xerorthents and Friant parts in group Cs.

137—Vista coarse sandy loam, 30 to 50 percent slopes. This steep soil is well drained and is on hilly and mountainous terrain along the northeastern boundary of the survey area. Elevation ranges from 1,600 to 2,700 feet. Average annual precipitation is about 18 inches, mean annual air temperature is about 60 degrees F, and the average frost-free season is about 300 to 330 days.

Typically, the surface layer is grayish brown and brown, slightly acid coarse sandy loam about 20 inches thick. The subsoil is yellowish brown, slightly acid coarse sandy loam about 16 inches thick. Weathered granitic rock is at a depth of 36 inches. Permeability is moderately rapid, and available water capacity is 2 to 4 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 20 to 40 inches.

Included with this soil in mapping are soils that are too small in extent to be mapped separately at the scale used. About 15 percent of this map unit is a soil that is less than 20 inches deep to relatively hard, unweathered granite bedrock and that has some outcrops of rock. Millsholm loam, 30 to 50 percent slopes, Saugus loam, 30 to 50 percent slopes, and Soper gravelly sandy loam, 30 to 50 percent slopes, each make up 1 or 2 percent of this map unit. These included soils generally are near large areas that are mapped separately. Also included are a few areas of a soil that is similar to this Vista soil but is medium acid in the subsoil. About 10 percent of this map unit is a Vista coarse sandy loam that has slopes of 50 to 75 percent.

This soil is used for watershed, wildlife habitat, and hiking trails.

In undisturbed areas this soil has a cover of annual grasses and shrubs. Much care should be exercised to prevent fire from destroying the plant cover. Winter rains may cause severe erosion in burned areas and may cause severe deposition in valleys, especially if heavy rains occur before annual grasses can grow and provide some protection for the soil.

Grazing and other intensive uses of this soil are not practical. This soil can support pasture plants suitable for grazing by domestic animals, but it is not adjacent to extensive areas of pastureland. Also, because this soil is upslope from urbanized areas the control of runoff, erosion, and flooding is critical. Gardening and landscaping group Bs.

138—Xerorthents, 0 to 30 slopes. This map unit consists of nearly level to moderately steep, altered soils that can support plants. These soils resulted from the movement of soil material by man. The composition of these Xerorthents varies greatly in individual mapped areas. The composition is fairly consistent within the boundaries of some areas, and it varies greatly within a short distance in other areas. These Xerorthents, unlike those making up part of other map units in the survey area, are not closely associated with a specific natural soil. In some mapped areas construction was under way while this soil survey was being made; in other areas further alteration of the soil material is unlikely. These Xerorthents are so diverse that it is not practical to group or describe them collectively.

Some mapped areas of these Xerorthents are in places where hills were removed. The resulting land is level with adjacent valley soils. Balcom soils and similar soils were on these hills, and even the shale and sandstone substratum of these soils was removed.

Some mapped areas consist of broken shale that was removed from hills that were leveled and from other excavated areas. Some of these areas are in small canyons and valleys that were filled; the resulting land is level with adjacent hilltops. A few of these areas contain a large amount of broken concrete and other waste material.

Some mapped areas are near the Chatsworth and Van Norman Reservoirs. These areas are level and consist of material that was excavated to increase the storage capacity of the reservoirs. Some of these areas are used as borrow pits, and one is a thick deposit of stratified sediment.

Some mapped areas consist of loamy soil material that was bulldozed and leveled. The deposits in these areas are several feet thick and have the general appearance of Mocho and Conejo soils. These Xerorthents are mostly in playgrounds and other recreational areas.

One mapped area is near Pacoima Wash and consists of a series of ponds and dikes that are used for ground water recharge. The texture of these Xerorthents is stony, gravelly, and sandy. Gardening and landscaping groups Bs and Cs.

139—Xerorthents-Urban land-Balcom complex, 5 to 15 percent slopes. This moderately sloping and strongly sloping map unit is in the western part of the survey area. It is about 40 percent Xerorthents, about 35 percent Urban land, 20 percent Balcom silty clay loam, and 5 percent exposures of shale and sandstone bedrock. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 800 to 1,600 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

Before grading and urbanization, the original soil in areas of this complex was a Balcom silty clay loam that had slopes of 9 to 30 percent. The current slope gradient of 5 to 15 percent is a result of grading, cutting, and filling operations. On 80 percent of the surface area, the original Balcom soil was cut and was used as fill material in other places. During grading operations a large amount of soft shale and sandstone was crushed and was mixed with soil material.

The Xerorthents in this complex are altered soils that resulted from grading of a Balcom silty clay loam that had slopes of 9 to 30 percent. The soft shale and sandstone that originally underlay this Balcom soil were crushed to form soil material. The crushed material has texture of loam and clay loam and contains a variable amount of small rock fragments. The depth to undisturbed shale and sandstone ranges from a few inches to more than 60 inches. The thickness of the soil material varies greatly within a short distance. Onsite examination is required to determine the soil depth. Permeability of these Xerorthents is moderately slow. Surface runoff is medium, and the erosion hazard is moderate. Effective rooting depth is 3 to 60 inches. These Xerorthents are calcareous. The content of lime generally is higher and is more variable than that in the undisturbed Balcom soil.

The Urban land part of this complex consists of areas covered by roads, driveways, and houses and of covered areas not suitable for plants. The material underlying urban structures is a mixture of soil and crushed shale and sandstone and is similar to the Xerorthents in this complex. Surface runoff is very rapid.

The Balcom soil in this complex is on short slopes between streets and in yards and small open areas. It is well drained and formed in material that was weathered in place from soft shale and sandstone.

Typically, the surface layer of the Balcom soil is light brownish gray, calcareous silty clay loam about 16 inches thick. The underlying material, to a depth of 37 inches, is light brownish gray, calcareous silty clay loam that has a few fragments of weathered shale. White, calcareous shale is at a depth of 37 inches. Permeability is moderately slow, and available water capacity is about 4 to 8 inches. Surface runoff is medium, and the erosion hazard is moderate. Effective rooting depth is 23 to 40 inches.

The exposures of shale and sandstone bedrock in this complex are on steep cut slopes that resulted from grading operations. Before grading, these areas consisted of a Gazos silty clay loam.

Almost all areas of this map unit are used as homesites and for other urban developments.

The Xerorthents and the Balcom soil in this complex have a moderately large amount of clay and are low in organic-matter content. As a result these soils are very hard when dry, especially if they have been worked and compacted when wet. Tillage should be done when the soil is dry or only slightly moist. Foot or vehicle traffic on the soil when it is wet causes compaction and makes it very hard and relatively nonporous when it dries. Adding organic matter helps to make the soil more friable and porous and to increase plant growth. Suitable organic matter includes garden compost, steer manure, peat moss, sawdust, wood chips, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Balcom soil is calcareous throughout, and the Xerorthents are calcareous in places where calcareous shale and sandstone have been mixed into the soil by grading and by other construction operations. Some plants, for example, citrus and gardenias, are susceptible to lime-induced chlorosis, especially in local spots of strongly calcareous soil. Azaleas require an imported acid soil that has a high content of organic matter; they can be grown either in containers or in pits dug in the local soil. Treatment with iron chelate or iron sulfate helps to correct chlorosis in affected plants. Many plants are not susceptible to chlorosis. An informed nurseryman or other plant specialist should be consulted before plant selection is made.

Because this map unit is on foothills, in most areas air drainage is fairly good so that cold night air is not likely to cause much frost damage to sensitive plants, for example, citrus and hibiscus.

After the Balcom soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil. In addition, the trees require staking and bracing to protect them from windthrow during wet, windy periods.

The Balcom soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. In small areas of soils that contain many shale and sandstone fragments or are less than 12 inches deep, proportionately less water is retained by the soil. Shallow-rooted, rapidly growing plants, for example, lawn grasses, require application of about 1 inch of water at a 5-day interval during hot, dry periods late in summer and early in fall. In periods of moderate temperature, these plants require application of about 3/4 inch of water at a 5-day interval. For well-established, drought-resistant shrubs and ground cover plants, for example, dwarf coyote bush, the interval between waterings can be doubled. In winter water should be applied if significant rainfall does not occur within 15 to 20 days. A detailed onsite examination of the soil and of plant response is needed to determine the proper amount and frequency of water application.

Because this complex is moderately sloping and strongly sloping, there is considerable runoff especially from areas of Urban land. Steep cut slopes and other areas where elevation abruptly changes greatly increase the velocity and erosive force of runoff. Excessive soil erosion and deposition of debris occur in exposed areas and in areas that do not have structures to control runoff. Before the rainy season begins in winter, grading and trenching should be completed and a system of street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns, ivy, or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

The Balcom soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. Grading and trenching are somewhat difficult even though the underlying bedrock is fairly soft. A soil mantle should be spread over unpaved areas that have been stripped of soil. The Balcom soil has a moderately large amount of clay and moderate shrink-swell potential, and it develops cracks when it dries. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group: Xerorthents part in groups Bs and Cs, Urban land part not assigned, and Balcom part in group Bs.

140—Xerorthents-Urban land-Balcom complex, 15 to 30 percent slopes. This moderately steep map unit is on foothills in the western part of the survey area. It is about 45 percent Xerorthents, about 35 percent Urban land, 15 percent Balcom silty clay loam, and 5 percent exposures of shale and sandstone bedrock. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 800 to 1,600 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

Before grading and urbanization the original soil in areas of this complex was Balcom silty clay loam, 30 to 50 percent slopes. The current slope gradient is a result of grading, cutting, and filling operations (fig. 2). Only about 15 percent of this complex is relatively undisturbed soil. During grading operations a large amount of soft shale and sandstone was crushed and was mixed with the soil.

The Xerorthents in this complex consist of altered soils that resulted from the grading of areas of Balcom silty clay loam. The soft shale and sandstone that originally underlay the Balcom soil were broken up and crushed by earthmoving equipment to form soil material. The crushed material has a texture of loam and clay loam and contains a variable amount of small rock fragments. The depth to undisturbed shale and sandstone ranges from a few inches to more than 60 inches, and the thickness of soil material varies greatly within a short distance. Onsite examination is required to determine the soil depth. Permeability of these Xerorthents is moderately slow. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 3 to 60 inches. These Xerorthents are calcareous. The lime content generally is higher and is more variable from place to place than that in undisturbed areas of Balcom soil.

The Urban land part of this complex consists of areas covered by roads, driveways, and houses and of other covered areas not suitable for plants. The material underlying urban structures is a mixture of soil and crushed shale and sandstone and is similar to the Xerorthents in this complex. Surface runoff is rapid.

The Balcom soil in this complex is on short slopes between streets and in yards and small open areas. It is well drained and formed in material that was weathered in place from soft shale and sandstone.

Typically, the surface layer of the Balcom soil is light brownish gray, calcareous silty clay loam about 16 inches thick. The underlying material, to a depth of 37 inches, is light brownish gray, calcareous silty clay loam that has a few fragments of weathered shale. White, calcareous shale is at a depth of 37 inches. Permeability is moderately slow, and available water capacity is about 4 to 8 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is 23 to 37 inches.

The exposures of shale and sandstone bedrock in this complex are on steep cut slopes that resulted from grading operations.

Almost all areas of this map unit are used as homesites and for other urban developments.

The Xerorthents and the Balcom soil in this complex have a moderately large amount of clay and are low in organic-matter content. As a result, these soils are very hard when dry, especially if they have been worked and compacted when wet. Tillage should be done when the soil is dry or only slightly moist. Foot or vehicle traffic on the soil when it is wet causes compaction and makes the soil very hard and relatively nonporous when it dries. Adding organic matter helps to make the soil more friable and porous and to increase plant growth. Suitable organic matter includes garden compost, steer manure, peat moss, sawdust, wood chips, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Balcom soil is calcareous throughout, and the Xerorthents are calcareous in places where calcareous shale and sandstone have been mixed into the soil by grading or by other construction activities. Some plants, for example, citrus and gardenias, are susceptible to lime-induced chlorosis, especially in local spots of strongly calcareous soil. Azaleas require an imported acid soil that has a high content of organic matter; they can be grown in containers or in pits dug in the local soil. Treatment with iron chelate or iron sulfate helps to correct chlorosis in affected plants. Many plants are not susceptible to chlorosis. An informed nurseryman or other plant specialist should be consulted before plant selection is made.

Because this map unit is on foothills, in most areas air drainage is fairly good and frost occurs less frequently than on the Valley floor. Frost-sensitive plants, for example, citrus and hibiscus, are not damaged in most years. However, because of local variations in air drainage, plants in some areas require protection from frost.

After the Balcom soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil. In addition, the trees require staking and bracing to protect them from windthrow during wet, windy periods.

The Balcom soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. In small areas of soils that contain many shale and sandstone fragments or are less than 12 inches deep, proportionately less water is retained by the soil. Shallow-rooted, rapidly growing plants, for example, lawn grasses, require application of about 1 inch of water at a 5-day interval during hot, dry periods late in summer and early in fall. During periods of moderate temperature, these plants require application of about 3/4 inch of water at a 5-day interval. For well-established, drought-resistant shrubs and ground cover plants, for example, dwarf coyote bush, the interval between watering can be doubled. In winter water should be applied if significant rainfall does not occur within 15 to 20 days. A detailed onsite examination of the soil and of plant response is needed to determine the proper amount and frequency of water application.

Because this complex is moderately steep, there is considerable runoff especially from areas of Urban land. Steep cut slopes and other areas where elevation abruptly changes greatly increase the velocity of runoff. Soil erosion and deposition are severe in exposed areas and in areas that do not have structures to control runoff. Before the rainy season begins in winter, grading and trenching should be completed and a system of street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, erosion and siltation are considerably reduced; however, the plants require care and the structures require maintenance.

The Balcom soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. Grading and trenching are somewhat difficult even though the underlying bedrock is fairly soft. A soil mantle should be spread over areas that have been stripped of soil. The Balcom soil has a moderately large amount of clay and moderate shrink-swell potential and develops cracks when it dries. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire.

Gardening and landscaping group: Xerorthents part in groups Bs and Cs, Urban land part not assigned, and Balcom part in group Bs.

141—Xerorthents-Urban land-Gazos complex, 5 to 15 percent slopes. This moderately sloping and strongly sloping map unit is on foothills in the western part of the survey area. It is about 45 percent Xerorthents, about 40 percent Urban land, and 15 percent Gazos silty clay loam. The components of this map unit are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 800 to 1,600 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 days.

Before grading and urbanization, the original soil in areas of this complex was mostly Gazos silty clay loam that had slopes of 9 to 30 percent. The current slope gradient is a result of cutting and filling operations. There are some narrow strips of steep slopes. Only about 15 percent of this map unit is undisturbed soil.

The Xerorthents in this complex consist of altered soils and broken and crushed shale. The soil material is mainly from the original Gazos soil. In places soil and other earthy material have been imported and spread over the surface or mixed with the original Gazos soil. These Xerorthents are suited to landscape plants except in small rocky areas that are mostly near steep banks. The depth to undisturbed shale ranges from a few inches to several feet, and onsite examination is required to determine the soil depth. The soil properties of these Xerorthents are somewhat similar to those of the Gazos soil. Permeability is moderate or moderately slow. Runoff is medium to moderately rapid, and the erosion hazard is moderate to high. Effective rooting depth is 4 to 48 inches.

The Urban land part of this complex consists of areas covered by roads, driveways, parking lots, and buildings and of other covered areas not suitable for plants. The material underlying urban structures is similar to the adjacent Xerorthents. It is a mixture of the original Gazos soil and crushed shale. Blankets of imported rock, sand, and gravel underlie some buildings and paved areas. Surface runoff is very rapid.

The Gazos soil in this complex is on short slopes between streets and in yards, vacant lots, and small open areas. It is well drained and formed in material that was weathered in place from hard shale.

Typically, the surface layer of the Gazos soil is about 28 inches thick. The upper part of the surface layer is grayish brown, medium acid and slightly acid silty clay loam 21 inches thick, and the lower part is grayish brown, neutral silty clay loam about 7 inches thick. Shale fragments make up 5 to 8 percent of the upper part and about 10 percent of the lower part. Hard, somewhat fractured shale is at a depth of 28 inches. Permeability is moderately slow, and available water capacity is about 4 to 8 inches. Surface runoff is medium to rapid, and the erosion hazard is moderate to high. Effective rooting depth is 24 to 40 inches.

Nearly all areas of this complex are used for urban development.

The Gazos soil contains a moderately large amount of clay and is hard or very hard when dry. Hardness is increased by working or compacting the soil when it is wet. Tillage should be done when the soil is dry or only slightly moist. Keeping off the soil when it is wet prevents compaction. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results. The Balcom soil is noncalcareous, and lime-induced chlorosis is not a problem.

In most areas of this complex air drainage is fairly good, but air drainage varies greatly from place to place. Frost-sensitive plants, for example, citrus and hibiscus, rarely are seriously damaged.

After the Gazos soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil. In addition, the trees require staking and bracing to protect them from windthrow during wet, windy periods.

The Gazos soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Water retention is less in areas of Xerorthents that contain a large amount of shale. Shallow-rooted, rapidly growing plants, for example, lawn grasses and some other ground cover plants, require application of about 1 inch of water at a 5-day interval during periods of long, hot days. During periods of moderate temperature, these plants require application of about 3/4 inch of water at a 5-day interval or 1 1/2 inches at a 10-day interval. For well-established, drought-resistant shrubs and ground cover plants, for example, dwarf coyote bush, the interval between waterings can be doubled. During winter water should be applied if significant rainfall does not occur within 15 to 20 days.

The hazard of erosion is moderate to high. The rate of erosion is highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns or other ground covers should be established in exposed areas to preserve site quality and help to prevent deposition downslope. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

The Gazos soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. Grading and trenching are somewhat difficult because of the hard, somewhat fractured shale bedrock. A soil mantle should be spread over areas that have been stripped of soil. The Gazos soil has a moderately large amount of clay and develops cracks when it dries. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group: Xerorthents part in groups Bs and Cs, Urban land part not assigned, and Gazos part in group Bs.

142—Xerorthents-Urban land-Gazos complex, 15 to 30 percent slopes. This moderately steep map unit is on foothills in the western part of the survey area. It is about 50 percent Xerorthents, about 35 percent Urban land, and 15 percent Gazos silty clay loam. The components of this map unit are closely intermingled and are too small in extent to be mapped separately at the scale used. Elevation ranges from about 800 to 1,600 feet. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 days.

Before grading and urbanization, the original soil in areas of this map unit was mostly Gazos silty clay loam that had slopes of 30 to 50 percent. The current slope gradient is a result of cutting and filling operations. A few cut slopes and escarpments are very steep and cause serious problems in the removal of runoff.

The Xerorthents in this complex consist of altered soils and broken and crushed shale. The soil material is mainly from the original Gazos soil. In places imported soil and other earthy materials have been spread over the surface or mixed with the Gazos soil. Small exposures of shale bedrock are in some places, especially near steep banks. These Xerorthents are suited to plants. The depth to undisturbed shale ranges from a few inches to several feet, and onsite examination is required to determine the soil depth. The soil properties of these Xerorthents are similar to those of the Gazos soil. Permeability is moderate or moderately slow. Runoff is medium to rapid, and the erosion hazard is moderate to high. Effective rooting depth is 4 to 48 inches.

The Urban land part of this complex consists of areas covered by roads, driveways, and buildings and of other covered areas not suitable for plants. The earthy material underlying urban structures is similar to the adjacent Xerorthents; it is a mixture of Gazos soil and crushed shale. In some places structures and pavement directly overlie shale bedrock or are underlain by a blanket of imported rock, sand, and gravel. Surface runoff is very rapid.

The Gazos soil in this complex is on short slopes between streets and in small open areas. It is well drained and formed in material that was weathered in place from hard shale.

Typically, the surface layer of the Gazos soil is about 28 inches thick. The upper part of the surface layer is grayish brown, medium acid and slightly acid silty clay loam 21 inches thick, and the lower part is grayish brown, neutral silty clay loam about 7 inches thick. Shale fragments make up 5 to 8 percent of the upper part and about 10 percent of the lower part. Hard, somewhat fractured shale is at a depth of 28 inches. Permeability is moderately slow, and available water capacity is about 4 to 7 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is about 24 to 40 inches.

This map unit is used for urban development.

The Gazos soil contains a moderately large amount of clay and is hard or very hard when dry. Hardness is increased by working or compacting the soil when it is wet. Tillage should be done when the soil is dry or only slightly moist. Keeping off the soil when it is wet prevents compaction. Adding organic matter helps to maintain and improve soil tilth and porosity. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, and various commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results. The Gazos soil is noncalcareous, and lime-induced chlorosis is not a problem.

In most areas of this map unit, air drainage is fairly good, but air drainage varies greatly from place to place. Frost-sensitive plants, for example, citrus and hibiscus, rarely are seriously damaged.

After the Gazos soil is graded for roads or foundations, onsite examination is required to determine the soil depth. Planning for grading or for importing soil so that plants can be grown should provide for a minimum soil depth of 1 foot. Deep-rooted trees and shrubs should not be planted in areas where the soil is less than 3 feet deep. Trees planted in these shallower areas generally attain less height than trees planted in areas of deeper soil. In addition, the trees require staking and bracing to prevent windthrow during wet, windy periods.

The Gazos soil retains about 1 1/2 to 2 inches of water per foot of soil after wetting. Water retention is less in areas of Xerorthents that contain a large amount of shale and rock. Shallow-rooted, rapidly growing plants, for example, lawn grasses and some other ground cover plants, require application of about 1 inch of water at a 5-day interval during periods of long, hot days. During periods of moderate temperature, these plants require application of about 3/4 inch of water at a 5-day interval or 1 1/2 inches at a 10-day interval. For well-established, drought-resistant shrubs and ground cover plants, for example, dwarf coyote bush, the interval between waterings can be doubled. During winter water should be applied if significant rainfall does not occur within 15 to 20 days.

The hazard of erosion is high to moderate. The rate of erosion is highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of street gutters, paved channels, and storm drains should be installed to remove runoff. Control of runoff is critical on steep cut slopes. Lawns or other ground covers should be established in exposed areas to preserve site quality and help to prevent deposition downslope. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

The Gazos soil has some limitations if it is used as a homesite or for roads, utilities, and other urban developments. Grading and trenching are somewhat difficult because of the hard, somewhat fractured shale bedrock. A soil mantle should be spread over areas that have been stripped of soil. The Gazos soil has a moderately large amount of clay and moderate shrink-swell potential and develops cracks when it dries. Because of shrink-swell potential and loosening of the soil by grading, concrete structures should be designed to exceed minimum strength requirements. Strength can be increased by the use of thicker or stronger concrete, blankets of crushed rock or sand, and vapor barriers and by reinforcement with steel or wire. Gardening and landscaping group: Xerorthents part in groups Bs and Cs, Urban land part not assigned, and Gazos part in group Bs.

143—Xerorthents-Urban land-Saugus complex, 15 to 30 percent slopes. This moderately steep map unit is on foothills on both sides of the Valley in the western part of the survey area. It is about 45 percent Xerorthents, 40 percent Urban land, and 15 percent Saugus loam. The components of this complex are closely intermingled and are too small in extent to be mapped separately at the scale used. Average annual precipitation is about 16 inches, mean annual air temperature is about 61 degrees F, and the average frost-free season is about 300 to 330 days.

Before grading and urbanization, the original soil in most areas of this map unit was a Saugus loam that had slopes of 30 to 50 percent. The current slope gradient of 15 to 30 percent resulted from cutting and filling operations. Some narrow strips of steep escarpments are also in this map unit.

The Xerorthents in this complex consist of altered soils that can support plants. These soils resulted from extensive grading. There are deep cuts and thick fills of soil material and crushed shale and sandstone. This material is from the original Saugus soil and its substratum. The depth to undisturbed shale and sandstone ranges from a few inches to many feet. These Xerorthents have soil properties somewhat similar to those of the Saugus soil. Permeability is moderate. Surface runoff is medium to very rapid, and the erosion hazard is moderate to very high. Effective rooting depth is 10 to 60 inches.

The Urban land part of this complex consists of areas covered by roads, driveways, and buildings and of other paved or covered areas that are not suitable for plants. The material underlying urban structures is mostly soil material and crushed shale and sandstone. This material is similar to the Xerorthents in this complex. In some places a blanket of gravel, sand, or crushed rock has been used as a base for pavement and buildings. Surface runoff is very rapid.

The Saugus soil in this complex is in strips between streets and in some yards and small open areas. It is well drained and formed in material that was weathered in place from upturned beds of soft shale and sandstone.

Typically, the surface layer of the Saugus soil is brown, slightly acid and neutral loam about 19 inches thick. The underlying material, to a depth of 45 inches, is light yellowish brown, neutral and mildly alkaline loam. Weathered soft shale and sandstone are at a depth of 45 inches. Permeability is moderate, and available water capacity is 4 to 8 inches. Surface runoff is rapid, and the erosion hazard is high. Effective rooting depth is about 40 to 56 inches.

Nearly all areas of this map unit are used for urban development.

The soils in this complex are suited to a wide variety of trees and shrubs. In some spots, however, shale and sandstone are close to the surface. In these spots, the shale and sandstone can be ripped and crushed to form soil material or imported topsoil can be used.

Maintaining porosity is a continual concern if the soils in this map unit are used for lawn grasses and landscape plants. Construction activities and foot and vehicle traffic tend to make the soils very compact, difficult to irrigate, and unfavorable for plants. If the soils are used for plants, they should not be worked when wet. Organic matter should be added to the soil before planting and during renovation of landscape plants. Suitable organic matter includes garden compost, steer manure, sawdust, wood chips, peat moss, and commercial soil conditioners. The selection of organic matter generally depends on cost and availability.

Nearly all garden and landscape plants respond favorably to the application of nitrogen fertilizer, especially where lush green growth is desired, for example, in lawns. The development of fruits, roots, and flowers is fair to good even if no supplemental fertilizer is applied; however, the application of potassium and phosphorous fertilizer helps to obtain the best results.

The Saugus soil is free of lime, but in a few places limy soil material has been imported for use in construction operations. Still, lime-induced chlorosis is not a problem.

Because this map unit is on foothills, in most areas air drainage is good and frost occurs less frequently than on the Valley floor. Frost-sensitive plants, for example, citrus and hibiscus, rarely are seriously damaged.

The Saugus soil retains about 1 1/2 inches of water per foot of soil after wetting. Rapidly growing plants, for example, lawn grasses and some ground cover plants, require application of about 1 inch of water at an interval of 5 days during periods of warm, long days. In periods of moderate temperature and daylength, these plants require application of about 3/4 inch of water at an interval of 5 days. If a drought-resistant ground cover plant, for example, dwarf coyote bush, is planted and is well established, the interval between waterings can be doubled. During winter nearly all plants require watering if significant rainfall does not occur within 15 to 20 days.

The hazards of erosion and siltation are high. These hazards are highest when the natural vegetation is removed for urban development. Before the rainy season begins in winter, grading and trenching should be completed and a system of low walls, street gutters, paved channels, and storm drains should be installed to remove runoff. Lawns, ivy, or other ground covers should be established in exposed areas. An organic mulch, for example, straw or jute, or other protective cover is needed to control erosion until the plants are well established. Mulching also increases plant growth. After landscape plants are well established and structures to control runoff are installed, the plants require care and the structures require maintenance.

The Saugus soil has low shrink-swell potential. Much soil material is graded and moved during site preparation, and proper grading, site preparation, and foundation design are needed to offset the settlement of soil that is loosened by grading. Gardening and landscaping group: Xerorthents part in group Bs, Urban land part not assigned, and Saugus part in group Bs.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of systems for septic tank disposal and for runoff control, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops, pasture, and rangeland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall quality of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

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

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

Soil groups for gardening and landscaping

The soils in the survey area have been placed in gardening and landscaping groups. These groups are described in this section.

Soil characteristics can vary considerably within a map unit, especially where there has been considerable cutting and filling for urban development. Therefore, land users are advised to make detailed onsite investigations in planning for extensive landscaped areas in which perennials are to be planted.

Upper case letters are used to indicate the overall quality of the soils for use in gardening and landscaping. Soils in group A are of very good quality; B, good; C, fair; and D, unsatisfactory. Soil properties considered in assigning the soils to a gardening and landscaping group are ease of tillage, site preparation, and soil manipulation; available water capacity throughout the profile; permeability; drainage class; and the presence of soil properties or soil layers that tend to increase the ill effects of overwatering. Not considered are local variations in frost hazard and in exposure to sun and wind.

For soils in groups B and C, a lower case letter is used to indicate the major soil limitation. The letter *c* indicates that enough clay is present so that permeability and ease of tillage are reduced. Permeability of soils in group Bc is only slightly slower than ideal and in group Cc is seriously restricted. The letter *d* is used to indicate excessively drained, droughty soils that retain little moisture within reach of most plant roots but that are very deep and nearly level. The letter *l* indicates soils that are nearly ideal for use in gardening and landscaping, except they are limy. The letter *s* indicates shallow soils that have slopes of 9 to 75 percent. Soils in group Bs are dominantly 20 to 48 inches deep, and soils in group Cs are dominantly 6 to 20 inches deep and tend to be droughty. Some of the soils in group Bs are limy or somewhat clayey.

Most soils used in gardening and landscaping can be improved by the annual addition of a large amount of suitable organic matter, especially soils in groups B and C. Suitable organic matter includes lawn clippings, leaves, and shredded prunings and commercial manure, bark, peat, and compost.

In the following paragraphs each gardening and landscaping group in the county is described. All of the soils in a group are similar in several major features, but they differ in soil reaction, permeability, available water capacity, depth, texture, and kinds of layers and in other features that affect plant growth. Detailed information about these soil features is given in the description of the map unit.

Group A. The soils in this group are of very good quality for use in gardening and landscaping. Management, site preparation, and tillage are easy. These soils are somewhat sandy and are well drained. Permeability is moderately rapid, and available water capacity generally is moderate. Water retention and fertility are less than optimum in some of these soils, but deficiencies and mistakes in soil management are easily corrected. These soils have no significant soil-related problems.

Group Bc. The soils in this group are of good quality for use in gardening and landscaping. They have a surface layer of clay loam or loam and a subsoil of clay loam. They are well drained. Permeability is moderately slow, and available water capacity is high. If these soils are tilled and compacted when wet, they become hard, cloddy, and difficult to till and absorb water slowly. If carefully managed, these soils are very productive, but mistakes in management are not so easy to correct as on soils in group A. These soils are the most productive of group B soils.

Group Bl. The soils in this group are of good quality for use in gardening and landscaping. They consist of loam and clay loam and are well drained. Permeability is moderate and moderately slow, and available water capacity is moderate to high. If these soils are tilled and compacted when wet, they become hard, cloddy, and difficult to till. These soils are limy. Sensitive plants may develop chlorosis, especially under conditions of prolonged wetness and poor aeration. Plants that require an acid, porous plant medium should not be grown unless the natural limy soil is removed and is replaced with an acid soil that has a high content of organic matter. Many other kinds of plants are not adversely affected, however. These soils are very productive if care is taken in management and in the selection of plants.

Group Bs. The soils in this group are of good quality for use in gardening and landscaping. They consist of sandy loam, loam, and clay loam. They are well drained. Permeability is moderately rapid to moderately slow. Available water capacity is low to moderate in most of these soils. If many of these soils are tilled and compacted when wet, they become hard, cloddy, and difficult to cultivate and absorb water slowly. Slopes range from 9 to 75 percent. Runoff, erosion, irrigation, and site preparation are management problems. Soil depth is mainly 20 to 40 inches, but a few of these soils are somewhat deeper. Small spots of calcareous soil result from trenching and grading that have left limy soil material at the surface. The overall quality of these soils is lower and soil problems are greater than those of soils in groups Bc and Bl.

Group Cc. The soils in this group are of fair quality for use in gardening and landscaping. They have a high content of clay. These soils are well drained, except for a few spots indicated on the maps. Available water capacity is moderate, but the soil absorbs and releases moisture slowly. These soils are very deep, but roots penetrate the lower part of the profile with difficulty. These soils are sticky or cloddy and are difficult to till. They are not suitable for plants that require very rapid drainage, good aeration, and a large supply of moisture. Once established, many plants grow very well.

Group Cs. The soils in this group are of fair quality for use in gardening and landscaping. They consist of sandy loam, loam, or clay loam. Most of these soils are porous and are well drained and somewhat excessively drained. Permeability is moderate to rapid. Available water capacity is low to very low. These soils are easy to till and crumble but are only 6 to 20 inches deep to rock. If these soils are used for deep-rooted trees and shrubs, plant growth is poor or extensive site preparation and use of imported soil material are required. Drought-resistant varieties should be selected, or watering and feeding of plants should be frequent and careful.

Group Cd. The soils in this group are of fair quality for use in gardening and landscaping. They consist of sand, very gravelly sand, and cobbly sand. They are somewhat excessively drained and excessively drained. Available water capacity is low to very low. These soils are loose and porous. Drought-resistant plants that have a deep, extensive root system should be selected and should be watered at a short interval. Survival of plants on the gravelly and cobbly soils in this group is marginal, except for the hardiest varieties, but the growth of shallow-rooted garden plants can be improved by mixing large amounts of finer textured soil and organic matter with the surface layer.

Group D. This group consists of areas of Badland and Rock outcrop which are unsuitable for plants.

Engineering

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

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

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

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

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

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

The information is presented mainly in tables. Table 2 shows, for each kind of soil, the degree and kind of limitations for building site development; table 3, for sanitary facilities; and table 5, for water management. Table 4 shows the suitability of each kind of soil as a source of construction materials.

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

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

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 2. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

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

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

Dwellings and *small commercial buildings* referred to in table 2 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 2 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, and shrink-swell potential are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 3 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good, fair*, or *poor*, which, respectively, mean about the same as the terms *slight, moderate*, and *severe*.

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

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a special system can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Area sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

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

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

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

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 4 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 8 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 4 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 8.

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

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

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

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

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

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

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 5 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

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

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

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

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

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

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

Recreation

The soils of the survey area are rated in table 6 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

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

The information in table 6 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 3, and interpretations for dwellings without basements and for local roads and streets, given in table 2.

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

Playgrounds require soils that can withstand intensive foot traffic (fig. 3). 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 or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to prolonged or frequent flooding. They should have few or no stones or boulders on the surface, and slopes should be less than 30 percent.

Wildlife habitat

RICHARD MCCABE, biologist, Soil Conservation Service, Riverside, California, assisted in preparing this section.

Wildlife provide opportunities for recreation and improve the quality of life in the survey area. They play an important role in the biological control of insect pests and provide a source of outdoor recreation for naturalists and birdwatchers.

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

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

In table 7, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

All of the soils in the survey area have been rated for wildlife habitat except Xerorthents, miscellaneous areas, and Urban land. Many soils have been rated very poor only because of the density of urban structures and population, and not because of the inherent properties of the soil.

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

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, salinity, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, sorghum, wheat, oats, barley, soybeans, and sunflowers. In this survey area grain and seed crops require irrigation.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, salinity, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, ryegrass, bermudagrass, clover, lana vetch, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are wild oats, filaree, wild sunflower, deer vetch, mustard, and lambsquarters. Wild herbaceous plants grow in areas moistened by irrigation wastewater.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture. Examples of shrubs are scrub oak, coast live oak, toyon, mountain-mahogany, sumac, California flat-topped buckwheat, chamise, sages, buckbrush, ceanothus, and creosote bush.

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

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

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

Openland habitat 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 kinds of wildlife attracted to these areas include dove, valley quail, pheasant, killdeer, roadrunner, meadowlark, field sparrow, cottontail, and skunk.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. These plants also grow near small streams, municipal water reservoirs, and unlined parts of the Los Angeles River. Some of the wildlife attracted to such areas are ducks, avocets, blackbirds, blacknecked stilts, Canada geese, herons, coots, curlews, egrets, gulls, kingfishers, marsh hawks, rails, terns, muskrat, raccoon, and bullfrogs.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include dove, red tail hawk, roadrunner, quail, blacktail jackrabbit, brush rabbit, cottontail, groundsquirrel, bobcat, coyote, mule deer, lizards, and snakes.

Soil properties

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

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses of soil series in the West San Fernando Valley Area are not published in this soil survey, but laboratory data for many soil series are available in other published surveys (*4*, *5*).

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 8 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 8 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 8 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 soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 8. Also in table 8 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

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

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 9 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

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

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

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

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the value given in table 9. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

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

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

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

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing 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, but crops can be grown if measures to control soil blowing 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, and 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, and crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and water features

Table 10 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. 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 that have a layer that impedes the downward movement of water or soils that have 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 clay soils 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.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*7*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 11, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

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

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is 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 expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haploxeroll (*Hapl*, meaning simple horizons, plus *xeroll*, the suborder of Mollisols that have a dry-moist moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups 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 is thought to typify the great group. An example is Typic Haploxerolls.

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

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

Soil series and morphology

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

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*3*). Unless otherwise noted, colors described are for dry soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Anacapa series

The Anacapa series consists of very deep, well drained soils that formed in young alluvium derived mainly from sandstone and shale. Anacapa soils are on the Valley floor, on fans, and in small narrow valleys. Slopes range from 0 to 9 percent.

The Anacapa soils are similar to Capistrano, Conejo, Mocho, and San Emigdio soils and are near Capistrano, Chualar, Mocho, San Emigdio, and Saugus soils. Capistrano soils lack free lime and generally are less alkaline than Anacapa soils. Conejo and Mocho soils are loam or clay loam and have more than 18 percent clay. Chualar soils have a B2t horizon of sandy clay loam. San Emigdio soils are calcareous throughout and are more stratified than Anacapa soils. Saugus soils are on dissected hills and have a substratum of soft shale and sandstone at a depth of 40 to 56 inches.

Typical pedon of Anacapa sandy loam in an area of Anacapa-Urban land complex, 0 to 2 percent slopes, in an abandoned orange grove 100 feet north of Tulsa Street and 150 feet west of Topanga Canyon Boulevard:

Ap—0 to 3 inches, grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; few fine tubular pores and many very fine interstitial pores; mildly alkaline (pH 7 8); clear smooth boundary.

A12—3 to 13 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist, moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and few fine tubular pores; mildly alkaline (pH 7.8); clear wavy boundary.

A13—13 to 24 inches, grayish brown (10YR 5/2) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, few very fine roots; few very fine tubular pores and common very fine tubular and interstitial pores; mildly alkaline (pH 7.8), clear wavy boundary.

C1—24 to 31 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure, slightly hard, friable, slightly sticky and nonplastic; few very fine roots, few fine tubular pores and many very fine tubular and interstitial pores; strong effervescence with disseminated lime and fine soft masses of lime; moderately alkaline (pH 8.0); clear wavy boundary.

C2ca—31 to 48 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive, slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine tubular and interstitial pores; violent effervescence with disseminated lime and soft masses, nodules, and filaments of lime; moderately alkaline (pH 8.0); clear smooth boundary.

C3ca—48 to 63 inches; pale brown (10YR 6/3) coarse sandy loam; yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic, few very fine and fine roots; common very fine tubular and interstitial pores; violent effervescence with disseminated lime and nodules of lime; moderately alkaline (pH 8.0); clear wavy boundary.

IIC4ca—63 to 72 inches, pale brown (10YR 6/3) gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; massive, soft, very friable, nonsticky and nonplastic; few very fine roots, many very fine interstitial pores; 35 percent, by volume, large rounded pebbles; violent effervescence with disseminated lime; moderately alkaline (pH 8.0).

Depth to free lime is 20 to 40 inches Lime is disseminated and in small filaments and nodules. Texture is sandy loam, fine sandy loam, or loam. The soil is not distinctly stratified to a depth of 40 inches or more. Below a depth of 40 inches some pedons are distinctly stratified with loamy sand. Gravel content ranges to as much as 50 percent.

The A horizon is grayish brown or dark grayish brown and is neutral or mildly alkaline.

Anacapa soils in this survey area are a taxadjunct to the Anacapa series because they have an insufficient amount of organic carbon in the 12- to 20-inch layer to qualify as pachic. This difference, however, does not significantly affect the use or behavior of the soils.

Balcom series

The Balcom series consists of moderately deep, well drained soils that formed in material that was weathered in place from soft shale and sandstone. These soils are on hills. Slopes range from 9 to 75 percent.

Balcom soils are similar to Gazos, Millsholm, and Saugus soils and are near Gazos, Lopez, Soper, and Soper Variant soils. Gazos and Lopez soils are grayish brown to dark grayish brown and have moist value of 2 or 3. Lopez soils are 6 to 20 inches deep to hard shale. Millsholm soils are noncalcareous and are 10 to 20 inches deep to hard shale or sandstone. Saugus soils are dominantly sandy loam and have less than 18 percent clay. Soper soils and Soper Variant soils are noncalcareous throughout and have a B2t horizon of sandy clay loam.

Typical pedon of Balcom silty clay loam in an area of Balcom silty clay loam, 15 to 30 percent slopes, 150 feet north of intersection of Chase Street and Kentland Avenue, near top of hill:

A11—0 to 6 inches; light brownish gray (2.5Y 6/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; violent effervescence, with disseminated lime, moderately alkaline (pH 8.0); clear smooth boundary

A12—6 to 16 inches; light brownish gray (2.5Y 6/2) silty clay loam; dark grayish brown (10YR 4/2) moist; few fine distinct light gray (10YR 7/2 dry and moist) mottles; weak fine subangular blocky structure, hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; violent effervescence with disseminated lime; few fine distinct light gray (10YR 7/2) flecks of lime; moderately alkaline (pH 8.0); gradual smooth boundary

Cca—16 to 37 inches; light brownish gray (10YR 6/2) silty clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure, hard, friable, slightly sticky and slightly plastic; few very fine roots, many very fine tubular and interstitial pores; about 5 percent by volume, soft weathered shale fragments 2 to 4 inches in diameter; violent effervescence with disseminated lime and filaments and fine irregularly shaped soft masses of lime, moderately alkaline (pH 8.0); gradual smooth boundary.

Cr—37 to 40 inches; white (2.5Y 8/2) weathered calcareous shale, pale yellow (5Y 7/3) moist.

Depth to soft shale or sandstone is 23 to 40 inches. Texture is clay loam or silty clay loam. The profile has slight to violent effervescence throughout The soil is grayish brown, light brownish gray, or pale brown. In some pedons the A1 horizon is slightly darker than the C horizon. Organic-matter content is less than 1 percent. Moist value is 4 or higher below a depth of 5 inches. Depth to few to many lime segregations is 15 to 28 inches. Fragments of shale and sandstone are scattered throughout the soil in some areas and make up as much as 10 percent of the soil, by volume.

Capistrano series

The Capistrano series consists of very deep, well drained soils that formed in young alluvium derived mainly from sedimentary rock. These soils are on the Valley floor, on fans, and in small narrow valleys. Slopes range from 0 to 9 percent.

Capistrano soils are similar to Anacapa, Conejo, Mocho, and San Emigdio soils and are near Anacapa, Conejo, Chualar, Mocho, and Saugus soils. Anacapa soils are calcareous below a depth of 20 to 40 inches. Conejo and Mocho soils are loam or clay loam and have more than 18 percent clay. Chualar soils have a B2t horizon of sandy clay loam. San Emigdio soils are calcareous throughout and are more stratified than Capistrano soils. Saugus soils are on hills and have a substratum of soft shale or sandstone at a depth of 40 to 56 inches.

Typical pedon of Capistrano fine sandy loam in an area of Capistrano-Urban land complex, 0 to 2 percent slopes, in a vacant lot 750 feet west and 60 feet north of the intersection of Sepulveda Boulevard and Sherman Way:

Ap—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; slightly acid (pH 6.5); gradual smooth boundary.

A12—3 to 20 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; few medium, common fine, and many very fine tubular pores; neutral (pH 7.0); gradual wavy boundary.

A13—20 to 41 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine, common fine, and few medium tubular pores; neutral (pH 7.3); gradual wavy boundary.

C—41 to 72 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine and few medium tubular pores; mildly alkaline (pH 7.8); clear smooth boundary.

All pedons are noncalcareous to a depth of 60 inches. Some pedons are calcareous below this depth. Texture throughout the profile is sandy loam, fine sandy loam, or loam, and the soil material is less than 18 percent clay. The profile lacks distinct stratification to a depth of 60 inches or more.

The A horizon is grayish brown, dark grayish brown, brown, or dark brown and is slightly acid or neutral. The C horizon is pale brown, light yellowish brown, or brown and is neutral to moderately alkaline.

Chualar series

The Chualar series consists of very deep, well drained soils that formed in old alluvium derived from sandstone and granite. These soils are on low dissected terraces and hills. Slopes range from 2 to 9 percent.

Chualar soils are similar to Soper soils and Soper Variant soils and are near Anacapa, Capistrano, Mocho, and San Emigdio soils. Anacapa, Capistrano, Mocho, and San Emigdio soils do not have a B2t horizon and except for the Capistrano soils, are calcareous in part or all of the profile. Soper soils and Soper Variant soils are 24 to 40 inches and 20 to 40 inches deep to bedrock, respectively.

Typical pedon of Chualar sandy loam in an area of Chualar-Urban land complex, 2 to 9 percent slopes, approximately 900 feet east and 500 feet north of the southeast corner of section 27, R. 17 W., R. 2 N., SBBM, Calabasas Quadrangle:

Ap—0 to 3 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; neutral (pH 7.0); clear smooth boundary.

A12—3 to 19 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; common very fine tubular pores; neutral (pH 7.0); clear wavy boundary.

B21t—19 to 44 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and slightly plastic; common very fine roots; few medium and fine and common very fine tubular pores; common thin clay films lining pores and on faces of peds; mildly alkaline (pH 7.5); clear smooth boundary.

B22t—44 to 70 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine tubular pores; many moderately thick clay films as bridges and lining pores; mildly alkaline (pH 7.8); clear smooth boundary.

C—70 to 82 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; massive; hard, firm, slightly sticky and plastic; few fine and very fine roots; common very fine tubular pores; common thin clay films as bridges and lining pores; mildly alkaline (pH 7.6).

The A horizon is brown, dark brown, or grayish brown and has hue of 10YR or 7.5YR. It is sandy loam or loam and is slightly acid or neutral. The B2t horizon is brown and has hue of 10YR or 7.5YR. It is sandy clay loam. It is slightly acid to mildly alkaline. In most pedons reaction increases with increasing depth. The C horizon is grayish brown, brown, or pale brown and has hue of 10YR or 7.5YR. It is somewhat stratified and ranges from sandy loam to clay loam. It is neutral to moderately alkaline. In some pedons some of the strata in the C horizon are calcareous.

Conejo series

The Conejo series consists of very deep, well drained soils that formed in young alluvium derived mostly from shale and sandstone. Conejo soils are on fans, in narrow valleys, and on the Valley floor. Slopes range from 0 to 9 percent.

The Conejo soils are similar to the Anacapa, Capistrano, Cropley, Mocho, and San Emigdio soils and also are near these soils. Anacapa, Capistrano, and San Emigdio soils are mostly sandy loam or fine sandy loam and have less than 18 percent clay. Mocho soils are calcareous throughout the profile. Cropley soils are clay throughout the profile.

Typical pedon of Conejo clay loam in an area of Conejo-Urban land complex, 0 to 2 percent slopes, in a vacant lot 100 feet north and 100 feet west of the intersection of Gloria and Stagg Streets:

Ap—0 to 2 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; hard, friable, sticky and plastic; many very fine roots; many very fine interstitial pores; 10 percent wormcasts, by volume; slightly acid (pH 6.5); clear smooth boundary.

A12—2 to 20 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; few fine and common very fine roots; many very fine tubular and interstitial pores and few fine tubular pores; slightly acid (pH 6.5); clear smooth boundary.

A13—20 to 35 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and few fine tubular pores; mildly alkaline (pH 7.5); clear wavy boundary.

C1—35 to 62 inches; pale brown (10YR 6/3) light clay loam, dark brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few very fine and fine roots; many very fine and common fine tubular pores; moderately alkaline (pH 8.0); clear wavy boundary.

C2—62 to 75 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine and few medium tubular pores; strong effervescence with fine irregular concretions and filaments of lime; moderately alkaline (pH 8.0).

The soil is dominantly clay loam with less than 35 percent clay to a depth of 40 inches or more and is loam or clay loam to a depth of 60 inches or more. It is noncalcareous to a depth of 60 inches or more.

The A horizon is grayish brown or brown and is slightly acid to mildly alkaline. The C horizon is grayish brown, pale brown, or light brownish gray and is mildly alkaline or moderately alkaline.

Cropley series

The Cropley series consists of very deep, well drained soils that formed in fine textured alluvium derived mostly from material that was weathered from shale. These soils are on fans and in basins. Slopes range from 0 to 9 percent.

Cropley soils are similar to Conejo soils and are near Capistrano, Conejo, and Mocho soils. Capistrano soils range from sandy loam to loam and have less than 18 percent clay. Conejo soils are dominantly clay loam and have 20 to 35 percent clay to a depth of 60 inches or more. Mocho soils are calcareous throughout the profile. They are loam or clay loam and have 18 to 35 percent clay to a depth of 40 inches or more.

Typical pedon of Cropley clay in an area of Cropley-Urban land complex, 2 to 9 percent slopes, 1,500 feet south and 200 feet west of the intersection of Victory Boulevard and Winnetka Avenue in the Pierce College Arboretum:

A11—0 to 22 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist, strong medium angular blocky and moderate medium granular structure; very hard, very firm, very sticky and very plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores, moderately alkaline (pH 8.0); gradual smooth boundary.

A12—22 to 36 inches, dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; strong medium angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine and fine roots; common very fine and fine tubular pores; numerous intersecting slickensides; effervescence with disseminations and segregations of lime; moderately alkaline (pH 8.0); gradual smooth boundary.

ACca—36 to 60 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong coarse angular blocky structure; very hard, very firm, very sticky and plastic; few very fine and fine roots; common very fine and fine tubular pores; numerous intersecting slickensides; strong effervescence with disseminated lime and soft masses of lime, moderately alkaline (pH 8.0); clear wavy boundary.

Cca—60 to 65 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, very sticky and plastic; few very fine roots; common very fine tubular pores; few shale fragments and few fine grained sandstone fragments; strong effervescence with disseminated lime and soft masses of lime; moderately alkaline (pH 8.0); clear wavy boundary.

The soil is clay or silty clay to a depth of 60 inches or more. When dry, the soil has cracks 1/2 inch to 2 inches wide that extend to a depth of about 40 inches. Depth to slickensides generally is 18 to 26 inches and in some pedons is 50 inches. Depth to free lime ranges from 20 to 30 inches.

The A horizon is dark gray or very dark gray and is mildly alkaline or moderately alkaline. The C horizon is grayish brown, dark grayish brown, or brown and is moderately alkaline.

Danville series

The Danville series consists of very deep, well drained soils that formed in moderately fine textured alluvium derived mostly from sedimentary rock. Some of the alluvium is derived from igneous and metamorphic rock. These soils are on low fans and low terraces. Slopes range from 0 to 2 percent.

Danville soils are similar to Chualar and Cropley soils and are near Capistrano, Chualar, Conejo, Cropley, and Mocho soils. Capistrano soils do not have a distinct B horizon and are sandy loam, fine sandy loam, or light loam throughout the profile. Chualar soils have a B2t horizon of sandy clay loam. Conejo soils are clay loam to a depth of 40 inches or more and do not have a distinct subsoil. Cropley soils are clay or silty clay to a depth of 60 inches or more and do not have a distinct B horizon. Mocho soils are calcareous throughout and lack a distinct B horizon.

Typical pedon of Danville silty clay loam in an area of Danville-Urban land complex, 0 to 2 percent slopes, 400 feet west and 100 feet south of the intersection of Hayvenhurst Avenue and Rinaldi Street:

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular and coarse subangular blocky structure; hard, friable, sticky and plastic; many very fine roots, many very fine interstitial and tubular pores; moderately alkaline (pH 8.0); clear wavy boundary.

A12—11 to 24 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; many very fine roots; many very fine interstitial and tubular pores; moderately alkaline (pH 8.0); clear wavy boundary.

B2t—24 to 42 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist, strong medium angular blocky structure; very hard, very firm, sticky and very plastic; common very fine roots; many very fine tubular pores; many moderately thick clay films on faces of peds and lining pores, moderately alkaline (pH 8.0); gradual wavy boundary

B3t—42 to 50 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong medium subangular blocky structure, very hard, very firm, sticky and plastic; few very fine roots, common very fine tubular pores; common moderately thick clay films on faces of peds; slight effervescence with disseminated lime; moderately alkaline (pH 8.0); gradual wavy boundary.

C—50 to 60 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; slight effervescence with disseminated lime; moderately alkaline (pH 8.0).

The A horizon is dark grayish brown or very dark grayish brown and is clay loam or silty clay loam. It is mildly alkaline or moderately alkaline but is not calcareous. It has a pH of 7.5 to 8.0. The boundary of the lower part of the A horizon is clear or gradual. The B2t horizon is dark grayish brown or dark brown. It is moderately alkaline but is noncalcareous. The B3t horizon is grayish brown or brown clay loam or clay It is noncalcareous in some areas. The C horizon is brown, strong brown, or grayish brown and is loam, sandy clay loam, or clay loam. In some areas it has a few pebbles and cobbles It is calcareous in most areas, but free lime is lacking in some areas.

Friant series

The Friant series consists of shallow, well drained soils that formed in material that was weathered in place from fractured Santa Monica slate in the mountains in the southern part of the survey area and from granitic rock in the San Gabriel foothills in the northern part. Friant soils are on hills and mountains. Slopes range from 15 to 75 percent.

Friant soils are similar to Gaviota, Lopez, and Millsholm soils and are near Soper, Vista, and Soper Variant soils. Gaviota soils are lighter in color and have value of 4 or higher. They have an organic-matter content of less than 1 percent and overlie hard sandstone. Lopez soils have more than 35 percent, by volume, rock fragments and formed in hard fractured shale. Millsholm soils are lighter in color and have moist value of 4 or higher and an organic-matter content of less than 1 percent. Vista soils are 20 to 40 inches deep. Soper soils and Soper Variant soils have a B2t horizon of sandy clay loam and are 24 to 40 inches and 20 to 40 inches deep, respectively.

Typical pedon of Friant fine sandy loam in an area of Friant fine sandy loam, 50 to 75 percent slopes, on the northeastern slope of a hill next to the easternmost lot at the end of Ardsley Road, about 500 feet northwest of the intersection of Mulholland Drive and Encino Hills Road:

A11—0 to 9 inches, dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist, moderate very fine and fine granular structure, soft, very friable, nonsticky and nonplastic, many very fine and fine roots; many very fine and fine interstitial pores, about 10 percent, by volume, rock fragments 2 to 10 millimeters in diameter, medium acid (pH 5 6); gradual smooth boundary.

A12—9 to 19 inches, dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist, moderate very fine and fine granular structure, soft, very friable, nonsticky and nonplastic, many very fine and fine and few medium roots, many very fine and fine interstitial pores, about 10 percent, by volume, rock fragments 2 to 10 millimeters in diameter; slightly acid (pH 6.5); abrupt wavy boundary

R—19 inches, hard highly fractured Santa Monica slate, some soil material similar to that in the A12 horizon in fractures in the upper part, common very fine and fine roots in fractures

Depth to hard rock is 6 to 20 inches Texture is sandy loam, fine sandy loam, or loam with less than 18 percent clay, and there is little or no change in texture with increasing depth Rock fragments 2 to 10 millimeters in diameter make up 5 to 15 percent, by volume, of the soil The soil is grayish brown, dark grayish brown, or brown. Some pedons have a horizon 1 to 5 inches thick just above the bedrock; this horizon is light brownish gray and has as much as 35 percent rock fragments

Gaviota series

The Gaviota series consists of shallow, somewhat excessively drained soils that formed in material that was weathered in place from hard sandstone. These soils are on hills and mountains. Slopes range from 9 to 75 percent.

Gaviota soils are similar to Friant, Lopez, and Millsholm soils and are near Balcom and Soper soils. Balcom soils are clay loam or silty clay loam and are 23 to 40 inches deep to soft sandstone or shale. Friant and Lopez soils are darker in color with a moist value of 2 or 3, have an organic-matter content of more than 1 percent, and overlie slate and hard shale, respectively. Millsholm soils have 18 to 35 percent clay. Soper soils have a B2t horizon of cobbly sandy clay loam and are 24 to 40 inches deep to hard conglomerate.

Typical pedon of Gaviota sandy loam in an area of Rock outcrop-Gaviota complex, 30 to 75 percent slopes, located off Woolsey Canyon Road approximately 1,700 feet east and 1,200 feet north of the southeast corner of sec. 21, R. 17 W., T. 2 N., SBBM, Calabasas Quadrangle:

A11—0 to 5 inches, brown (10YR 5/3) sandy loam, dark brown (7.5YR 4/2) moist, weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine and very few fine roots; many very fine and few fine tubular pores; slightly acid (pH 6 2); clear wavy boundary

A12—5 to 15 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 4/2) moist, massive; slightly hard, friable, nonsticky and nonplastic; common very fine and very few fine roots, many very fine and medium and common fine tubular pores, slightly acid (pH 6 2); abrupt wavy boundary.

R—15 inches; very pale brown sandstone

Depth to hard sandstone is 10 to 20 inches. Texture is sandy loam or fine sandy loam and does not change with increasing depth. Rock fragments make up as much as 20 percent, by volume, of the soil. The soil is brown, grayish brown, or yellowish brown. It has moist value of 4 or higher and has an organic-matter content of less than 1 percent It is slightly acid or neutral

Gazos series

The Gazos series consists of moderately deep, well drained soils that formed in material that was weathered in place from hard shale and sandstone. These soils are on hills and in other upland areas. Slopes range from 9 to 50 percent.

Gazos soils are similar to Balcom, Lopez, and Soper soils and are near Balcom and Saugus soils. Balcom soils are calcareous throughout and have an organic-matter content of less than 1 percent. Lopez soils are 6 to 20 inches deep to hard shale and have about 30 to 65 percent, by volume, rock fragments. Saugus soils are 40 to 56 inches deep to soft shale, sandstone, or conglomerate; they are sandy loam or loam and have less than 18 percent clay. Soper soils have an A horizon of gravelly sandy loam or loam and a B2t horizon of gravelly or cobbly sandy clay loam or clay loam.

Typical pedon of Gazos silty clay loam, 30 to 50 percent slopes, approximately 2,200 feet north and 1,200 feet east of the northwest corner of section 24, R.17 W., T. 1 N., SBBM, in the Canoga Park Quadrangle:

A11—0 to 12 inches, grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist, weak medium granular structure, hard, friable, slightly sticky and slightly plastic; common very fine roots, few very fine and fine tubular and common very fine interstitial pores, about 5 percent, by volume, soft weathered shale fragments 2 to 10 millimeters in diameter; medium acid (pH 6.0), clear wavy boundary.

A12—12 to 21 inches, grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist, weak medium subangular blocky structure, hard, friable, sticky and plastic; few very fine roots, few very fine tubular and interstitial pores and few fine tubular pores, about 8 percent, by volume, soft weathered shale fragments 2 to 10 millimeters in diameter, slightly acid (pH 6 5), clear wavy boundary

A13—21 to 28 inches, grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist, weak coarse subangular blocky structure, slightly hard, friable, sticky and plastic, few very fine and fine tubular pores and few very fine interstitial pores; about 10 percent, by volume, soft weathered shale fragments 2 to 10 millimeters in diameter, neutral (pH 7.0); clear irregular boundary

R—28 inches; hard fractured shale.

Depth to hard shale or sandstone is 24 to 40 inches Weathered shale fragments make up as much as 10 percent, by volume, of the soil material. The soil is gray, grayish brown, or dark grayish brown, and in most areas there is little change in color with increasing depth. Some pedons have a C horizon a few inches thick. This horizon is lighter in color and has more weathered rock fragments than the A horizon. The soil is silty clay loam or clay loam and is neutral to medium acid

Lopez series

The Lopez series consists of shallow, somewhat excessively drained soils that formed in material that was weathered in place from hard shale or sandstone. Lopez soils are on hills and mountains. Slopes range from 30 to 50 percent.

Lopez soils are similar to Friant, Gaviota, and Gazos soils and are near Balcom, Gaviota, and Gazos soils. Balcom soils are 23 to 40 inches deep to soft shale and are calcareous throughout. Friant soils have no more than 15 percent, by volume, rock fragments and formed in slate and granite. Gaviota soils have moist value of 4 or higher and have an organic-matter content of less than 1 percent. Gazos soils are 24 to 40 inches deep to hard shale and have less than 10 percent, by volume, rock fragments.

Typical pedon of Lopez shaly clay loam, 30 to 50 percent slopes, on a grassy ridgetop near Oat Mountain, approximately 150 feet south and 100 feet west of the northeast corner of sec. 25, R. 17 W., T. 3 N., SBBM, in the Oat Mountain Quadrangle:

A11—0 to 8 inches, grayish brown (10YR 5/2) shaly clay loam, very dark grayish brown (10YR 3/2) moist, moderate medium granular structure; slightly hard, very friable, sticky and slightly plastic; many very fine roots; many very fine tubular and interstitial pores; about 45 percent, by volume, shale fragments, 75 percent of which are less than 1 inch in diameter; neutral (pH 7.0), clear wavy boundary.

A12—8 to 13 inches; grayish brown (10YR 5/2) very shaly clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and slightly plastic, common very fine roots, many very fine tubular and interstitial pores; few thin clay films as bridges, about 65 percent, by volume, shale fragments as much as 2 1/2 inches thick, 5 inches long and 3 inches wide; slightly acid (pH 6 5), abrupt irregular boundary.

R—13 inches; white (10YR 8/2) hard highly fractured shale; strata tilted at an angle of about 30 to 40 degrees; few thin clay films in rock fractures.

Depth to hard fractured shale or sandstone is 6 to 20 inches. Rock fragments make up about 35 to 50 percent, by volume, of the upper part of the soil profile and from about 35 to 65 percent of the lower part. The soil is grayish brown, dark grayish brown, or brown and is shaly or very shaly clay loam or loam. Organic-matter content ranges from 2 to 4 percent. The soil is neutral to slightly acid.

Millsholm series

The Millsholm series consists of shallow, well drained soils that formed in material that was weathered in place from hard sandstone or shale. Millsholm soils are on hills and mountains. Slopes range from 30 to 50 percent.

Millsholm soils are similar to Friant, Gaviota, and Lopez soils and are near Balcom, Friant, and Gazos soils. Balcom soils are 23 to 40 inches deep to soft shale or sandstone and are calcareous throughout. Friant soils have an organic-matter content of more than 1 percent and have moist value of 2 or 3. Gaviota soils are sandy loam or fine sandy loam and have less than 18 percent clay. Lopez soils have an organic-matter content of 2 to 4 percent and have 35 to 65 percent shale fragments.

Typical pedon of Millsholm loam, 30 to 50 percent slopes, on a ridgetop about 1,000 feet east and 900 feet north of the northeast corner of section 32, R. 16 W., T. 1 N., SBBM, in the Canoga Park Quadrangle:

A1—0 to 6 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist, weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots, few medium and common very fine tubular pores and many very fine interstitial pores; medium acid (pH 6.0); clear wavy boundary.

B2—6 to 15 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic, many very fine roots; few fine and common very fine tubular pores and common very fine interstitial pores; few thin discontinuous clay films; medium acid (pH 6.0); clear wavy boundary.

R—15 inches, hard fractured sandstone.

Depth to hard sandstone or shale is 10 to 20 inches. The soil is neutral to medium acid It generally has the same reaction throughout, or the reaction is without consistent change.

The A horizon is light yellowish brown, pale brown, light brownish gray, brown, or yellowish brown and is loam or silty clay loam. The B horizon is grayish brown, brown, or yellowish brown. It is similar to the A horizon, except it has few discontinuous clay films. It is loam or silty clay loam and has slightly more clay than the A horizon.

Mocho series

The Mocho series consists of very deep, well drained soils that formed in young alluvium derived mainly from sandstone and shale. Mocho soils are on fans and on the Valley floor. Slopes range from 0 to 9 percent.

Mocho soils are similar to Anacapa, Balcom, and Conejo soils and are near Anacapa, Conejo, and San Emigdio soils. Anacapa soils are sandy loam with less than 18 percent clay and are noncalcareous to a depth of 20 to 40 inches. Balcom soils are on hills and are underlain by soft shale and sandstone at a depth of 23 to 40 inches. Conejo soils are noncalcareous to a depth of 60 inches or more. San Emigdio soils are sandy loam and have less than 18 percent clay.

Typical pedon of Mocho loam in an area of Mocho-Urban land complex, 0 to 2 percent slopes, in a vacant lot 75 feet south and 300 feet east of the intersection of Sherman Way and Corbin Avenue:

Ap—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; few medium tubular pores and few very fine tubular and interstitial pores; slight effervescence with disseminated lime; moderately alkaline (pH 8.0); clear wavy boundary.

A12—4 to 16 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; few medium tubular pores and few very fine tubular and interstitial pores; strong effervescence with disseminated lime and few fine filaments of lime; moderately alkaline (pH 8.0); clear wavy boundary.

C1—16 to 29 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores and few very fine interstitial pores; violent effervescence with disseminated lime and few fine filaments of lime; moderately alkaline (pH 8.0); gradual wavy boundary.

C2—29 to 47 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine and very fine tubular pores; violent effervescence with disseminated lime and few fine filaments of lime; moderately alkaline (pH 8.0); clear wavy boundary.

C3—47 to 57 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and plastic; few very fine roots; few very fine tubular pores; stratified with small pockets of sand; violent effervescence with disseminated lime and few fine filaments of lime; moderately alkaline (pH 8.0); clear smooth boundary.

C4—57 to 76 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist, massive; hard, friable, sticky and plastic; few fine roots; few very fine tubular pores; violent effervescence with disseminated lime, few fine filaments of lime, and pockets of common fine filaments of lime; moderately alkaline (pH 8.0).

The texture is mainly loam throughout the profile but thin strata of clay loam, silty clay loam, sandy clay loam, fine sandy loam, or sandy loam are throughout the profile. All of the strata are calcareous. Some fine segregations of lime are below a depth of 10 to 20 inches.

The A horizon is grayish brown, brown or dark grayish brown. The C horizon is pale brown or grayish brown.

San Emigdio series

The San Emigdio series consists of very deep, well drained soils that formed in young alluvium derived mostly from sandstone, shale, and diorite. These soils are on fans and on the valley floor. Slopes range from 0 to 2 percent.

San Emigdio soils are similar to Anacapa, Capistrano, Mocho, and Saugus soils and are near Anacapa, Capistrano, Chualar, and Mocho soils. Anacapa soils are free of lime to a depth of 20 to 40 inches, and Capistrano soils are free of lime to a depth of 60 inches or more. Both of these soils have an organic-matter content of more than 1 percent in the A horizon. Chualar soils have a B2t horizon of brown sandy clay loam. Mocho soils have more than 18 percent clay and are dominantly loam and clay loam throughout the profile. Saugus soils are noncalcareous and are underlain by soft sandstone or conglomerate at a depth of 40 to 56 inches.

Typical pedon of San Emigdio sandy loam in an area of San Emigdio-Urban land complex, 0 to 2 percent slopes, in a vacant lot 600 feet east and 75 feet north of the intersection of Topanga Canyon Boulevard and Nordhoff Street:

Ap—0 to 3 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; many very fine interstitial pores; violent effervescence with disseminated lime and grains of lime; moderately alkaline (pH 8.0); abrupt smooth boundary.

A12—3 to 19 inches, grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine and common fine tubular pores and common very fine interstitial pores, violent effervescence with disseminated lime and grains of lime; moderately alkaline (pH 8.0); clear smooth boundary.

C1—19 to 30 inches, pale brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; many very fine and few fine tubular pores; violent effervescence with disseminated lime and grains of lime; moderately alkaline (pH 8.0); clear smooth boundary.

C2—30 to 39 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine and few fine tubular and interstitial pores; violent effervescence with disseminated lime and nodules and filaments of lime; moderately alkaline (pH 8.0); clear wavy boundary.

C3—39 to 48 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular and interstitial pores; violent effervescence with disseminated lime; moderately alkaline (pH 8.0); clear wavy boundary.

C4—48 to 52 inches; pale brown (10YR 6/3) coarse sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores and few very fine tubular pores; some small pockets of gravel; violent effervescence with disseminated lime; moderately alkaline (pH 8.0); clear irregular boundary.

C5—52 to 77 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores and few very fine tubular pores; some pockets of gravel 2 to 6 inches in diameter; violent effervescence with disseminated lime; moderately alkaline (pH 8.0).

The soil is somewhat stratifed and is mainly sandy loam, but loamy sand and coarse sandy loam in strata of varying thickness make up as much as 33 percent, by volume, of the soil material. The soil is calcareous throughout and contains about 1 to 5 percent gravel.

The A horizon is grayish brown, brown, or dark grayish brown. This horizon is darker in color than is characteristic of the San Emigdio soils described in other survey areas. Other soils in this survey area which have an organic-matter content of 1 to 3 percent in the A horizons commonly have these colors. San Emigdio soils in this survey area have an organic-matter content of less than 1 percent. The C horizon is light brownish gray or pale brown.

Saugus series

The Saugus series consists of deep, well drained soils that formed in material that was weathered in place from soft shale, sandstone, and conglomerate. These soils are on dissected hills. Slopes range from 15 to 50 percent.

Saugus soils are similar to Anacapa, Balcom, Capistrano, and San Emigdio soils and are near Gaviota, Gazos, Millsholm, and Soper soils. Anacapa, Capistrano, and San Emigdio soils are more than 60 inches deep and are on slopes of less than 9 percent. Balcom soils are calcareous and consist of clay loam or silty clay loam. They are 23 to 40 inches deep to soft shale or sandstone. Gaviota and Millsholm soils are less than 20 inches deep to hard rock.

Gazos soils are less than 40 inches deep, have more than 18 percent clay, and have moist value of 2 or 3. Soper soils have a B2t horizon of gravelly or cobbly clay loam or sandy clay loam.

Typical pedon of Saugus loam, 30 to 50 percent slopes, approximately 4,200 feet east and 400 feet south of the northwest corner of section 22, R. 17 W., T. 2 N., SBBM, in the Calabasas Quadrangle:

A11—0 to 11 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; weak medium granular and subangular blocky structure; hard, very friable, nonsticky and slightly plastic; common very fine roots; few very fine tubular and interstitial pores; slightly acid (pH 6.5); clear wavy boundary.

A12—11 to 19 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky and granular structure; hard, very friable, nonsticky and slightly plastic; common very fine roots; few medium, fine, and very fine tubular pores and few very fine interstitial pores; neutral (pH 7.0); clear wavy boundary.

C1—19 to 37 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; neutral (pH 7.2); clear wavy boundary.

C2—37 to 45 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; mildly alkaline (pH 7.4); clear wavy boundary.

Cr—45 to 52 inches; weathered soft shale and sandstone.

Depth to soft shale, sandstone, or conglomerate is 40 to 60 inches. These soft formations crush to soil material but in their natural state are penetrated by very few or no roots. The soil is sandy loam, fine sandy loam, or light loam and has less than 18 percent clay. Gravel and cobbles make up about 10 to 15 percent, by volume, of the upper part of the profile and as much as 35 percent of the lower part. The soil is slightly acid to mildly alkaline. In most pedons reaction is similar throughout the profile or has no consistent pattern of change with increasing depth.

The A horizon is grayish brown, brown, light brownish gray, or pale brown. It has an organic-matter content of less than 1 percent and has moist value of 4 or higher. The C horizon is grayish brown, brown, light brownish gray, pale brown, or light yellowish brown. The color of the C horizon is similar to that of the A horizon or is one unit higher in value. In a few places the Cr horizon has thin seams or coatings of lime.

Soboba series

The Soboba series consists of very deep, excessively drained soils that formed in young alluvium derived mainly from diorite and granite. Soboba soils are on fans and in narrow valleys along washes. Slopes range from 0 to 9 percent.

Soboba soils are similar to Capistrano, San Emigdio, and Tujunga soils are near Capistrano, Chualar, Gazos, San Emigdio, and Saugus soils. Capistrano soils are fine sandy loam, and San Emigdio soils are sandy loam. Both of these soils have less than 15 percent gravel and other rock fragments. Tujunga soils are sand and have less than 15 percent rock fragments. Chualar soils have a B2t horizon of brown sandy clay loam. Gazos and Saugus soils are on hills and are underlain by shale or sandstone at a depth of 24 to 40 inches. Saugus soils are underlain by shale, sandstone, or conglomerate at a depth of 40 to 56 inches.

Typical pedon of Soboba gravelly loamy sand, 0 to 2 percent slopes, in natural vegetation in Little Tujunga Wash, 100 yards north of Foothill Boulevard, 4,400 feet west and 2,400 feet south of the southwest corner section 4, R. 14 W., T. 2 N., SBBM, in the Sunland Quadrangle:

A1—0 to 9 inches; pale brown (10YR 6/3) gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose (moist and dry), nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 30 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

C—9 to 60 inches; very pale brown (10YR 7/3) very gravelly sand, brown (10YR 5/3) moist; single grain; loose (moist and dry), nonsticky and nonplastic; wet, few very fine and few coarse roots; many very fine interstitial pores; weakly expressed coarse stratification; about 45 percent, by volume, gravel and about 12 percent cobbles; neutral (pH 7.0).

Stratification ranges from very weak to distinct. Texture ranges from sand and coarse sand to loamy sand. In some places there are strata of sandy loam that range to as much as several inches thick. These strata generally are in the upper part of the profile. The upper 4 to 14 inches of the profile has 15 to 35 percent gravel and very few to common cobbles and larger stones. Rock fragments make up 35 to 70 percent, by volume, of the rest of the profile. The fragments are mostly pebbles as much as 3 inches in diameter and, in some areas, cobbles as much as 10 inches in diameter and large stones as much as 3 feet in diameter. The soil is slightly acid to mildly alkaline, and reaction generally increases with increasing depth.

The A1 horizon ranges from 4 to 14 inches thick and is pale brown, grayish brown, or brown. The C horizon is light brownish gray, pale brown, light gray, or very pale brown.

Soper series

The Soper series consists of moderately deep, well drained soils that formed in material that was weathered in place from conglomerate and sandstone. Soper soils are on hills. Slopes range from 15 to 50 percent.

Soper soils are similar to Chualar and Soper Variant soils and are near Balcom, Gaviota, and Saugus soils. Balcom soils have uniform texture and are calcareous throughout the profile. Chualar soils are 60 inches or more deep and are not underlain by conglomerate or sandstone. Gaviota soils are 10 to 20 inches deep to hard sandstone. Saugus soils do not have a B2t horizon and have less than 18 percent clay throughout the profile. Soper Variant soils have a medium to strongly acid B2t horizon and are underlain by weathered granitic rock.

Typical pedon of Soper gravelly sandy loam, 30 to 50 percent slopes, on a grassy hillside 1,100 feet west of Topanga Canyon Boulevard and 1,200 feet south of Plummer Street at the end of Farralone Road:

A1—0 to 11 inches; grayish brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and few fine tubular and interstitial pores; about 15 percent, by volume, gravel and cobbles; slightly acid (pH 6.5); clear smooth boundary.

B2t—11 to 24 inches; brown (10YR 5/3) cobbly sandy clay loam, dark brown (10YR 4/3) moist; strong coarse subangular blocky structure; hard, firm, sticky and plastic; many very fine and very few medium roots; many very fine and few fine tubular pores; many moderately thick clay films on faces of peds; 25 percent, by volume, cobbles, slightly acid (pH 6.5); clear wavy boundary.

B3t—24 to 31 inches; brown (10YR 5/3) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, sticky and slightly plastic; common very fine and very few medium roots; common very fine tubular pores; many moderately thick clay films on faces of peds; 30 percent, by volume, gravel and cobbles; slightly acid (pH 6.5); clear wavy boundary.

Cr—31 to 55 inches; yellowish brown weathered conglomerate.

Depth to conglomerate or sandstone is 24 to 40 inches. The soil is neutral or slightly acid, and reaction increases with increasing depth or is about the same throughout the profile.

The A horizon is grayish brown, dark grayish brown, or brown and has an organic-matter content of 1 to 3 percent. It is gravelly or cobbly sandy loam or loam and has 15 to 25 percent pebbles and cobbles. The A horizon boundary is abrupt or clear. The B2t horizon is brown, dark brown, or light yellowish brown. It is gravelly or cobbly clay loam or sandy clay loam and has 20 to 35 percent pebbles and cobbles. Most pedons have a B3t horizon that has slightly less clay than the B2t horizon.

Soper Variant

The Soper Variant consists of moderately deep, well drained soils that formed in material that was weathered in place from granitic rock. Soper Variant soils are on hills and mountains. Slopes range from 50 to 75 percent.

Soper Variant soils are similar to Chualar and Soper soils and are near Friant soils. Chualar soils are more than 60 inches deep and formed in alluvium. Friant soils are nearly uniform in texture and are 6 to 20 inches deep to hard fractured slate. Soper soils are neutral or slightly acid and formed in material that was weathered from conglomerate and sandstone.

Typical pedon of Soper Variant sandy loam in an area of Soper Variant sandy loam, 50 to 75 percent slopes, along a fire road approximately 1 mile west of San Vicente Mountain, about 500 feet north of intersection with Mulholland Drive, in a road about 50 feet north of the first wide turn to east:

A1—0 to 3 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine tubular and interstitial pores; about 10 percent, by volume, rock fragments 2 to 15 millimeters in size; medium acid (pH 6.0); gradual wavy boundary.

B1t—3 to 12 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium angular blocky structure; slightly hard, friable, sticky and plastic; few medium and common very fine roots; many very fine and fine interstitial pores and common very fine and fine tubular pores; few thin clay films lining pores and on face of peds; about 5 percent, by volume, rock fragments 2 to 5 millimeters in size; strongly acid (pH 5.5); gradual smooth boundary.

B2t—12 to 25 inches; strong brown (7.5YR 5/8) sandy clay loam, strong brown (7.5YR 5/6) moist; weak medium angular blocky structure; hard, firm, sticky and plastic; few medium and common very fine roots; many very fine and fine tubular pores; common thin clay films lining pores and on faces of peds; strongly acid (pH 5.1); gradual wavy boundary.

Cr—25 to 32 inches; deep strongly weathered granitic rock; soil material similar to B2t horizon in fractures; very strongly acid (pH 4.8).

Depth to weathered granitic rock is 20 to 40 inches. Rock fragments 2 to 15 millimeters in diameter make up as much as 10 percent of the profile.

The A horizon is grayish brown or brown in hue of 10YR or 7.5YR and is reddish brown in hue of 5YR. It is sandy loam or loam and is slightly acid or medium acid. The Bt horizon is brown or strong brown in hue of 7.5YR or is reddish brown in hue of 5YR. It is medium acid or strongly acid and has a base saturation of 50 to 75 percent.

Tujunga series

The Tujunga series consists of very deep, somewhat excessively drained soils that formed in young sandy alluvium derived mainly from dioritic or granitic rock. Tujunga soils are on alluvial fans and in valleys near streams. Slopes range from 0 to 2 percent.

Tujunga soils are similar to Anacapa, Capistrano, Mocho, San Emigdio, and Soboba soils and are near Capistrano, Mocho, Soboba, and Soper soils. Anacapa and Capistrano soils are sandy loam or fine sandy loam and have a dark colored A horizon. Mocho soils are calcareous loam, and San Emigdio soils are calcareous sandy loam. Soboba soils have more than 35 percent rock fragments, by volume. Soper soils are on hills and are underlain by conglomerate. They have a B2t horizon of sandy clay loam.

Typical pedon of Tujunga sand in an area of Tujunga-Urban land complex, 0 to 2 percent slopes, in an open area 1,600 feet west and 1,300 feet north of the southeast corner of section 22, R. 17 W., T. 3 N., SBBM, in the San Fernando Quadrangle:

A1—0 to 12 inches; pale brown (10YR 6/3) sand, brown (10YR 4/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; slightly acid (pH 6.2); diffuse smooth boundary.

C1—12 to 42 inches; very pale brown (10YR 7/3) sand, brown (10YR 5/3) moist; single grain; loose (moist and dry), nonsticky and nonplastic; common fine roots; many very fine interstitial pores; neutral (pH 7.0); diffuse smooth boundary.

C2—42 to 60 inches; very pale brown (10YR 7/3) sand, brown (10YR 5/3) moist, stratified with coarse sand, 5 percent gravel, and very few cobbles; single grain; loose (moist and dry), nonsticky and nonplastic; few fine roots; many very fine interstitial pores; neutral (pH 7.0).

Texture throughout the profile is mainly medium to coarse sand. Some profiles have strata of loamy sand that make up no more than one-third of profile. Rock fragments generally make up less than 15 percent of the soil material, by volume, but they make up as much as 25 percent in some areas. Cobbles make up as much as 10 percent, by volume, of the soil material. Stratification ranges from very weak to distinct.

The A1 horizon is pale brown, light brownish gray, or brown. The C horizon is very pale brown, pale brown, light brownish gray, or light gray. The A1 horizon and the upper part of the C horizon are slightly acid or neutral. Below a depth of 40 inches, the soil is neutral or mildly alkaline.

Vista series

The Vista series consists of moderately deep, well drained soils that formed in material that was weathered in place from granodiorite and related granitic rock. These soils are on hills and mountains. Slopes range from 30 to 50 percent.

Vista soils are similar to Balcom, Friant, and Millsholm soils and are near Friant, Saugus, Soper, and Tujunga soils. Balcom soils are calcareous silty clay loam and are underlain by soft shale and sandstone. Friant soils are less than 20 inches deep to hard bedrock. Millsholm soils are loam and silty clay loam and are less than 20 inches deep to hard sandstone or shale. Saugus soils are more than 40 inches deep to soft sandstone and shale. Soper soils have a B2t horizon of gravelly or cobbly clay loam. Tujunga soils are very deep and consist of sand and loamy sand. They are on alluvial fans and in valleys.

Typical pedon of Vista coarse sandy loam, 30 to 50 percent slopes, on a south-facing slope covered by native shrubs and introduced annual grasses, 200 feet west and 200 feet south of the southeast corner of section 17, R. 15 W., T. 1 N., SBBM, in the San Fernando Quadrangle:

A11—0 to 3 inches; grayish brown (10YR 5/2) coarse sandy loam, dark brown (10YR 3/3) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); abrupt smooth boundary.

A12—3 to 10 inches; brown (10YR 5/3) coarse sandy loam, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard, friable, nonsticky and nonplastic; common fine and medium roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); diffuse irregular boundary.

A13—10 to 20 inches; brown (10YR 5/3) coarse sandy loam; dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard, friable, nonsticky and nonplastic; few fine roots and common very fine and fine interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

B21—20 to 29 inches; yellowish brown (10YR 5/4) coarse sandy loam, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; common very fine and fine tubular and interstitial pores; very few thin clay films as bridges; slightly acid (pH 6.1); clear wavy boundary.

B22—29 to 36 inches; yellowish brown (10YR 5/4) coarse sandy loam; dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common very fine and fine tubular and interstitial pores; very few thin clay films as bridges and on faces of peds; slightly acid (pH 6.1); clear irregular boundary.

Cr—36 to 60 inches; weathered granodiorite.

Depth to weathered granitic rock is 20 to 40 inches. The soil is neutral or slightly acid, and reaction does not have a consistent pattern of change with increasing depth.

The A horizon is grayish brown, brown, or dark brown. The B horizon is pale brown, brown, or yellowish brown. It is similar to the A horizon but has slightly more clay and has some clay films bridging sand grains.

Xerorthents

Xerorthents are altered soils that can support plants but lack soil horizons and many other characteristics that commonly result from soil formation. These soils result from the excavation, moving, and filling of earthy material by man. Much of the soil material is derived from geologic formations and parent material of natural soils, and some of it contains solid waste in amounts that vary. Depth to bedrock ranges from 10 inches to more than 60 inches. Xerorthents generally have few predictable soil properties. In many places they are mapped in a complex with natural soils and Urban land. Slopes range from 0 to 30 percent.

The properties of individual areas of Xerorthents can be determined from observation of the properties of soils in nearby areas, from information about related geologic formations, and from field observation. Some of these properties are given in the description of map units of which Xerorthents make up a significant part.

Formation of the soils

In this section, the major factors of soil formation are discussed and are related to the soils in the survey area, and some of the processes of soil formation are explained.

The major factors of soil formation are parent material, climate, living organisms, relief, and time. Each soil is affected by all of these factors, but the relative importance of each factor varies from one soil to another.

Parent material

The mineral parent material in the survey area consists of alluvium in the Valley and of residuum that weathered from several kinds of rocks in the hills and mountains. Much of the soil material in the survey area is derived from Miocene sedimentary rock that consists of siliceous and diatomaceous shale, siltstone, sandstone, and conglomerate.

In the north central part of the survey area are beds of relatively soft Pliocene siltstone, sandstone, and conglomerate. This material is not very different from that of the Miocene Formations.

In the hills in the western part of the survey area is a large area of hard Cretaceous sandstone that has beds of shale and conglomerate, but alluvium from this source is obscured by material washed from the Miocene and Pliocene Formations. The residuum and alluvium from these formations are well supplied with bases, particularly calcium, and commonly have some free lime.

The northeast corner of the survey area and areas just outside the boundary of the survey area consist mainly of granodiorite and diorite gneiss. These rocks have many minerals high in content of base elements and weather at a moderate rate.

A small area of strongly weathered granite is on the southern side of the Valley. Also on the southern side, in the Santa Monica Mountains, is an area of highly metamorphosed old sediment that locally is called Santa Monica Shale.

Climate

The climate of the survey area is characterized by a relatively small difference between summer and winter temperatures. Winters are wet, and summers are dry. Average annual precipitation is about 18 inches in the Valley and is a few inches greater in the hills and mountains. In most years precipitation is well below average. In a few years it is average or well above average.

Weathering of minerals through solution and other physical and chemical changes are restricted to the moist winter and spring months, and even during this period the changes occur slowly because of cool temperatures. Plants grow slowly and use soil moisture at a low rate in winter. In most years the amount of precipitation exceeds the rate of evaporation and transpiration so that most of the soils are moistened throughout the profile by late in winter or early in spring. Generally, however, only a small amount of water passes all the way through the soil. During the rest of the year, climate has little effect on soil formation.

Climate is relatively uniform through the survey area. It has considerably influenced the kind of soils present. Local differences between soils are related to soil-forming forces other than climate.

Living organisms

Plants, burrowing animals, bacteria, fungi, earthworms, worms and insects are the principal organisms that help to determine the nature of a soil. The influence of vegetation on the soils in this survey area probably is greater than that of other organisms.

Plants add organic matter to soil. Grasses, particularly small forbs, add organic matter through the decomposition of their fine root systems. Shrubs add organic matter through the decomposition of leaves and their incorporation into the upper layers of soil.

The decomposed remains of grasses and shrubs in this survey area are fairly high in bases and have a carbon-nitrogen ratio of about 12 to 15. Loss of bases and a tendency toward acid soil conditions are offset by the local plant community, which recycles these bases. The decomposition of plant remains produces carbonic acid, which is a weak but pervasive compound that breaks down rocks and minerals and releases plant nutrients.

The decay of plant roots greatly influences the number and size of larger pores. Decomposed organic products bind mineral particles into aggregates to form soil structure and increase the number of capillary and larger pores.

Earthworms and some insects increase soil porosity. Rodents churn and mix soil and tend to undo the differentiation of distinct soil layers that develop over time. In this survey area it is not clear that rodents have strongly influenced soil formation, but considerable mixing has occurred and has allowed the formation of distinct soil horizons.

Relief

Slope greatly influences the rate of drainage and the amount of water passing over and through the soil. If other factors, for example, vegetation, are not considered, the steeper the slope, the more water will run off and the more soil will be carried away. Where slopes are gentle, less soil is lost through erosion and more water infiltrates and moves through the soil. Long periods of ponding will result in little or no movement of water through the soil material and in no oxidation.

Time

Time controls the degrees of expression of other soil forming forces. For example, if only a little time has passed, the character of the soil will be largely controlled by parent material. If the soil is very old, it generally will show the effects of climate and living organisms and most differences in parent material will be obscured.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkaline soil. Any soil that has a pH greater than 7.3. (See Reaction, soil.)

Alluvial fan. A sloping, fan-shaped mass of sediment deposited by a stream where it emerges from an upland onto a plain.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Ap horizon. The surface layer of soil disturbed by cultivation or pasturing.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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

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

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

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

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

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.

Chroma. See Munsell notation.

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

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

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7 5 centimeters) in diameter.

Coarse textured (light 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.

Compaction. In engineering, any process by which the soil grains are rearranged to decrease void space and bring them into closer contact with one another, thereby increasing the weight of solid material per cubic foot.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Compost. Organic residues or a mixture of organic residues and soil that has been piled and allowed to undergo decomposition.

Compressible. Excessive decrease in volume of soft soil under load.

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.

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.

Cut. In engineering, an area from which earth is removed by excavation.

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

Cutting and filling. The process of excavating part of an area and using the excavated material for adjacent embankments.

Debris. Loose material resulting from the disintegration of rocks and vegetative material. This material is transported by streams, ice, or floodwater.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Dryland farming. The practice of crop production in areas of low rainfall without use of irrigation.

Effective rooting depth. The depth to which a soil is readily penetrated by roots and used for extraction of water and plant nutrients. Approximated depth classes are as follows—

Very deep	More than 60 inches
Deep	40 to 60 inches
Moderately deep	20 to 40 inches
Shallow	10 to 20 inches
Very Shallow	Less than 10 inches

Effervescence. The fizz observed when dilute hydrochloric acid is applied to a soil containing free carbonates. The amount of effervescence is divided into three classes: slight effervescence, strong effervescence, and violent effervescence.

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.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

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

Excess lime. Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

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

Favorable. Favorable soil features for the specified use.

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

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity*, or *capillary capacity*.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

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

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

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.

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 from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

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.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

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

Igneous rock. Rock that formed by solidification from a molten or partially molten state.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Lime. Chemically, lime is calcium oxide, but as the term is commonly used, lime is also calcium carbonate and calcium hydroxide. Agricultural lime refers to ground limestone, hydrated lime, or burned lime, with or without magnesium minerals.

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

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting 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 greater than that of organic soil.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

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).

Munsell notation. A designation of color by degrees of the three single 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.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Organic matter, soil. The organic fraction of the soil including plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by organisms living in the soil. Soil organic matter commonly is determined by measuring the amount of organic material in a soil sample passed through a 2-millimeter sieve.

Outlet channel. A waterway constructed or altered primarily to carry water from manmade structures, for example, terraces, tile lines, and diversions.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

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

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

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in 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 a semisolid to a plastic state.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

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

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

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

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

Residual soil. A soil that formed in material that was weathered in place from bedrock.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground 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.

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

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shaly. An adjective incorporated into the designation of a soil texture class when the soil mass contains 15 to 90 percent, by volume, coarse fragments of shale. (See Coarse fragments.)

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.

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.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake. The slow movement of water into the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

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

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature 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 other plant and animal life characteristics of the soil 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.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subgrade. Soil that is prepared and compacted to support structures or pavement.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

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 or management.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

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

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

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

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

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Watershed. Land and water areas that are within the confines of a drainage divide; or a water problem area consisting entirely or partly of land needing drainage or irrigation.

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

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

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

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

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 a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a 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.

Illustrations

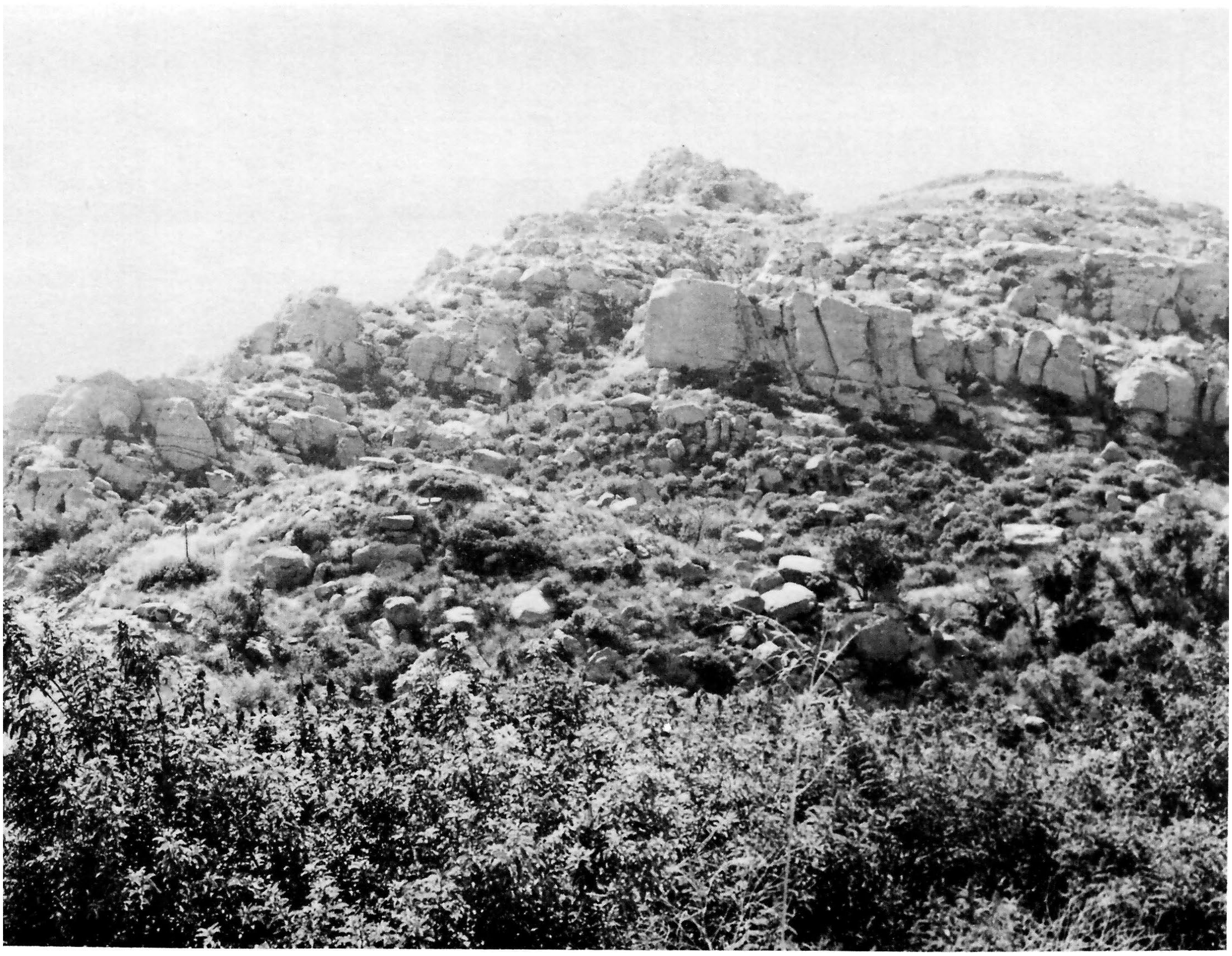

Figure 1.—This is a typical area of Rock outcrop-Gaviota complex, 30 to 75 percent slopes.

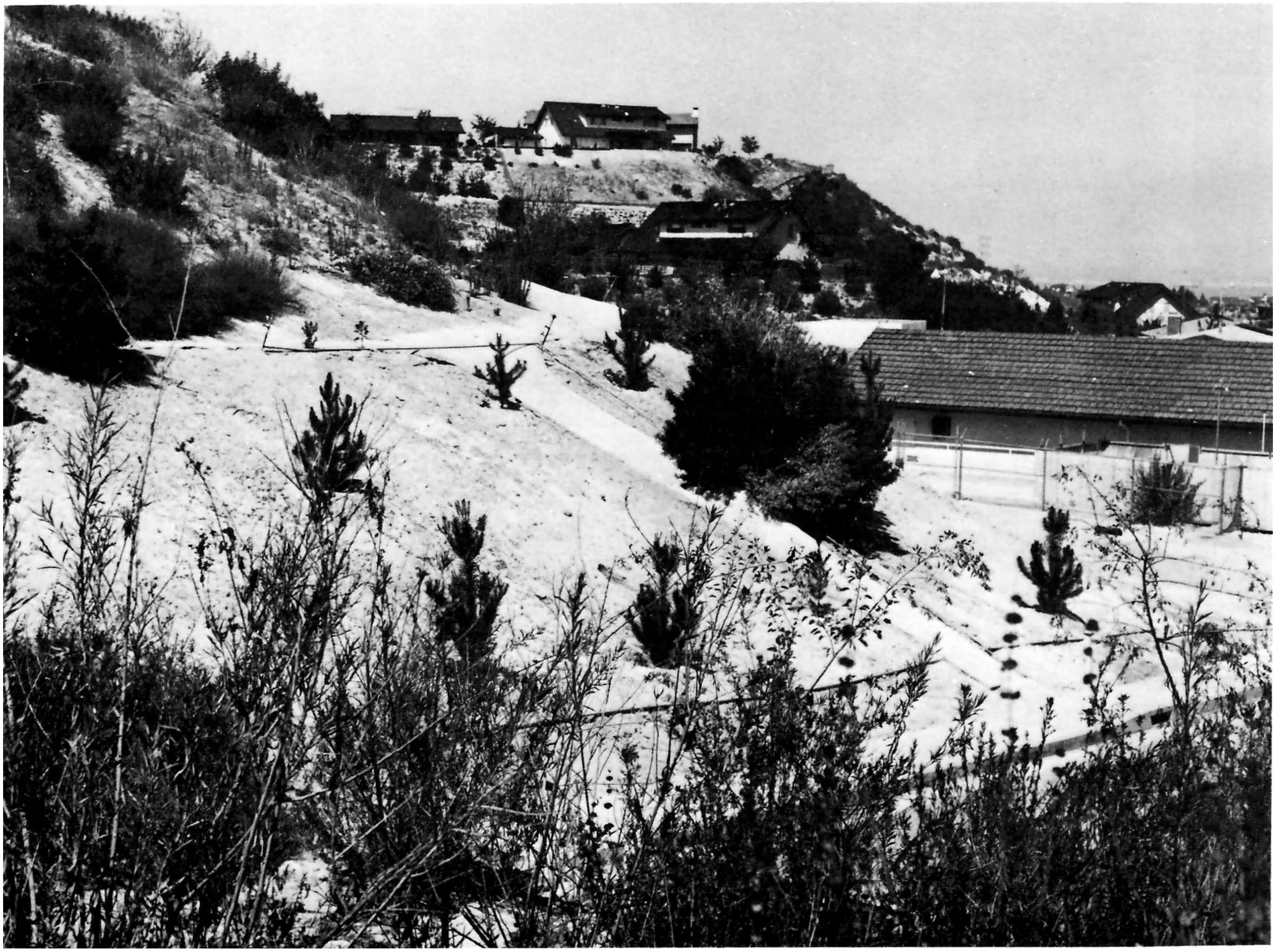

Figure 2.—Concrete diversions and grass, trees, and shrubs protect steep cut slopes from erosion in this area of Xerorthents-Urban land-Balcom complex, 15 to 30 percent slopes.

Figure 3.—This playground is on Mocho soil in an area of Mocho-Urban land complex, 0 to 2 percent slopes.

Tables

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
100	Anacapa sandy loam, 2 to 9 percent slopes	215	0.2
101	Anacapa-Urban land complex, 0 to 2 percent slopes	4,680	4.1
102	Badland	2,180	1.9
103	Balcom silty clay loam, 9 to 15 percent slopes	615	0.5
104	Balcom silty clay loam, 15 to 30 percent slopes	1,450	1.3
105	Balcom silty clay loam, 30 to 50 percent slopes	6,340	5.6
106	Balcom silty clay loam, 50 to 75 percent slopes	425	0.4
107	Capistrano-Urban land complex, 0 to 2 percent slopes	7,060	6.2
108	Capistrano-Urban land complex, 2 to 9 percent slopes	2,680	2.4
109	Chualar-Urban land complex, 2 to 9 percent slopes	5,075	4.5
110	Conejo-Urban land complex, 0 to 2 percent slopes	11,055	9.8
111	Conejo-Urban land complex, 2 to 9 percent slopes	1,310	1.2
112	Cropley-Urban land complex, 0 to 2 percent slopes	3,150	2.8
113	Cropley-Urban land complex, 2 to 9 percent slopes	620	0.5
114	Danville-Urban land complex, 0 to 2 percent slopes	850	0.8
115	Friant fine sandy loam, 50 to 75 percent slopes	1,460	1.3
116	Gaviota sandy loam, 9 to 30 percent slopes	760	0.7
117	Gaviota sandy loam, 30 to 50 percent slopes	1,385	1.2
118	Gazos silty clay loam, 15 to 30 percent slopes	1,030	0.9
119	Gazos silty clay loam, 30 to 50 percent slopes	2,335	2.1
120	Gazos-Balcom complex, 30 to 50 percent slopes	3,625	3.2
121	Lopez shaly clay loam, 30 to 50 percent slopes	3,240	2.9
122	Millsholm loam, 30 to 50 percent slopes	1,345	1.2
123	Mocho-Urban land complex, 0 to 2 percent slopes	13,490	11.9
124	Mocho-Urban land complex, 2 to 9 percent slopes	510	0.4
125	Rock outcrop-Friant complex, 50 to 75 percent slopes	410	0.3
126	Rock outcrop-Gaviota complex, 30 to 75 percent slopes	4,280	3.8
127	San Emigdio-Urban land complex, 0 to 2 percent slopes	9,015	8.0
128	Saugus loam, 15 to 30 percent slopes	475	0.4
129	Saugus loam, 30 to 50 percent slopes	2,950	2.6
130	Soboba gravelly loamy sand, 0 to 2 percent slopes	1,110	1.0
131	Soboba gravelly loamy sand, 2 to 9 percent slopes	260	0.2
132	Soper gravelly sandy loam, 15 to 30 percent slopes	870	0.8
133	Soper gravelly sandy loam, 30 to 50 percent slopes	725	0.6
134	Soper Variant sandy loam, 50 to 75 percent slopes	365	0.3
135	Tujunga-Urban land complex, 0 to 2 percent slopes	890	0.8
136	Urban land-Xerorthents-Friant complex, 15 to 30 percent slopes	225	0.2
137	Vista coarse sandy loam, 30 to 50 percent slopes	1,000	0.9
138	Xerorthents, 0 to 30 percent slopes	550	0.5
139	Xerorthents-Urban land-Balcom complex, 5 to 15 percent slopes	7,095	6.3
140	Xerorthents-Urban land-Balcom complex, 15 to 30 percent slopes	3,195	2.8
141	Xerorthents-Urban land-Gazos complex, 5 to 15 percent slopes	235	0.2
142	Xerorthents-Urban land-Gazos complex, 15 to 30 percent slopes	550	0.5
143	Xerorthents-Urban land-Saugus complex, 15 to 30 percent slopes	810	0.7
	Water	1,285	1.1
	Total	113,180	100.0

TABLE 2.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Anacapa:					
100	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
[1]101:					
Anacapa part	Slight	Slight	Slight	Slight	Moderate: low strength.
Urban land part.					
Badland:					
102.					
Balcom:					
103	Severe: depth to rock.	Moderate: slope, depth to rock, low strength.	Severe: depth to rock.	Severe: slope.	Severe: low strength.
104, 105, 106	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Capistrano:					
[1]107:					
Capistrano part	Slight	Slight	Slight	Slight	Moderate: low strength.
Urban land part.					
[1]108:					
Capistrano part	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Urban land part.					
Chualar:					
[1]109:					
Chualar part	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: shrink-swell, low strength.
Urban land part.					
Conejo:					
[1]110:					
Conejo part	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Urban land part.					
[1]111:					
Conejo part	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Urban land part.					

See footnote at end of table.

TABLE 2.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Cropley:					
[1]112:					
Cropley part---	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Urban land part.					
[1]113:					
Cropley part---	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Urban land part.					
Danville:					
[1]114:					
Danville part--	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Urban land part.					
Friant:					
115--------------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Gaviota:					
116, 117---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Gazos:					
118, 119---------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
[1]120:					
Gazos part-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Balcom part----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Lopez:					
121--------------	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Millsholm:					
122--------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Mocho:					
[1]123:					
Mocho part-----	Slight-----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
Urban land part.					

See footnote at end of table.

TABLE 2.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Mocho:					
[1]124:					
Mocho part	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: low strength, shrink-swell.
Urban land part.					
Rock outcrop:					
[1]125:					
Rock outcrop part.					
Friant part	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
[1]126:					
Rock outcrop part.					
Gaviota part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
San Emigdio:					
[1]127:					
San Emigdio part	Slight	Slight	Slight	Slight	Moderate: low strength.
Urban land part.					
Saugus:					
128, 129	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Soboba:					
130	Severe: small stones, cutbanks cave.	Slight	Slight	Slight	Slight.
131	Severe: small stones, cutbanks cave.	Slight	Moderate: large stones.	Moderate: slope.	Moderate: large stones.
Soper:					
132, 133	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Soper Variant:					
134	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Tujunga:					
[1]135:					
Tujunga part	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Urban land part.					
Urban land:					
[1]136:					
Urban land part.					

See footnote at end of table.

TABLE 2.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Urban land: Xerorthents part.					
Friant part	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Vista: 137	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Xerorthents: 138.					
[1]139: Xerorthents part.					
Urban land part.					
Balcom part	Severe: depth to rock.	Moderate: slope, depth to rock, low strength.	Severe: depth to rock.	Severe: slope.	Severe: low strength.
[1]140: Xerorthents part.					
Urban land part.					
Balcom part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
[1]141: Xerorthents part.					
Urban land part.					
Gazos part	Severe: depth to rock.	Moderate: slope, shrink-swell, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.
[1]142: Xerorthents part.					
Urban land part.					
Gazos part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
[1]143: Xerorthents part.					
Urban land part.					
Saugus part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

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

TABLE 3.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," and "fair." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Area sanitary landfill	Daily cover for landfill
Anacapa:			
100	Slight	Severe: seepage.	Good.
[1]101:			
Anacapa part	Slight	Severe: seepage.	Good.
Urban land part.			
Badland:			
102.			
Balcom:			
103	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
104, 105, 106	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Capistrano:			
[1]107, [1]108:			
Capistrano part	Slight	Severe: seepage.	Good.
Urban land part.			
Chualar:			
[1]109:			
Chualar part	Severe: percs slowly.	Severe: seepage.	Good.
Urban land part.			
Conejo:			
[1]110, [1]111:			
Conejo part	Severe: percs slowly.	Slight	Fair: too clayey.
Urban land part.			
Cropley:			
[1]112, [1]113:			
Cropley part	Severe: percs slowly.	Slight	Poor: too clayey.
Urban land part.			
Danville:			
[1]114:			
Danville part	Severe: percs slowly.	Slight	Poor: too clayey.
Urban land part.			
Friant:			
115	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, area reclaim, thin layer.

See footnote at end of table.

TABLE 3.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Area sanitary landfill	Daily cover for landfill
Gaviota:			
116, 117	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Gazos:			
118, 119	Severe: slope, depth to rock, percs slowly.	Severe: slope.	Poor: slope, thin layer, area reclaim.
[1]120:			
Gazos part	Severe: slope, depth to rock, percs slowly.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Balcom part	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Lopez:			
121	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones, thin layer.
Millsholm:			
122	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Mocho:			
[1]123, [1]124:			
Mocho part	Moderate: percs slowly.	Slight	Good.
Urban land part.			
Rock outcrop:			
[1]125:			
Rock outcrop part.			
Friant part	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, area reclaim, thin layer.
[1]126:			
Rock outcrop part.			
Gaviota part	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
San Emigdio:			
[1]127:			
San Emigdio part	Slight	Severe: seepage.	Good.
Urban land part.			

See footnote at end of table.

TABLE 3.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Area sanitary landfill	Daily cover for landfill
Saugus:			
128, 129	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
Soboba:			
130, 131	Slight	Severe: seepage.	Poor: too sandy, small stones.
Soper:			
132, 133	Severe: slope, percs slowly, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Soper Variant:			
134	Severe: slope, percs slowly, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Tujunga:			
[1]135:			
Tujunga part	Slight	Severe: seepage.	Poor: too sandy.
Urban land part.			
Urban land:			
[1]136:			
Urban land part.			
Xerorthents part.			
Friant part	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, area reclaim, thin layer.
Vista:			
137	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope.
Xerorthents:			
138.			
[1]139:			
Xerorthents part.			
Urban land part.			
Balcom part	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer, too clayey.
[1]140:			
Xerorthents part.			
Urban land part.			
Balcom part	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.

See footnote at end of table.

TABLE 3.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Area sanitary landfill	Daily cover for landfill
Xerorthents:			
[1]141:			
Xerorthents part.			
Urban land part.			
Gazos part	Severe: depth to rock, percs slowly.	Moderate: slope.	Poor: thin layer, area reclaim.
[1]142:			
Xerorthents part.			
Urban land part.			
Gazos part	Severe: slope, depth to rock, percs slowly.	Severe: slope.	Poor: slope, thin layer, area reclaim.
[1]143:			
Xerorthents part.			
Urban land part.			
Saugus part	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.

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

TABLE 4.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Anacapa:				
100	Good	Poor: excess fines.	Unsuited	Fair: small stones.
[1]101:				
Anacapa part	Good	Poor: excess fines.	Unsuited	Fair: small stones.
Urban land part.				
Badland:				
102.				
Balcom:				
103	Poor: low strength, thin layer, area reclaim.	Unsuited	Unsuited	Fair: slope, too clayey.
104	Poor: low strength, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope.
105, 106	Poor: slope, low strength, thin layer.	Unsuited	Unsuited	Poor: slope.
Capistrano:				
[1]107, [1]108:				
Capistrano part	Fair: low strength.	Poor: excess fines.	Unsuited	Good.
Urban land part.				
Chualar:				
[1]109:				
Chualar part	Fair: shrink-swell.	Unsuited	Unsuited	Fair: small stones.
Urban land part.				
Conejo:				
[1]110, [1]111:				
Conejo part	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
Urban land part.				
Cropley:				
[1]112, [1]113:				
Cropley part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Urban land part.				

See footnote at end of table.

TABLE 4.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Danville:				
[1]114:				
Danville part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey, small stones.
Urban land part.				
Friant:				
115	Poor: slope, thin layer, area reclaim.	Poor: excess fines.	Unsuited	Poor: slope, area reclaim.
Gaviota:				
116	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited	Poor: slope, area reclaim.
117	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited	Poor: slope, area reclaim.
Gazos:				
118	Poor: thin layer, low strength, area reclaim.	Unsuited	Unsuited	Poor: slope.
119	Poor: thin layer, slope, low strength.	Unsuited	Unsuited	Poor: slope.
[1]120:				
Gazos part	Poor: thin layer, slope, low strength.	Unsuited	Unsuited	Poor: slope.
Balcom part	Poor: slope, low strength, thin layer.	Unsuited	Unsuited	Poor: slope.
Lopez:				
121	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: slope, small stones, area reclaim.
Millsholm:				
122	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, thin layer, area reclaim.
Mocho:				
[1]123, [1]124:				
Mocho part	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: excess lime.
Urban land part.				

See footnote at end of table.

TABLE 4.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Rock outcrop:				
[1]125:				
Rock outcrop part.				
Friant part	Poor: slope, thin layer, area reclaim.	Poor: excess fines.	Unsuited	Poor: slope, area reclaim.
[1]126:				
Rock outcrop part.				
Gaviota part	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited	Poor: slope, area reclaim.
San Emigdio:				
[1]127:				
San Emigdio part	Good	Poor: excess fines.	Unsuited	Good.
Urban land part.				
Saugus:				
128	Fair: low strength, slope.	Unsuited	Unsuited	Poor: slope.
129	Poor: slope.	Unsuited	Unsuited	Poor: slope.
Soboba:				
130, 131	Good	Fair: excess fines.	Fair: excess fines.	Poor: small stones, too sandy.
Soper:				
132	Poor: low strength.	Unsuited: excess fines.	Unsuited	Poor: slope, small stones.
133	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited	Poor: slope, small stones.
Soper Variant:				
134	Poor: slope, low strength, thin layer.	Unsuited	Unsuited	Poor: slope.
Tujunga:				
[1]135:				
Tujunga part	Good	Fair: excess fines.	Unsuited	Poor: too sandy.
Urban land part.				
Urban land:				
[1]136:				
Urban land part.				
Xerorthents part.				
Friant part	Poor: thin layer, area reclaim.	Poor: excess fines.	Unsuited	Poor: slope, area reclaim.

See footnote at end of table.

TABLE 4.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Vista:				
137	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited	Poor: slope, area reclaim.
Xerorthents:				
138.				
[1]139:				
Xerorthents part.				
Urban land part.				
Balcom part	Poor: low strength, thin layer, area reclaim.	Unsuited	Unsuited	Fair: slope, too clayey.
[1]140:				
Xerorthents part.				
Urban land part.				
Balcom part	Poor: low strength, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope.
[1]141:				
Xerorthents part.				
Urban land part.				
Gazos part	Poor: thin layer, area reclaim, low strength.	Unsuited	Unsuited	Fair: slope, small stones, too clayey.
[1]142:				
Xerorthents part.				
Urban land part.				
Gazos part	Poor: thin layer, area reclaim, low strength.	Unsuited	Unsuited	Poor: slope.
[1]143:				
Xerorthents part.				
Urban land part.				
Saugus part	Fair: low strength, slope.	Unsuited	Unsuited	Poor: slope.

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

TABLE 5.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Anacapa:						
100	Slope, seepage.	Piping, low strength.	Slope	Droughty, slope.	Favorable	Droughty, slope.
[1]101:						
Anacapa part	Seepage	Piping, low strength.	Favorable	Droughty	Favorable	Droughty.
Urban land part.						
Badland:						
102.						
Balcom:						
103, 104, 105, 106	Slope, depth to rock.	Low strength, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock	Slope, rooting depth.
Capistrano:						
[1]107:						
Capistrano part	Seepage	Low strength	Favorable	Favorable	Favorable	Favorable.
Urban land part.						
[1]108:						
Capistrano part	Seepage	Low strength	Slope	Slope	Favorable	Slope.
Urban land part.						
Chualar:						
[1]109:						
Chualar part	Slope, seepage.	Favorable	Slope	Slope	Favorable	Favorable.
Urban land part.						
Conejo:						
[1]110:						
Conejo part	Favorable	Low strength	Favorable	Favorable	Favorable	Favorable.
Urban land part.						
[1]111:						
Conejo part	Slope	Low strength	Slope	Slope	Slope	Slope.
Urban land part.						
Cropley:						
[1]112:						
Cropley part	Favorable	Low strength, hard to pack.	Percs slowly	Percs slowly	Percs slowly	Percs slowly, slope.
Urban land part.						

See footnote at end of table.

TABLE 5.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Cropley:						
[1]113:						
Cropley part	Slope	Low strength, hard to pack.	Percs slowly, slope.	Percs slowly, slope.	Percs slowly	Percs slowly, slope.
Urban land part.						
Danville:						
[1]114:						
Danville part	Favorable	Low strength, hard to pack.	Percs slowly	Percs slowly	Percs slowly	Slope, percs slowly.
Urban land part.						
Friant:						
115	Depth to rock, slope, seepage.	Thin layer, low strength, piping.	----------	----------	Slope, depth to rock.	Slope, rooting depth.
Gaviota:						
116, 117	Slope, depth to rock.	Slope, thin layer, piping.	----------	----------	Slope, depth to rock.	Slope, rooting depth.
Gazos:						
118, 119	Slope, depth to rock.	Low strength, thin layer.	Slope, depth to rock	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth.
[1]120:						
Gazos part	Slope, depth to rock.	Low strength, thin layer.	Slope, depth to rock	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth.
Balcom part	Slope, depth to rock.	Low strength, thin layer, shrink-swell.	Slope, depth to rock	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth.
Lopez:						
121	Slope, depth to rock.	Thin layer	----------	----------	Slope, depth to rock.	Slope, rooting depth.
Millsholm:						
122	Slope, depth to rock.	Low strength, thin layer.	----------	----------	Depth to rock, slope.	Slope, rooting depth.
Mocho:						
[1]123:						
Mocho part	Favorable	Low strength	Favorable	Favorable	Favorable	Favorable.
Urban land part.						
[1]124:						
Mocho part	Slope	Low strength	Slope	Slope	Favorable	Favorable.
Urban land part.						
Rock outcrop:						
[1]125:						
Rock outcrop part.						
Friant part	Depth to rock, slope, seepage.	Thin layer, low strength, piping.	----------	----------	Slope, depth to rock.	Slope, rooting depth.

See footnote at end of table.

TABLE 5.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Rock outcrop:						
[1]126:						
Rock outcrop part.						
Gaviota part	Slope, depth to rock.	Slope, thin layer, piping.	-------------	-------------	Slope, depth to rock.	Slope, rooting depth.
San Emigdio:						
[1]127:						
San Emigdio part	Seepage, slope.	Piping	Favorable	Favorable	Favorable	Favorable.
Urban land part.						
Saugus:						
128, 129	Slope	Piping	-------------	-------------	Slope	Slope.
Soboba:						
130	Seepage	Seepage	Slope, cutbanks cave.	Slope, droughty.	Too sandy, slope.	Droughty, slope.
131	Slope, seepage.	Seepage	Slope, cutbanks cave.	Slope, droughty.	Too sandy, slope.	Droughty, slope.
Soper:						
132, 133	Slope	Low strength	Slope, depth to rock.	Slope, rooting depth.	Slope	Slope.
Soper Variant:						
134	Slope	Low strength	-------------	-------------	Slope	Slope.
Tujunga:						
[1]135:						
Tujunga part	Seepage	Piping, seepage.	-------------	Droughty, fast intake.	Too sandy	Droughty.
Urban land part.						
Urban land:						
[1]136:						
Urban land part.						
Xerorthents part.						
Friant part	Depth to rock, slope, seepage.	Thin layer, low strength, piping.	-------------	-------------	Slope, depth to rock.	Slope, rooting depth.
Vista:						
137	Slope, seepage, depth to rock.	Piping, low strength, thin layer.	Slope, depth to rock	Slope, droughty, rooting depth.	Slope	Slope, droughty.
Xerorthents:						
138.						
[1]139, [1]140:						
Xerorthents part.						
Urban land part.						

See footnote at end of table.

TABLE 5.--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
Xerorthents:						
[1]139, [1]140:						
Balcom part	Slope, depth to rock.	Low strength, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth.
[1]141, [1]142:						
Xerorthents part.						
Urban land part.						
Gazos part	Slope, depth to rock.	Low strength, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth.
[1]143:						
Xerorthents part.						
Urban land part.						
Saugus part	Slope	Piping	---	---	Slope	Slope.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole 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	Picnic areas	Playgrounds	Paths and trails
Anacapa:			
100	Slight	Moderate: slope.	Slight.
[1]101:			
Anacapa part	Slight	Slight	Slight.
Urban land part.			
Badland:			
102.			
Balcom:			
103	Moderate: slope.	Severe: slope.	Slight.
104	Severe: slope.	Severe: slope.	Moderate: slope.
105, 106	Severe: slope.	Severe: slope.	Severe: slope.
Capistrano:			
[1]107:			
Capistrano part	Slight	Slight	Slight.
Urban land part.			
[1]108:			
Capistrano part	Slight	Severe: slope.	Slight.
Urban land part.			
Chualar:			
[1]109:			
Chualar part	Slight	Moderate: slope, small stones.	Slight.
Urban land part.			
Conejo:			
[1]110:			
Conejo part	Slight	Slight	Slight.
Urban land part.			
[1]111:			
Conejo part	Slight	Moderate: slope.	Slight.
Urban land part.			
Cropley:			
[1]112, [1]113:			
Cropley part	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
Urban land part.			

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Picnic areas	Playgrounds	Paths and trails
Danville:			
[1]114:			
Danville part	Slight	Moderate: too clayey.	Slight.
Urban land part.			
Friant:			
115	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Gaviota:			
116	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
117	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Gazos:			
118	Severe: slope.	Severe: slope.	Moderate: slope.
119	Severe: slope.	Severe: slope.	Severe: slope.
[1]120:			
Gazos part	Severe: slope.	Severe: slope.	Severe: slope.
Balcom part	Severe: slope.	Severe: slope.	Severe: slope.
Lopez:			
121	Severe: slope, small stones.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
Millsholm:			
122	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Mocho:			
[1]123:			
Mocho part	Slight	Slight	Slight.
Urban land part.			
[1]124:			
Mocho part	Slight	Moderate: slope.	Slight.
Urban land part.			
Rock outcrop:			
[1]125:			
Rock outcrop part.			
Friant part	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Picnic areas	Playgrounds	Paths and trails
Rock outcrop:			
[1]126:			
Rock outcrop part.			
Gaviota part	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
San Emigdio:			
[1]127:			
San Emigdio part	Slight	Slight	Slight.
Urban land part.			
Saugus:			
128	Severe: slope.	Severe: slope.	Moderate: slope.
129	Severe: slope.	Severe: slope.	Severe: slope.
Soboba:			
130, 131	Moderate: small stones, too sandy.	Severe: small stones.	Moderate: small stones.
Soper:			
132	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
133	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Soper Variant:			
134	Severe: slope.	Severe: slope.	Severe: slope.
Tujunga:			
[1]135:			
Tujunga part	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Urban land part.			
Urban land:			
[1]136:			
Urban land part.			
Xerorthents part.			
Friant part	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
Vista:			
137	Severe: slope.	Severe: slope.	Severe: slope.
Xerorthents:			
138.			
[1]139:			
Xerorthents part.			
Urban land part.			
Balcom part	Moderate: slope.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Picnic areas	Playgrounds	Paths and trails
Xerorthents:			
[1]140:			
Xerorthents part.			
Urban land part.			
Balcom part	Severe: slope.	Severe: slope.	Moderate: slope.
[1]141:			
Xerorthents part.			
Urban land part.			
Gazos part	Moderate: slope.	Severe: slope.	Slight.
[1]142:			
Xerorthents part.			
Urban land part.			
Gazos part	Severe: slope.	Severe: slope.	Moderate: slope.
[1]143:			
Xerorthents part.			
Urban land part.			
Saugus part	Severe: slope.	Severe: slope.	Moderate: slope.

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

TABLE 7.--WILDLIFE HABITAT POTENTIALS

[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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
Anacapa:									
100----------------	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
[1]101:									
Anacapa part----	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Urban land part.									
Badland:									
102.									
Balcom:									
103, 104----------	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Very poor	Fair.
105----------------	Poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Very poor	Fair.
106----------------	Poor	Poor	Fair	Fair	Very poor	Very poor	Fair	Very poor	Fair.
Capistrano:									
[1]107:									
Capistrano part-	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Urban land part.									
[1]108:									
Capistrano part-	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Urban land part.									
Chualar:									
[1]109:									
Chualar part----	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Urban land part.									
Conejo:									
[1]110:									
Conejo part-----	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Urban land part.									
[1]111:									
Conejo part-----	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Urban land part.									
Cropley:									
[1]112:									
Cropley part----	Fair	Good	Poor	Poor	Poor	Poor	Fair	Poor	Poor.
Urban land part.									
[1]113:									
Cropley part----	Fair	Good	Poor	Poor	Poor	Very poor	Fair	Very poor	Poor.
Urban land part.									
Danville:									
[1]114:									
Danville part---	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Urban land part.									

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
Friant:									
115	Poor	Very poor	Fair	Poor	Very poor	Very poor	Poor	Very poor	Poor.
Gaviota:									
116	Poor	Poor	Fair	Fair	Very poor	Very poor	Poor	Very poor	Poor.
117	Very poor	Very poor	Fair	Fair	Very poor	Very poor	Poor	Very poor	Poor.
Gazos:									
118	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
119	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Very poor	Good.
[1]120:									
Gazos part	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Very poor	Good.
Balcom part	Poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Very poor	Fair.
Lopez:									
121	Very poor	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
Millsholm:									
122	Very poor	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
Mocho:									
[1]123:									
Mocho part	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor.	
Urban land part.									
[1]124:									
Mocho part	Good	Good	Good	Good	Very poor	Very poor	Good	Very poor.	
Urban land part.									
Rock outcrop:									
[1]125:									
Rock outcrop part.									
Friant part	Poor	Very poor	Fair	Poor	Very poor	Very poor	Poor	Very poor	Poor.
[1]126:									
Rock outcrop part.									
Gaviota part	Very poor	Very poor	Fair	Fair	Very poor	Very poor	Poor	Very poor	Poor.
San Emigdio:									
[1]127:									
San Emigdio part	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
Urban land part.									
Saugus:									
128	Poor	Poor	Good	Good	Very poor	Very poor	Fair	Very poor	Good.
129	Very poor	Very poor	Good	Good	Very poor	Very poor	Fair	Very poor	Good.
Soboba:									
130, 131	Very poor	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor.
Soper:									
132	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
133	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Very poor	Good.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Wetland wildlife	Rangeland wildlife
Soper Variant:									
134	Very poor	Very poor	Good	Good	Very poor	Very poor	Poor	Very poor	Good.
Tujunga:									
[1]135:									
Tujunga part	Poor	Poor	Fair	Fair	Very poor	Very poor	Poor	Very poor	Fair.
Urban land part.									
Urban land:									
[1]136:									
Urban land part.									
Xerorthents part	Very poor	Very poor	Good	Good	Very poor	Very poor	Very poor	Very poor	Good.
Friant part	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Very poor	Fair.
Vista:									
137	Very poor	Very poor	Fair	Fair	Very poor	Very poor	Very poor	Very poor	Fair.
Xerorthents:									
138	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor.
[1]139:									
Xerorthents part	Very poor	Very poor	Good	Good	Very poor	Very poor	Very poor	Very poor	Good.
Urban land part.									
Balcom part	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Very poor	Fair.
[1]140:									
Xerorthents part	Very poor	Very poor	Good	Good	Very poor	Very poor	Very poor	Very poor	Good.
Urban land part.									
Balcom part	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Very poor	Fair.
[1]141:									
Xerorthents part	Very poor	Very poor	Good	Good	Very poor	Very poor	Very poor	Very poor	Good.
Urban land part.									
Gazos part	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
[1]142:									
Xerorthents part	Very poor	Very poor	Good	Good	Very poor	Very poor	Very poor	Very poor	Good.
Urban land part.									
Gazos part	Fair	Good	Good	Good	Very poor	Very poor	Good	Very poor	Good.
[1]143:									
Xerorthents part	Very poor	Very poor	Good	Good	Very poor	Very poor	Very poor	Very poor	Good.
Urban land part.									
Saugus part	Poor	Poor	Good	Good	Very poor	Very poor	Fair	Very poor	Good.

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

TABLE 8.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol > means more than. Absence of an entry indicates that data were not estimated. NP means nonplastic]

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	
Anacapa:											
100	0-48	Sandy loam	SM	A-2, A-4	0	80-100	75-100	50-70	20-40	---	NP
	48-72	Coarse sandy loam, gravelly coarse sandy loam.	SM	A-2, A-1, A-4	0	65-100	35-100	30-60	20-40	---	NP
[1]101:											
Anacapa part	0-48	Sandy loam	SM	A-2, A-4	0	80-100	75-100	50-70	20-40	---	NP
	48-72	Coarse sandy loam, gravelly coarse sandy loam.	SM	A-2, A-1, A-4	0	65-100	60-100	30-60	20-40	---	NP
Urban land part.											
Badland: 102.											
Balcom:											
103, 104, 105, 106	0-37	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-85	35-45	15-20
	37	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Capistrano:											
[1]107, [1]108:											
Capistrano part	0-41	Fine sandy loam	SM	A-4	0	95-100	95-100	70-85	40-50	15-25	NP-5
	41-72	Loam	ML	A-4	0	95-100	95-100	80-95	60-70	20-30	NP-5
Urban land part.											
Chualar:											
[1]109:											
Chualar part	0-19	Sandy loam	SM	A-4	0	100	90-100	65-70	35-50	15-25	NP-5
	19-70	Sandy clay loam	SM-SC, SC	A-4, A-6	0	80-100	75-100	65-85	35-50	20-30	5-15
Urban land part.											
Conejo:											
[1]110, [1]111:											
Conejo part	0-62	Clay loam	CL	A-6, A-7	0	95-100	90-100	70-100	65-80	30-45	10-20
	62-75	Loam, clay loam	CL	A-6, A-7	0	95-100	90-100	55-90	50-80	20-45	10-25
Urban land part.											
Cropley:											
[1]112, [1]113:											
Cropley part	0-65	Clay	CL, CH	A-7	0	100	95-100	80-100	70-95	40-60	15-30
Urban land part.											
Danville:											
[1]114:											
Danville part	0-24	Silty clay loam	CL	A-6	0	90-100	80-100	70-85	55-70	30-40	15-25
	24-50	Clay	CL, CH	A-7	0	100	95-100	70-85	55-70	40-60	20-30
	50-60	Clay loam	CL	A-6, A-7	0	85-100	75-90	65-90	50-75	30-50	10-25
Urban land part.											
Friant:											
115	0-19	Fine sandy loam	SM, SM-SC	A-4	0-10	90-100	85-100	60-70	35-45	20-30	NP-10
	19	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 8.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
Gaviota:											
116, 117----------	0-15	Sandy loam------	SM	A-4, A-2	0-5	75-100	75-100	55-70	30-50	20-30	NP-5
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gazos:											
118, 119----------	0-28	Silty clay loam -	CL	A-6	0	90-100	80-95	70-85	65-80	30-40	10-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]120:											
Gazos part------	0-28	Silty clay loam-	CL	A-6	0	90-100	80-95	70-85	65-80	30-40	10-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Balcom part-----	0-37	Silty clay loam-	CL	A-6, A-7	0	100	100	90-100	80-85	35-45	15-20
	37	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Lopez:											
121---------------	0-8	Shaly clay loam-	GM	A-2	0-15	35-65	35-50	30-40	20-35	30-50	5-15
	8-13	Very shaly clay loam.	GM	A-2	0-15	25-40	20-35	20-30	15-30	40-50	10-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Millsholm:											
122---------------	0-15	Loam------------	ML, CL-ML	A-4	0	80-100	80-100	70-95	50-75	20-35	5-10
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mocho:											
[1]123, [1]124:											
Mocho part------	0-76	Loam------------	CL-ML, CL	A-4, A-6	0	80-100	75-100	70-95	60-80	20-40	5-15
Urban land part.											
Rock outcrop:											
[1]125:											
Rock outcrop part.											
Friant part-----	0-19	Fine sandy loam-	SM, SM-SC	A-4	0-10	90-100	85-100	60-70	35-45	20-30	NP-10
	19	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]126:											
Rock outcrop part.											
Gaviota part----	0-15	Sandy loam------	SM	A-4, A-2	0-5	75-100	75-100	55-70	30-50	20-30	NP-5
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
San Emigdio:											
[1]127:											
San Emigdio part	0-77	Sandy loam------	SM	A-4	0	95-100	90-100	55-70	35-40	15-30	NP-5
Urban land part.											
Saugus:											
128, 129----------	0-45	Loam------------	SM, SM-SC, ML, CL-ML	A-4	0-5	90-100	75-100	60-95	40-60	20-30	NP-10
	45	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 8.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Soboba:											
130, 131----------	0-9	Gravelly loamy sand.	SM	A-1	0-10	75-90	50-75	25-50	10-20	---	NP
	9-60	Very gravelly sand, very gravelly loamy sand.	GP, GP-GM	A-1	0-10	40-50	25-50	10-25	0-10	---	NP
Soper:											
132, 133----------	0-11	Gravelly sandy loam.	SM, SM-SC	A-4, A-2	0-10	80-100	60-75	40-60	25-50	15-30	NP-10
	11-31	Cobbly sandy clay loam, gravelly sandy clay loam, gravelly clay loam.	CL, SC	A-6	15-30	75-95	70-85	50-65	40-60	20-40	10-20
	31	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Soper Variant:											
134---------------	0-3	Sandy loam------	SM	A-2, A-4	0	95-100	85-100	55-70	30-50	15-25	NP-5
	3-25	Sandy clay loam-	SC, CL	A-2, A-6, A-7	0	95-100	85-100	70-90	30-55	30-45	15-25
	25	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Tujunga:											
[1]135:											
Tujunga part----	0-60	Sand------------	SM, SP-SM	A-1, A-2, A-3	0	90-100	75-100	40-70	5-20	---	NP
Urban land part.											
Urban land:											
[1]136:											
Urban land part.											
Xerorthents part	0-60	Variable	---	---	---	---	---	---	---	---	---
Friant part-----	0-19	Fine sandy loam-	SM, SM-SC	A-4	0-10	90-100	85-100	60-70	35-45	20-30	NP-10
	19	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Vista:											
137---------------	0-36	Coarse sandy loam.	SM	A-2	0	90-100	80-95	45-65	20-35	---	NP
	36	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Xerorthents:											
138---------------	0-60	Variable	---	---	---	---	---	---	---	---	---
[1]139:											
Xerorthents part-	0-60	Variable	---	---	---	---	---	---	---	---	---
Urban land part.											
Balcom part-----	0-37	Silty clay loam-	CL	A-6, A-7	0	100	100	90-100	80-85	35-45	15-20
	37	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 8.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Xerorthents:											
[1]140:											
Xerorthents part	0-60	Variable	---	---	---	---	---	---	---	---	---
Urban land part.											
Balcom part-----	0-37	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-85	35-45	15-20
	37	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]141:											
Xerorthents part	0-60	Variable	---	---	---	---	---	---	---	---	---
Urban land part.											
Gazos part------	0-28	Silty clay loam	CL	A-6	0	90-100	80-95	70-85	60-70	30-40	10-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]142:											
Xerorthents part	0-60	Variable	---	---	---	---	---	---	---	---	---
Urban land part.											
Gazos part------	0-28	Silty clay loam	CL	A-6	0	90-100	80-95	70-85	65-80	30-40	10-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]143:											
Xerorthents part	0-60	Variable	---	---	---	---	---	---	---	---	---
Urban land part.											
Saugus part-----	0-45	Loam-------------	SM, SM-SC, ML, CL-ML	A-4	0-5	90-100	75-100	60-95	40-60	20-30	NP-10
	45	Weathered bedrock.	---	---	---	---	---	---	---	---	---

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

TABLE 9.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than. Entries under "erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Anacapa:											
100	0-48	2.0-6.0	0.10-0.12	6.6-7.8	<2	Low	Low	Low	0.37	5	---
	48-72	2.0-6.0	0.06-0.10	7.9-8.4	<2	Low	High	Low	0.37		
[1]101:											
Anacapa part	0-48	2.0-6.0	0.10-0.12	6.6-7.8	<2	Low	Low	Low	0.37	5	---
	48-72	2.0-6.0	0.06-0.10	7.9-8.4	<2	Low	High	Low	0.37		
Urban land part.											
Badland:											
102.											
Balcom:											
103, 104, 105, 106	0-37	0.2-0.6	0.18-0.19	7.9-8.4	<2	Moderate	Moderate	Low	0.37	2	---
	37	---	---	---	---	---	---	---	---		
Capistrano:											
[1]107, [1]108:											
Capistrano part	0-41	2.0-6.0	0.10-0.15	6.1-8.4	<2	Low	High	Low	0.24	5	---
	41-72	2.0-6.0	0.14-0.17	6.6-8.4	<2	Low	High	Low	0.37		
Urban land part.											
Chualar:											
[1]109:											
Chualar part	0-19	0.6-2.0	0.10-0.12	6.1-7.3	<2	Low	Low	Low	0.28	3	---
	19-70	0.2-0.6	0.17-0.18	6.1-7.8	<2	Moderate	Moderate	Low	0.32		
Urban land part.											
Conejo:											
[1]110, [1]111:											
Conejo part	0-62	0.2-0.6	0.17-0.18	6.1-7.8	<2	Moderate	Moderate	Low	0.28	5	---
	62-75	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	High	Low	0.32		
Urban land part.											
Cropley:											
[1]112, [1]113:											
Cropley part	0-65	0.06-0.2	0.12-0.15	7.4-8.4	<2	High	High	Low	0.24	5	---
Urban land part.											
Danville:											
[1]114:											
Danville part	0-24	0.2-0.6	0.18-0.19	7.4-8.4	<2	Moderate	High	Moderate	0.32	5	---
	24-50	0.06-0.2	0.12-0.15	7.9-8.4	<2	High	High	Low	0.24		
	50-60	0.2-0.6	0.17-0.18	7.9-8.4	<2	Moderate	High	Low	0.28		
Urban land part.											
Friant:											
115	0-19	2.0-6.0	0.10-0.12	5.6-6.5	<2	Low	Low	Low	0.32	1	---
	19	---	---	---	---	---	---	---	---		
Gaviota:											
116, 117	0-15	2.0-6.0	0.07-0.12	6.1-7.3	<2	Low	Low	Low	0.43	1	---
	15	---	---	---	---	---	---	---	---		
Gazos:											
118, 119	0-28	0.2-0.6	0.17-0.19	5.6-7.3	<2	Moderate	Moderate	Low	0.37	2	---
	28	---	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 9.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Gazos:											
[1]120:											
Gazos part------	0-28	0.2-0.6	0.17-0.19	5.6-7.3	<2	Moderate--	Moderate-	Low------	0.37	2	---
	28	---	---	---	---	----------	---------	---------	---		
Balcom part-----	0-37	0.2-0.6	0.18-0.19	7.9-8.4	<2	Moderate--	Moderate-	Low------	0.37	2	---
	37	---	---	---	---	----------	---------	---------	---		
Lopez:											
121---------------	0-8	0.6-2.0	0.10-0.12	6.1-7.3	<2	Low-------	Moderate-	Moderate-	0.15	1	---
	8-13	0.6-2.0	0.06-0.12	6.1-7.3	<2	Low-------	Moderate-	Moderate-	0.10		
	13	---	---	---	---	----------	---------	---------	---		
Millsholm:											
122---------------	0-15	0.6-2.0	0.14-0.16	5.6-7.3	<2	Low-------	Low------	Moderate-	0.43	1	---
	15	---	---	---	---	----------	---------	---------	---		
Mocho:											
[1]123, [1]124:											
Mocho part------	0-76	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate--	High-----	Low------	0.43	5	---
Urban land part.											
Rock outcrop:											
[1]125:											
Rock outcrop part.											
Friant part-----	0-19	2.0-6.0	0.10-0.12	5.6-6.5	<2	Low-------	Low------	Low------	0.32	1	---
	19	---	---	---	---	----------	---------	---------	---		
[1]126:											
Rock outcrop part.											
Gaviota part----	0-15	2.0-6.0	0.07-0.12	6.1-7.3	<2	Low-------	Low------	Low------	0.43	1	---
	15	---	---	---	---	----------	---------	---------	---		
San Emigdio:											
[1]127:											
San Emigdio part-	0-77	2.0-6.0	0.10-0.12	7.9-8.4	<2	Low-------	High-----	Low------	0.32	5	---
Urban land part.											
Saugus:											
128, 129----------	0-45	0.6-2.0	0.11-0.14	6.1-7.8	<2	Low-------	Moderate	Low------	0.28	3	---
	45	---	---	---	---	----------	---------	---------	---		
Soboba:											
130, 131----------	0-9	>20	0.03-0.08	6.1-7.8	<2	Low-------	Low------	Low------	0.15	5	---
	9-60	>20	0.01-0.05	6.1-7.8	<2	Low-------	Low------	Low------	0.10		
Soper:											
132, 133----------	0-11	0.6-2.0	0.08-0.10	6.1-7.3	<2	Low-------	Moderate-	Moderate-	0.32	3	---
	11-31	0.2-0.6	0.11-0.13	6.1-7.3	<2	Moderate	Moderate	Low------	0.28		
	31	---	---	---	---	----------	---------	---------	---		
Soper Variant:											
134---------------	0-3	0.6-2.0	0.09-0.12	5.6-6.5	<2	Low-------	Moderate-	Moderate-	0.32	3	---
	3-25	0.2-0.6	0.15-0.18	5.1-6.0	<2	Moderate--	High-----	High-----	0.20		
	25	---	---	---	---	----------	---------	---------	---		
Tujunga:											
[1]135:											
Tujunga part----	0-60	6.0-20	0.05-0.08	6.1-7.8	<2	Low-------	Low------	Low------	0.17	5	1
Urban land part.											

See footnote at end of table.

TABLE 9.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodi-bility group
	In	In/hr	In/in	pH	Mmhos/cm						
Urban land:											
[1]136:											
Urban land part.											
Xerorthents part	0-60	---	---	---	---	----------	---------	---------	---	---	---
Friant part-----	0-19	2.0-6.0	0.10-0.12	5.6-6.5	<2	Low-------	Low------	Low------	0.32	1	---
	19	---	---	---	---	----------	---------	---------	---		
Vista:											
137---------------	0-36	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low-------	Moderate-	Moderate-	0.28	2	---
	36	---	---	---	---	----------	---------	---------	---		
Xerorthents:											
138---------------	0-60	---	---	---	---	----------	---------	---------	---	---	---
[1]139, [1]140:											
Xerorthents part	0-60	---	---	---	---	----------	---------	---------	---	---	---
Urban land part.											
Balcom part-----	0-37	0.2-0.6	0.18-0.19	7.9-8.4	<2	Moderate--	Moderate-	Low------	0.37	2	---
	37	---	---	---	---	----------	---------	---------	---		
[1]141, [1]142:											
Xerorthents part	0-60	---	---	---	---	----------	---------	---------	---	---	---
Urban land part.											
Gazos part------	0-28	0.2-0.6	0.17-0.19	5.6-7.3	<2	Moderate--	Moderate-	Low------	0.32	2	---
	28	---	---	---	---	----------	---------	---------	---		
[1]143:											
Xerorthents part	0-60	---	---	---	---	----------	---------	---------	---	---	---
Urban land part.											
Saugus part-----	0-45	0.6-2.0	0.11-0.14	6.1-7.8	<2	Low-------	Moderate-	Low------	0.28	3	---
	45	---	---	---	---	----------	---------	---------	---		

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

TABLE 10.--SOIL AND WATER FEATURES

[Absence of an entry indicates that the feature is not a concern. See text for descriptions of hydrologic groups. The symbol > means more than]

Soil name and map symbol	Hydrologic group	Bedrock	
		Depth	Hardness
		In	
Anacapa:			
100	B	>60	---
[1]101:			
Anacapa part	B	>60	---
Urban land part.			
Badland:			
102.			
Balcom:			
103, 104, 105, 106	B	23-40	Rippable.
Capistrano:			
[1]107, [1]108:			
Capistrano part	B	>60	---
Urban land part.			
Chualar:			
[1]109:			
Chualar part	B	>60	---
Urban land part.			
Conejo:			
[1]110, [1]111:			
Conejo part	C	>60	---
Urban land part.			
Cropley:			
[1]112, [1]113:			
Cropley part	D	>60	---
Urban land part.			
Danville:			
[1]114:			
Danville part	C	>60	---
Urban land part.			
Friant:			
115	D	6-20	Rippable.
Gaviota:			
116, 117	D	10-20	Hard.
Gazos:			
118, 119	C	24-40	Hard.
[1]120:			
Gazos part	C	24-40	Hard.
Balcom part	B	23-40	Rippable.

See footnote at end of table.

TABLE 10.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock	
		Depth	Hardness
		In	
Lopez:			
121	D	6-20	Hard.
Millsholm:			
122	D	10-20	Hard.
Mocho:			
[1]123, [1]124:			
Mocho part	B	>60	---
Urban land part.			
Rock outcrop:			
[1]125:			
Rock outcrop part.			
Friant part	D	6-20	Rippable.
[1]126:			
Rock outcrop part.			
Gaviota part	D	10-20	Hard.
San Emigdio:			
[1]127:			
San Emigdio part	B	>60	---
Urban land part.			
Saugus:			
128, 129	B	40-60	Rippable.
Soboba:			
130, 131	A	>60	---
Soper:			
132, 133	C	24-40	Rippable.
Soper Variant:			
134	C	20-40	Rippable.
Tujunga:			
[1]135:			
Tujunga part	A	>60	---
Urban land part.			
Urban land:			
[1]136:			
Urban land part.			
Xerorthents part	C	10-60	Hard.
Friant part	D	8-20	Rippable.
Vista:			
137	C	20-40	Rippable.
Xerorthents:			
138	---	10-60	Rippable.

See footnote at end of table.

TABLE 10.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock	
		Depth	Hardness
		In	
Xerorthents:			
[1]139, [1]140:			
Xerorthents part	---	10-60	Hard.
Urban land part.			
Balcom part	B	23-40	Rippable.
[1]141, [1]142:			
Xerorthents part	---	10-60	Hard.
Urban land part.			
Gazos part	C	24-40	Hard.
[1]143:			
Xerorthents part	---	10-60	Hard.
Urban land part.			
Saugus part	B	40-60	Rippable.

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

TABLE 11.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See the section "Soil series and morphology" for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
*Anacapa	Coarse-loamy, mixed, thermic Calcic Pachic Haploxerolls
Balcom	Fine-loamy, mixed, thermic Calcixerollic Xerochrepts
Capistrano	Coarse-loamy, mixed, thermic Entic Haploxerolls
Chualar	Fine-loamy, mixed, thermic Typic Argixerolls
Conejo	Fine-loamy, mixed, thermic Pachic Haploxerolls
Cropley	Fine, montmorillonitic, thermic Chromic Pelloxererts
Danville	Fine, montmorillonitic, thermic Pachic Argixerolls
Friant	Loamy, mixed, thermic Lithic Haploxerolls
Gaviota	Loamy, mixed, nonacid, thermic Lithic Xerorthents
Gazos	Fine-loamy, mixed, thermic Pachic Haploxerolls
Lopez	Loamy-skeletal, mixed, thermic Lithic Ultic Haploxerolls
Millsholm	Loamy, mixed, thermic Lithic Xerochrepts
Mocho	Fine-loamy, mixed, thermic Fluventic Haploxerolls
San Emigdio	Coarse-loamy, mixed (calcareous), thermic Typic Xerofluvents
Saugus	Coarse-loamy, mixed, nonacid, thermic Typic Xerorthents
Soboba	Sandy-skeletal, mixed, thermic Typic Xerofluvents
Soper	Fine-loamy, mixed, thermic Typic Argixerolls
Soper Variant	Fine-loamy, mixed, thermic Ultic Haploxeralfs
Tujunga	Mixed, thermic Typic Xeropsamments
Vista	Coarse-loamy, mixed, thermic Typic Xerochrepts
Xerorthents	Xerorthents

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