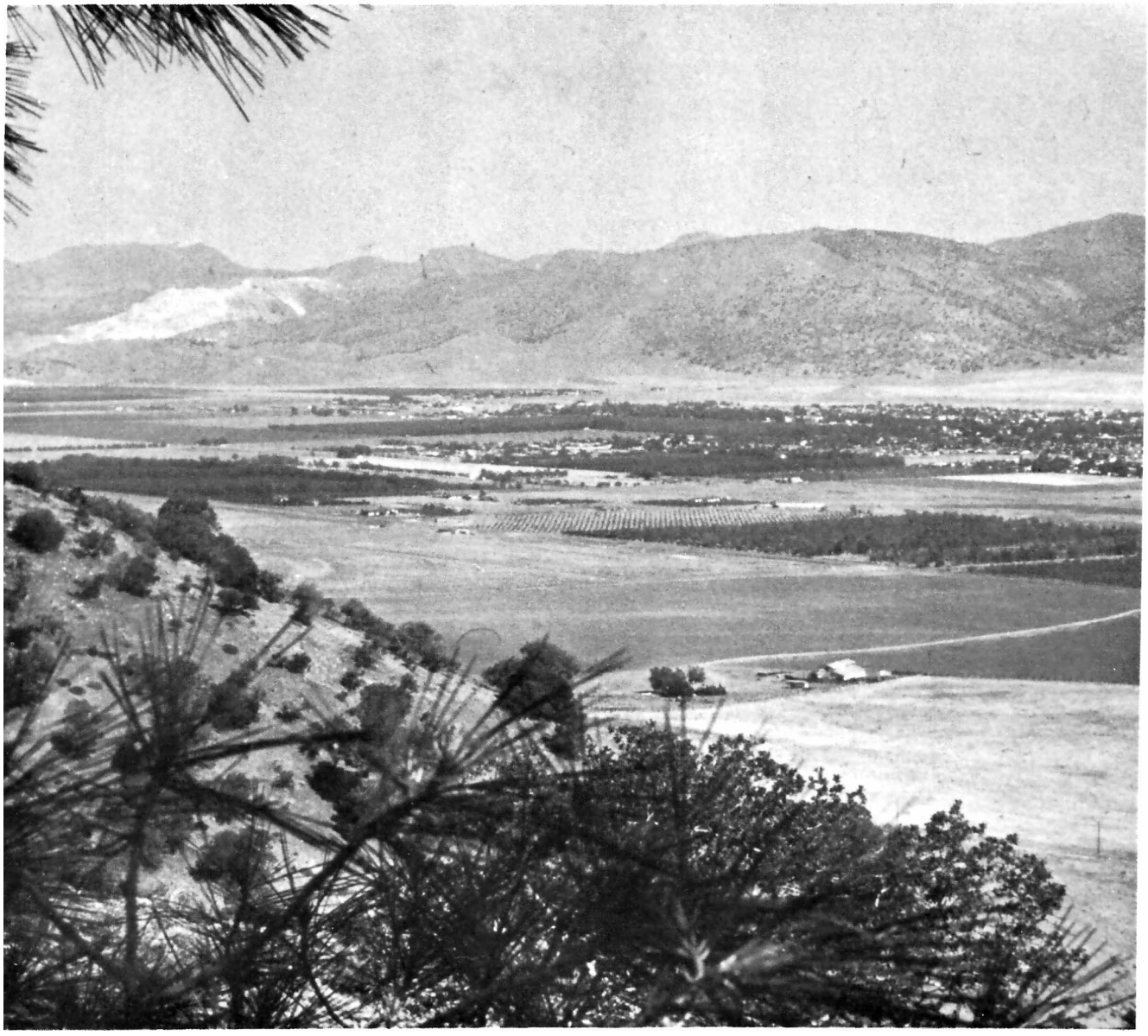
Soil Survey of

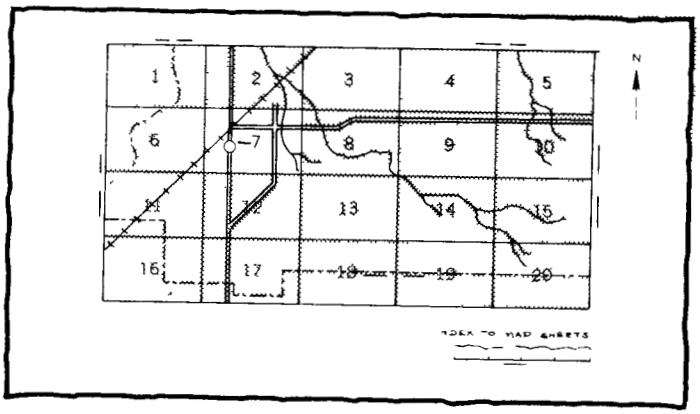
KERN COUNTY CALIFORNIA
SOUTHEASTERN PART

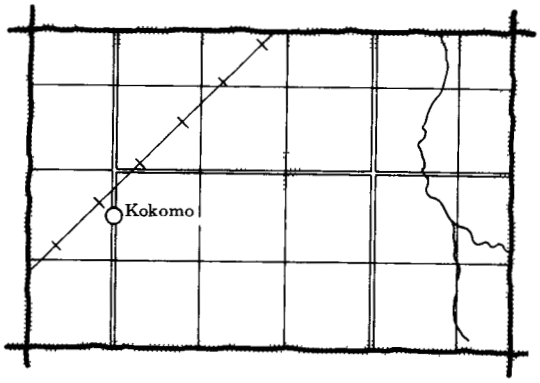


United States Department of Agriculture, Soil Conservation Service,
in cooperation with University of California, Agricultural Experiment Station

HOW TO USE

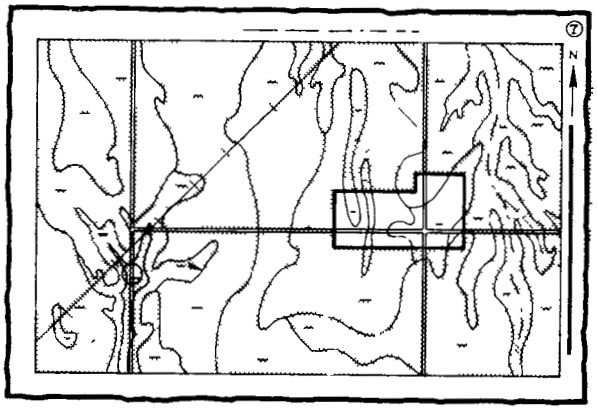
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

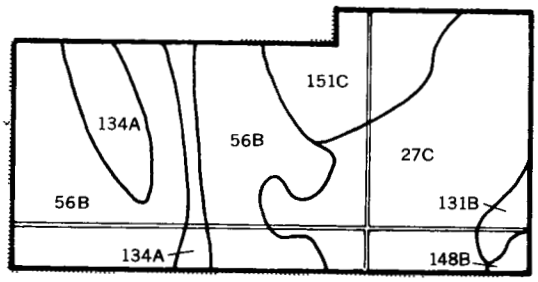




2. Note the number of the map sheet and turn to that sheet.

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





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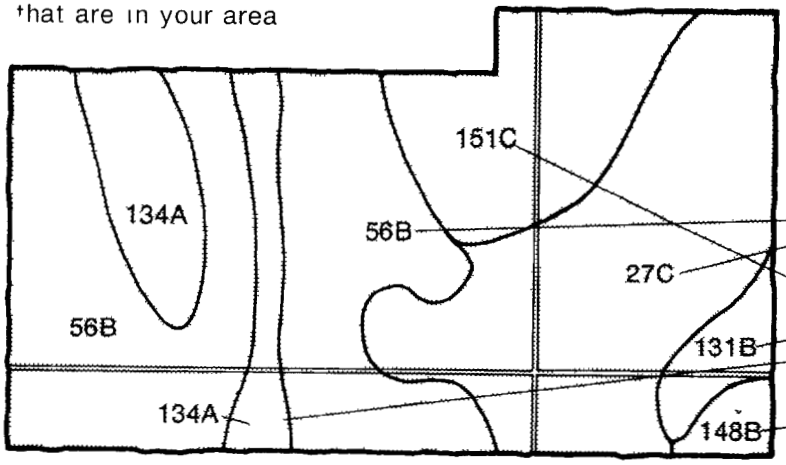

Symbols

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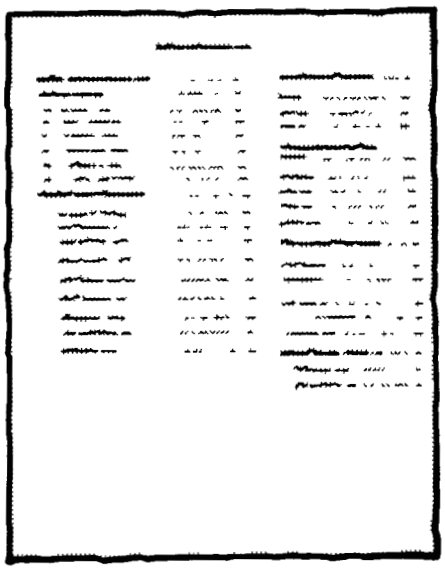
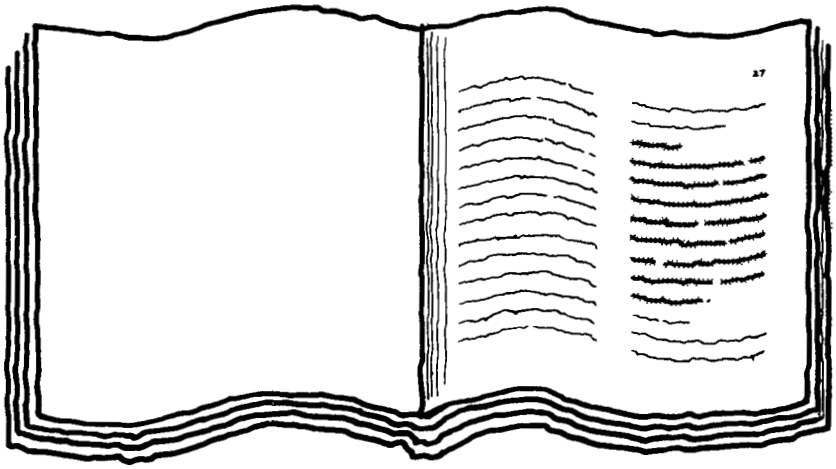
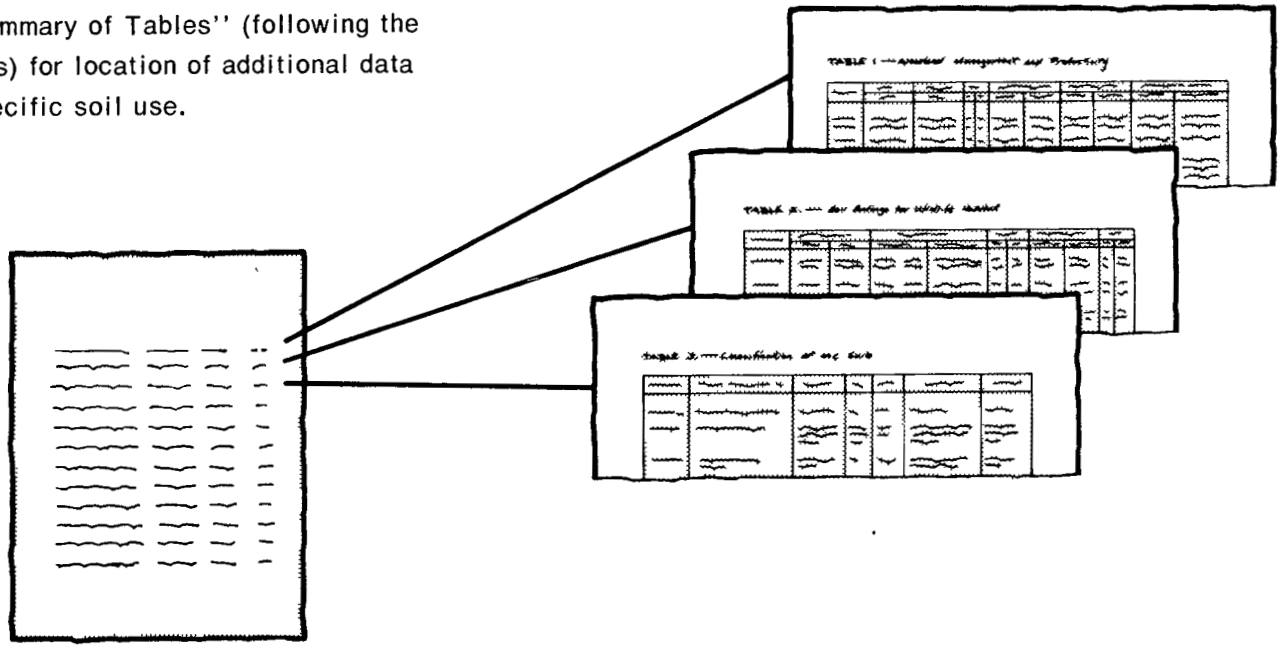
THIS SOIL SURVEY

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





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

Major fieldwork for this soil survey was performed in the period 1963-1976. Soil names and descriptions were approved in 1976. This survey was made cooperatively by the Soil Conservation Service and the University of California, Agricultural Experiment Station. It is part of the technical assistance furnished to the Eastern Kern County and Tehachapi Resource Conservation Districts.

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

Cover: The town of Tehachapi and outlying orchards in the Tehachapi Valley are on Steuber sandy loam.

contents

soil series

Issued September 1981

index to soil map units

summary of tables

preface

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

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

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

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

Location of Kern County, California, Southeastern Part.

soil survey of
Kern County, California
Southeastern Part

By Mario A. Valverde and Hal L. Hill, Soil Conservation Service

Fieldwork by Hal L. Hill, Ronald D. Edwards, Griffith S. Jones,
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Soil Conservation Service

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

The survey area is in the southeastern part of Kern County in the central part of California, 300 miles south of San Francisco and 120 miles north of Los Angeles. It covers about 1,600 square miles, or 1,007,800 acres.

The northern boundary of the area is formed by Panama Lane eastward to San Bernadino County, which borders the area on the east. Parts of Los Angeles County and Antelope Valley soil survey areas form the southern boundary. The western boundary runs south from the Di Giorgio settlement.

This part of Kern County includes rugged mountains, foothills, and desert areas. Elevation ranges from 400 to nearly 8,000 feet.

general nature of the area

This section provides general information about the area. It describes the history and agricultural development; population trends; physiography, relief, and drainage; climate; water supply; and vegetation.

history and agricultural development

The first record of agricultural development in Kern County was in 1860, when cattle and sheep were brought into the area. Because of the low precipitation, crops depend largely upon irrigation water. Development of water for irrigation, however, began with the mining industry. As miners came to the area, irrigation ditches were established and vegetable crops were grown.

In 1862, a farmer in the area now known as Tehachapi wrote to a Los Angeles newspaper that "There is no place more inviting than this valley. Perfectly healthy—there are many thousand acres of the best kind of land, plenty of water of the best quality, and an inexhaustible supply of timber" (*3*).

The Kern County Land Company, which had a great influence on the development of agriculture in the area, was established in 1890. Many kinds of fruit and vegetables were grown. In 1910 the first irrigation well in the Tehachapi Valley was drilled. By 1914 electrical power was available and there were over 1,500 water pumping plants in the county (*4*).

Today, agriculture is still one of the main industries in the area. Much of the nearly level to moderately sloping land in the western part of the survey area is used for grapes, citrus, nuts (such as almonds and pistachios), alfalfa, and cotton. Except for small areas of citrus and dryland grain, areas at the edge of the mountains are used primarily for livestock grazing. The mountainous areas are used for grazing, and a few wooded areas provide firewood. In areas of the Mojave Desert where irrigation water is available, alfalfa and cotton are the main crops.

Although agriculture is the main industry, the mining of borax, the production of cement, and the processing of carbon products also bring revenue into the area.

population trends

The population of Kern County has grown considerably since 1870, when it was 2,925. In 1950 the population was 228,309, and in 1970 it was 330,234. By 1980 it is expected (*6*) to reach 360,000.

The major towns in the survey area are Boron (population 2,900), California City (2,100), Mojave (2,840), and Tehachapi (4,200). Between 1960 and 1970 the population within the soil survey area increased 13.1 percent. It is generally assumed (*6*) that (1) the petroleum industry and agriculture, including their dependent industries, will continue to be a stable economic base for Kern County; (2) the decline in rural population during the 1960's has halted; and (3) there will be a natural increase in population. Migration presently has a minor net effect on the population growth.

physiography, relief, and drainage

The eastern half of the survey area is in the Mojave Desert. Alluvial fans, plains, low pediments, and scattered buttes are the main landscape features. The general slope is toward the southeast, but some low pediments and a few steep buttes face other directions in localized areas.

A small segment of the Sierra-Nevadas and part of the Tehachapi Mountains occupy about three-fourths of the western half of the area. In the middle of this rugged terrain are the valleys in which the city of Tehachapi is located. There are several geologic faults in this area. The major ones are the Garlock Canyon and Whitewolf.

The westernmost part of the survey area is the southeast edge of the San Joaquin Valley. It consists of nearly level and gently sloping alluvial fans and stream flood plains.

The highest elevation, about 8,000 feet, is on the mountainous uplands. The lowest, about 400 feet, is in the San Joaquin Valley.

From the mountains to the desert, Sand Canyon and the eastern part of the Tehachapi Valley drain to Cache Creek. The rest of the desert drainage flows southeasterly. The major outlets from the mountain valleys are Tehachapi Creek and its tributary, Brite Creek. Both drain most of the Tehachapi and Brite Valley northward into the San Joaquin Valley. Cummings Valley drains to Chanac Creek which flows westward into the San Joaquin Valley. Pastoria Creek, Tunis Creek, El Paso Creek, and Tejon Creek are the main streams from the mountains to the San Joaquin Valley.

climate

Prepared by Jerry L. Hatfield, biometeorologist, University of California at Davis.

Because of the mountain ranges and desert areas, the survey area has a highly variable climate. The Tehachapi Mountains form the southern border of the San Joaquin Valley; to the east lies the Mojave Desert. Within this region, the climate is generally sunny, dry, and warm.

Table 1 gives data on air temperature (degrees F) and precipitation for the Tehachapi Mountains as recorded at Tehachapi. Table 2 gives data on air temperature (degrees F) and precipitation for the Mojave Desert as recorded at Cantil. In general, the climate varies more between stations in the mountains than between stations on the desert.

In Tehachapi the summer maximum temperatures are in the upper 80's and nights are cool. This is typical of the mountain areas. In Cantil days are very hot and nights are cool. Even during the winter the maximum temperature on the desert averages 60 degrees; nights are below freezing.

Tehachapi receives more than 10 inches of precipitation annually. Most falls in November through March. Precipitation at Cantil is very light and averages just slightly more than three inches annually. Most falls in December, January, and February. Because precipitation is so light, soil moisture supplies are depleted by June 9 at Tehachapi and April 2 at Cantil. At Tehachapi every winter has measurable snowfall; at Cantil about 12 percent of the winters have one day of snowfall.

Table 3 shows the probabilities of freezing temperatures (degrees F) and length of growing seasons at Tehachapi and Cantil. Tehachapi has a growing season of 156 days above 32 degrees. The last frost in spring is about May 1, and the first frost in fall is around the middle of October. Cantil has a growing season of 224 days above 32 degrees. Generally, the last frost in spring occurs before April 15 and the first frost in fall occurs after November 1.

Because of the topography in this survey area, large climatic variations occur within relatively short distances. Annual precipitation ranges from 12 to 21 inches in the mountains, 6 to 12 inches in the foothills, 3 to 6 inches in the Mojave Desert, and 6 to 9 inches for areas in the San Joaquin Valley.

Growing degree days are shown in tables 1 and 2. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation can be used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall. Tehachapi has a moderate temperature regime but ample growing degree days for plant growth. Cantil has enough growing degree days for multiple cropping, but most plants would not survive the very hot summer temperatures and would require large amounts of water.

Winds are highly variable in the mountains because of the complex terrain. At Tehachapi winds blow with equal frequency from the west-northwest and from the east-southeast. On the Mojave Desert winds are prevalently

from the west-southwest. In the San Joaquin Valley winds are prevalently from the northwest. Throughout the survey area the winds are generally light, 4 to 12 miles per hour. Winds at any location within the area, however, may vary from these patterns.

water supply

In the mountainous uplands, all areas except one are serviced by ground water supplies. The water table has been monitored in the Tehachapi, Brite, and Cummings Valleys. It shows a history of dropping. The Tehachapi Valley alone has a water right for 5,500 acre feet annually. In another area of the mountains, immediately north of the survey area, intensive studies show the water table is dropping rapidly.

The mountain valley area imports water for agriculture and urban use. The current capacity is 15,000 acre feet for municipal use and 5,000 acre feet for agriculture.

The survey area in the San Joaquin Valley is supplied by the Arvin-Edison water district, which has an annual capacity of about 540,000 acre feet from the California Aqueduct, Kern Friant Canal, and local ground water.

The desert part of the survey area is associated with the Antelope Valley-Eastern Kern Water District but is still serviced by ground water.

vegetation

Natural vegetation in the soil survey area is classified into six major cover types: woodland-grass, annual grassland, chaparral, desert shrub, conifers, and the pinyon-juniper type (*5*). Within each of these groups there are many intergrades.

In some areas, the vegetation has been changed significantly by fires and accelerated erosion. An example of this is in the Oak Creek area.

The woodland-grass cover type surrounds Cummings and Brite Valleys and all but the southeastern part of Tehachapi Valley. Blue oak is the predominant tree, although California white oak is often mixed with the blue oak in the more moist valleys of the foothills. Cheatgrass, annual fescues, and scattered perennials make up most of the understory vegetation. Woodland-grass stands occur on most of the residual and alluvial soils. This vegetative type, however, is not present in the Sand Canyon watershed.

Annual grassland of the survey area is typified by cheatgrass, filaree, red brome, annual fescues, ripgut brome, wild oats, and burclover. It commonly includes bunchgrasses, especially purple needlegrass, pine bluegrass, and bottlebrush squirreltail. This cover type is extensive and is mostly between the woodland-grass cover and cultivated alluvial soils. Soils supporting grass are extremely varied and include soils of nearly all of the soil series in the survey area. Fallowed or abandoned farmlands are quickly covered with the aggressive annual bromes.

Chaparral plants are mostly Brewer oak, buckbrush, desert ceanothus, manzanita, western mountainmahogany, California scrub oak, and dwarf canyon oak. Chaparral occurs at elevations from 2,400 to 6,800 feet. It is supported principally by the upland Walong, Friant, Arujo, Anaverde, and Tollhouse soils that have moderate to steep slopes.

The desert shrub type is limited to elevations under 3,000 feet in the Mojave Desert (*9*). Alkali blite, allscale, creosotebush, shadscale, spiny hopsage, and white bursage are the main shrubs. Desert needlegrass, Indian ricegrass, schismus, and red brome are the major grasses. The proportion and combination of these plants vary with changes in the soils and topography of the desert.

The conifers are limited mostly to elevations above 6,000 feet in the southern part of the survey area, including the Tehachapi, Brite, and Cummings Valleys. Jeffrey pine, sugar pine, and white fir make up most of this type. California black oak commonly occurs with one or all of the conifers. Edmundston and Tweedy soils support the pine and fir species.

Most of the Sand Canyon watershed and parts of the eastern side of the Tehachapi Valley watershed are covered with a pinyon-juniper-chaparral mixture. Pinyon pine and California juniper occur together and separately with California scrub oak. A wide variety of shrubs, including those in the genera Haplopappus and Ephedra, are in this cover type. Desert needlegrass and cheatgrass are the principal grasses of the understory vegetation. Tweedy-Anaverde complex, Nacimiento soils, and Porterville soils support much of this type, although most of it occurs on rocky land; rough, broken, and stony land; and rock outcrop.

At least three other shrubs grow in significant amounts in the mountain areas: big sagebrush, rabbitbrush, and California buckwheat. Big sagebrush has invaded and appears to be increasing primarily in woodland-grass chaparral. Rabbitbrush is restricted mostly to canyon washes of mixed alluvium and small areas of Tujunga and Tehachapi soils, where it often forms a dense canopy. California buckwheat, a widely adapted shrub associated with all the types mentioned previously, is most abundant in drier areas—especially in Sand Canyon.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in

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

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

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

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

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

general soil map units

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

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

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

soil descriptions

The 15 general soil map units have been divided into four groups according to landforms and a combination of climate and vegetation.

Soils on alluvial fans, flood plains, and terraces on the eastern edge of the San Joaquin Valley

The soils in this group are dominantly on the lower positions of the landscape in the western part of the survey area. The soils are nearly level to steep. Elevation ranges from about 500 feet along the northwestern edge of the survey area to about 2,700 feet next to the Tehachapi Mountains. The mean annual precipitation ranges from 6 to 12 inches, and the mean annual temperature is about 63 degrees F. The average frost-free season ranges from 200 to 300 days. Vegetation is dominantly sparse annual grasses and shrubs.

These soils are very deep and well drained and somewhat excessively drained. They have loamy sand to sandy clay loam surface layers.

These soils are used mainly for cultivated crops. In a few areas they are used for rangeland, wildlife habitat, and recreation.

The soils in this group provide native habitat for quail, mourning dove, and band-tailed pigeon, which are the common game birds of the survey area. Small mammals found are jackrabbits, brush rabbits, cottontail, ground squirrels, San Joaquin kit fox, and coyotes. There are many other small and nongame animals as well as many other kinds of birds. Planting and proper management of desirable herbaceous plants and shrubs can improve wildlife habitat where the slope is less than 30 percent.

Two map units are in this group. They cover about 8 percent of the survey area.

1. Hesperia-Arvin-Whitewolf

Very deep, nearly level to moderately sloping, well drained and somewhat excessively drained soils; on alluvial fans, flood plains, and stream terraces

This map unit is at the edge of the San Joaquin Valley next to the Tehachapi Mountains on the western boundary of the survey area (fig. 1). The soils formed dominantly in moderately coarse and coarse textured alluvium derived from granitic rock. Elevation ranges from 500 to 1,500 feet.

This unit covers about 5 percent of the survey area. It is about 40 percent Hesperia soils, 20 percent Arvin soils, and 10 percent Whitewolf soils. The remaining 30 percent is minor soils.

Hesperia soils are well drained soils on alluvial fans. Slope ranges from 0 to 9 percent. Typically, these soils are sandy loam and fine sandy loam throughout.

Arvin soils are well drained soils on alluvial fans, flood plains, and stream terraces. Slope ranges from 2 to 9 percent. Typically, these soils are sandy loam with thin strata of coarser and finer material. In many places, they have pebbles, cobbles, and stones throughout.

Whitewolf soils are somewhat excessively drained soils on alluvial fans and flood plains. Slope ranges from 2 to 5 percent. Typically, the surface layer is loamy sand. The underlying material is loamy coarse sand. Gravel content ranges up to 15 percent.

Minor in this unit are well drained Chanac, Cibo, DiGiorgio, and Wasioja soils. There are also small areas of Fluvents and Psamments-Xerolls.

Soils of this unit are used mainly for irrigated crops. In a few areas where natural vegetation remains, they are used for rangeland, recreation, and wildlife habitat.

Low to moderate available water capacity and a hazard of erosion are the main soil limitations. The soil blowing hazard is high on the Whitewolf soils and moderate on the Hesperia and Arvin soils.

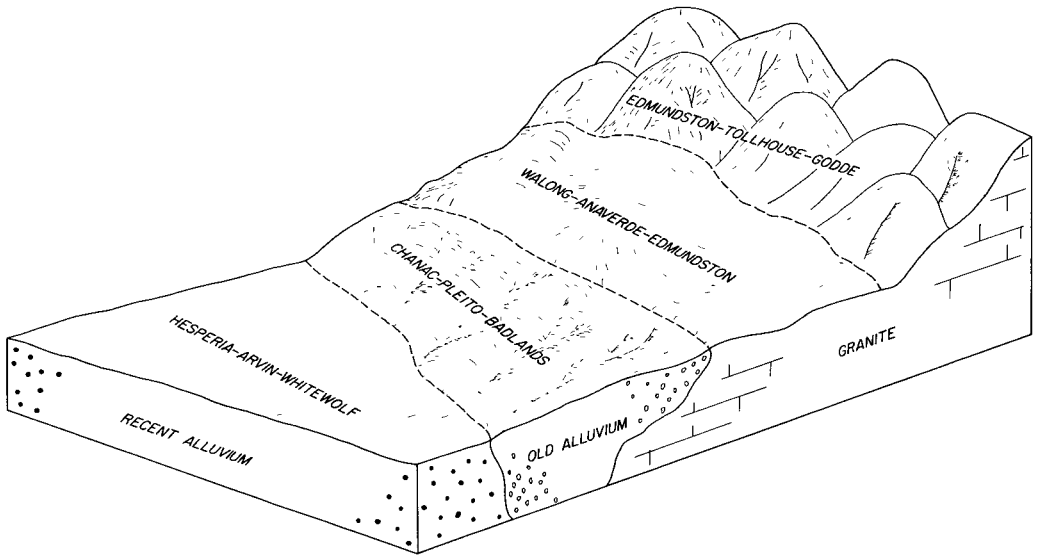

Figure 1.—Typical pattern of soils on the western slopes of the Tehachapi Mountains and in adjacent areas in the San Joaquin Valley

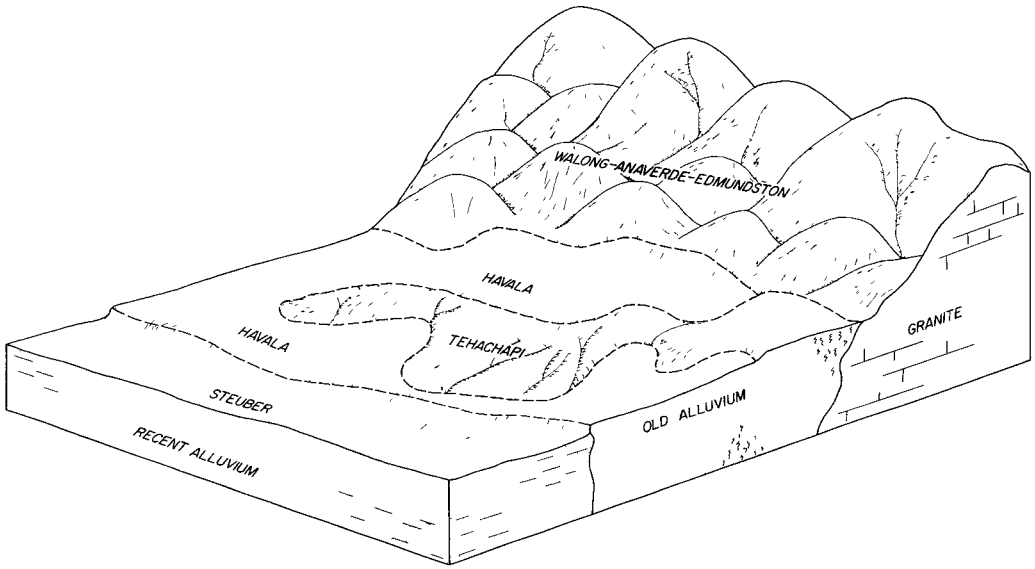

Figure 2.—Typical pattern of soils in the Tehachapi Valley and adjacent mountains.

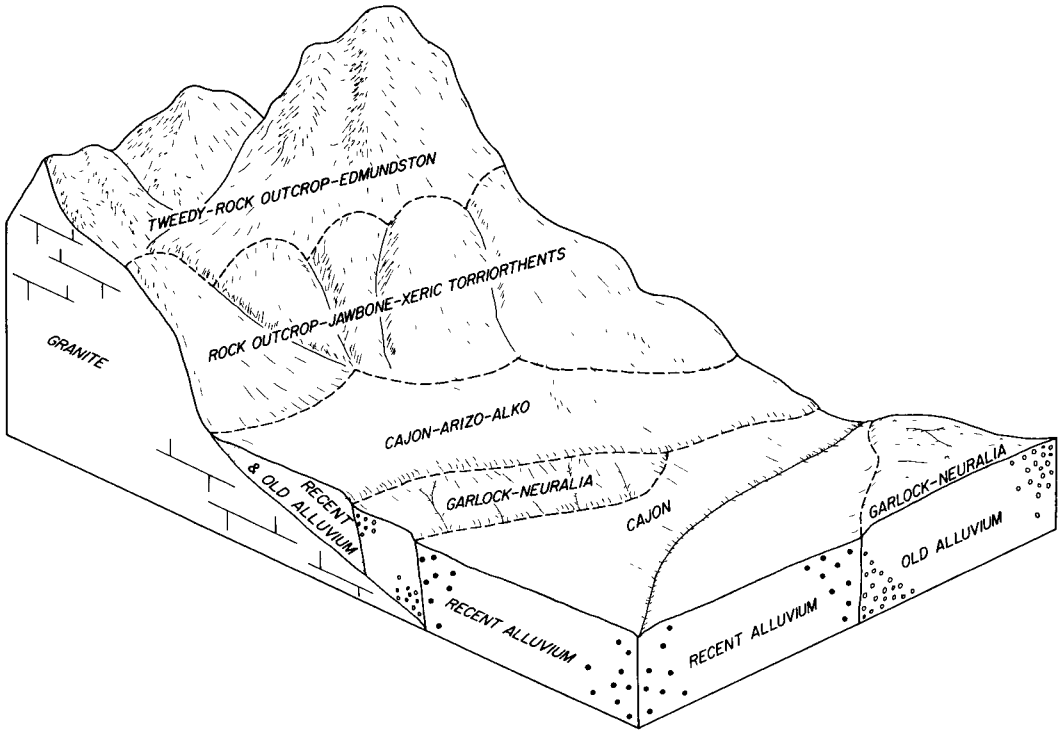

Figure 3.—Typical pattern of soils on the eastern foot slopes of the Sierra Nevada and Tehachapi Mountains and in the western edge of the Mojave Desert

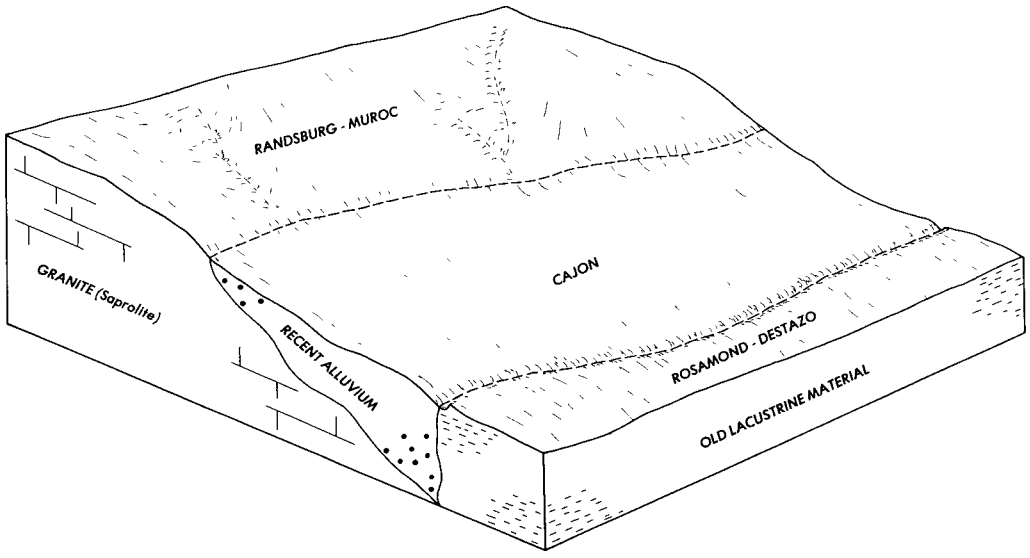

Figure 4.—Typical pattern of soils on the Mojave Desert.

2. Chanac-Pleito-Badlands

Very deep, gently sloping to steep, well drained soils on old dissected terraces; and Badlands

This map unit is near the base of the Tehachapi Mountains on the west side of the survey area (fig. 1). The soils formed in old, weakly consolidated, moderately fine textured alluvium of mixed origin or in moderately fine textured alluvium derived from granitic rock. Elevation ranges from 575 to 2,000 feet.

This unit covers about 3 percent of the survey area. It is about 22 percent Chanac soils, 16 percent Pleito soils, and 14 percent Badlands. The remaining 48 percent is minor soils.

Chanac soils are well drained. Slope ranges from 5 to 50 percent. Typically, the surface layer and subsoil are sandy clay loam. The substratum is stratified coarse sandy loam and clay loam. These soils have layers of accumulated calcium carbonate below a depth of about 10 inches.

Pleito soils are well drained. Slope ranges from 2 to 50 percent. Typically, surface layer and subsoil are sandy clay loam. The substratum is gravelly sandy clay loam. These soils have layers of accumulated calcium carbonate below a depth of about 16 inches.

Badlands consist of steep barren land that has been dissected by many gullies. Local relief ranges from 25 to 500 feet.

Minor in this unit are areas of Haploxerolls and Rock outcrop. There are some small areas of Anaheim Variant, Tunis soils, and Walong soils.

Soils in this unit are used mainly for rangeland, wildlife habitat, and oilfields. The gently sloping soils are used for irrigated crops and dryland grain. Excessively steep slopes and a hazard of erosion are the main limitations. In many areas these soils have little or no vegetation.

Soils on uplands and in valleys of the Sierra Nevada and Tehachapi Mountains

The soils in this group are on mountains in the central to western part of the survey area. The soils are dominantly strongly sloping to very steep, but some soils in the mountain valleys are nearly level. Elevation ranges from about 2,000 feet in the lower part of the Tehachapi Mountains to nearly 8,000 feet at the mountain peaks. The mean annual precipitation ranges from 10 inches at the lower elevations to 21 inches near the high mountain peaks. The average annual temperature is about 59 degrees F, and the average frost-free season ranges from 150 to 250 days. Vegetation is dominantly conifers at the higher elevations and a grass-oak mixture at the lower elevations.

These soils are shallow to very deep and well drained or somewhat excessively drained. They have gravelly sandy loam, gravelly loam, or sandy loam surface layers.

Most soils in this group are used for woodland, rangeland, recreation, wildlife habitat, and watershed. However, soils in the mountain valleys, where slopes are smoother, are used mainly for irrigated crops. A few soils in these areas are also used for urban development.

Most soils in this group are well suited to wildlife. They provide habitat for quail, mourning dove, bandtailed pigeon, and a few chukars, which are the common game birds of the survey area. The principal big game animal of the Tehachapi and Sierra Nevada Mountains is mule deer. Black bears and mountain lions are common. Small mammals include ground squirrels, jackrabbits, coyotes, and bobcats. Fish are limited, but some reservoirs may contain warm water fish such as bluegill, largemouth bass, and channel catfish. Streams at higher elevations contain trout. There are many other small and nongame animals and birds throughout the mountains. Proper management of the native plants can improve the potential for wildlife habitat. Dense vegetation and rock outcrops provide dense and good wildlife cover.

Four map units are in this group. They cover about 37 percent of the survey area.

3. Walong-Anaverde-Edmundston

Very deep to moderately deep, hilly to very steep, well drained soils underlain by weathered granite or schist; on mountainous uplands

This map unit is mainly on side slopes between the terraces on the eastern edge of the San Joaquin Valley (fig. 1) and the mountains edging the west side of the Tehachapi Valley (fig. 2). The soils formed in medium and moderately coarse textured residuum weathered from granite and schist. Elevation ranges from 2,000 to 6,000 feet.

This unit covers about 20 percent of the survey area. It is about 45 percent Walong soils, 10 percent Anaverde soils, and 10 percent Edmundston soils. The remaining 35 percent is minor soils.

Walong soils are moderately deep. Slope ranges from 15 to 75 percent. Typically, these soils have a sandy loam surface layer and subsoil. Below this is weathered granitic rock.

Anaverde soils are very deep. Slope ranges from 30 to 75 percent. Typically, these soils have a gravelly loam surface layer and subsoil and a gravelly sandy loam and stony sandy loam substratum.

Edmundston soils are deep. Slope ranges from 30 to 75 percent. Typically, these soils have a sandy loam surface layer and subsoil. The substratum is gravelly coarse sandy loam. Below this is weathered granite.

Minor in this unit are well drained Arujo, Friant, Steuber, and Tehachapi soils and somewhat excessively drained Godde, Tollhouse, and Tunis soils. There are also small areas of Psamments, Xerolls, and Xererts-Xerolls and some small bodies of water.

Soils in this unit are used mainly for rangeland, wildlife habitat, and watershed Soils in a few areas are used for homesites and recreation. Excessively steep slopes, a hazard of erosion, and low to moderate available water capacity are the main limitations. Among the recreational uses are hiking paths, camping, and parks.

4. Edmundston-Tollhouse-Godde

Deep and shallow, steep to very steep, well drained and somewhat excessively drained soils underlain by weathered granite; on mountainous uplands

This map unit is on complex slopes located both north and south of the high mountain valleys (fig. 1). The soils formed in moderately coarse textured residuum weathered mainly from granitic rocks. Elevation ranges from 4,000 to 8,000 feet.

This unit covers about 4 percent of the survey area. It is about 36 percent Edmundston soils, 26 percent Tollhouse soils, and 25 percent Godde soils. The remaining 13 percent is minor soils.

Edmundston soils are deep and well drained. Slope ranges from 30 to 75 percent. Typically, these soils have a sandy loam surface layer and subsoil and a gravelly coarse sandy loam substratum. Below this is weathered granite.

Tollhouse soils are shallow and somewhat excessively drained. Slope ranges from 30 to 75 percent. Typically, these soils have a sandy loam and gravelly sandy loam surface layer. Below this is highly weathered granite.

Godde soils are shallow and somewhat excessively drained. Slope ranges from 30 to 75 percent. Typically, these soils have a surface layer and underlying material of gravelly sandy loam. Below this is a highly fractured granitic rock.

Minor in this unit are well drained Arujo, Havala, Nacimiento, Steuber, Tehachapi, and Walong soils. There are also areas of Xerorthents-Rock outcrop.

Soils in this unit are used mainly for rangeland, recreation, watershed, and wildlife habitat. The main limitations are the excessively steep slopes, limited soil depth, a hazard of erosion, and very low to moderate available water capacity.

5. Tweedy-Rock outcrop-Edmundston

Rock outcrop and deep and moderately deep, steep and very steep, well drained soils underlain by weathered granite or schist; on mountainous uplands

This map unit is in the north-central part of the survey area (fig. 3). The soils formed in moderately coarse and medium textured residuum weathered from granite and schist. Elevation ranges from 4,000 to 6,000 feet.

This unit covers about 8 percent of the survey area. It is about 25 percent Tweedy soils, 21 percent Rock outcrop, and 14 percent Edmundston soils. The remaining 40 percent is minor soils.

Tweedy soils are moderately deep. Slope ranges from 30 to 75 percent. Typically, these soils have a sandy loam surface layer and a sandy clay loam subsoil. Below this is highly weathered schist.

Rock outcrop are areas with little or no soil. Slope ranges from 30 to 75 percent. These areas consist of exposures of igneous, metamorphic, and sedimentary rock. The kinds of rock include granite, basalt, gneiss, and sandstone.

Edmundston soils are deep. Slope ranges from 30 to 75 percent. Typically, these soils have a sandy loam surface layer and subsoil. The substratum is gravelly coarse sandy loam. Below this is weathered granite.

Minor in this unit are well drained Anaverde, Sween Variant, Tehachapi, and Walong soils and somewhat excessively drained Godde soils. There are also small areas of Xerolls, Xerorthents, and Torriorthents.

Soils in this unit are used mainly for rangeland, recreation, watershed, and wildlife habitat. The main limitations are the excessively steep slopes, a hazard of erosion, limited soil depth, and low or moderate available water capacity.

6. Steuber-Tehachapi-Havala

Very deep, nearly level to hilly, well drained soils; on alluvial fans, stream flood plains, and terraces of the mountain valleys

This map unit is dominantly in an area around the city of Tehachapi in the central part of the survey area (fig. 2). Two small areas are also near Chanac Creek and El Paso Creek on the western foot slopes of the Tehachapi Mountains. The soils formed in moderately coarse and moderately fine textured alluvium derived from granitic rock. Elevation ranges from 3,000 to 5,000 feet.

This unit covers about 5 percent of the survey area. It is about 42 percent Steuber soils, 27 percent Tehachapi soils, and 21 percent Havala soils. The remaining 10 percent is minor soils.

Steuber soils are on alluvial fans and stream flood plains. Slope ranges from 0 to 9 percent. Typically, these soils are sandy loam throughout.

Tehachapi soils are on alluvial fans and old terraces. Slope ranges from 2 to 30 percent. Typically, these soils have a sandy loam surface layer and a sandy clay loam and clay loam subsoil. The substratum is sandy loam.

Havala soils are on alluvial fans and old terraces. Slope ranges from 0 to 30 percent. Typically, these soils have a sandy loam surface layer and a sandy clay loam subsoil. The substratum is sandy loam.

Minor in this unit are well drained Arujo, Nacimiento, and Potterville soils; somewhat excessively drained Tujungo soils; and poorly drained Chino Variant soils. There are also small areas of Xerorthents-Rock outcrop and Psamments-Xerolls and a few bodies of water.

Soils in this unit are used mainly for irrigated crops, orchards, rangeland, watershed, and wildlife habitat. Where these soils are cultivated, the main limitations are a low or moderate available water capacity and a hazard of erosion on the steeper slopes. In most areas, however, these soils are well suited to cultivated crops and orchards as long as water for irrigation is available.

Soils on the eastern foot slopes of the Sierra Nevada and Tehachapi Mountains

The soils in this group are in relatively dry transitional areas between the high mountains and the Mojave

Desert. The soils are nearly level to very steep. Elevation ranges from 2,800 feet near the desert to 5,000 feet in the mountainous areas. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual temperature ranges from 60 to 65 degrees F. The average frost-free season ranges from 175 days at the highest point to 225 days near the Mojave Desert.

These soils are shallow and very deep and well or somewhat excessively drained. They have gravelly loamy sand, gravelly sandy loam, or loamy sand surface layers.

These soils are used mainly for rangeland, watershed, and wildlife habitat.

The soils in this group provide native habitat for a combination of mountain and desert wildlife. It is inhabited by the common game birds of the survey area, which are quail, chukar, mourning dove, and band-tailed pigeon. The principal big game animal is the mule deer. Small game mammals include jackrabbits, desert cottontails, ground squirrels, coyotes, and bobcats. There are many other small animals, such as lizards and rattlesnakes, and various kinds of birds. Rock outcrop and Torriorthents provide good dens and cover.

Two map units are in this group. They cover about 8 percent of the survey area.

7. Rock outcrop-Jawbone-Xeric Torriorthents

Rock outcrop and shallow, hilly to very steep, well drained and somewhat excessively drained soils; on mountainous uplands

This map unit is east of the Mojave Desert in the foothills of the mountainous uplands (fig. 3). The soils formed dominantly in coarse and moderately coarse residuum weathered mainly from granitic rock. Elevation ranges from 3,000 to 5,000 feet.

This unit covers about 7 percent of the survey area. It is about 24 percent Rock outcrop, 17 percent Jawbone soils, and 17 percent Xeric Torriorthents. The remaining 42 percent is minor soils.

Rock outcrop consists of barren areas of outcrops, mainly of granite, basalt, and sandstone. Slope ranges from 50 to 75 percent.

Jawbone soils are excessively drained. Slope ranges from 15 to 75 percent. Typically, these soils have a gravelly loamy sand surface layer. Below this is highly weathered granite.

Xeric Torriorthents are well drained to somewhat excessively drained soils. Slope ranges from 50 to 85 percent. These soils range from sandy loam to clay loam. In some places, they are gravelly and are as much as 20 percent coarse fragments.

Minor in this unit are well drained Edmundston, Hi Vista, and Randsburg soils; somewhat excessively drained Cajon soils; and excessively drained Cinco soils. There are also small areas of Xerorthents and Xerolls-Rock outcrop.

Soils in this unit are used mainly for rangeland, watershed, and wildlife habitat. The main limitations are the excessively steep slopes, limited soil depth, very low available water capacity, and a hazard of erosion.

8. Pajuela-Whitewolf

Very deep, nearly level to steep, somewhat excessively drained soils; on old stream terraces, alluvial fans, and flood plains

This map unit is east of the Mojave Desert at the base of the Tehachapi Mountains. The soils formed in coarse and moderately coarse alluvial material derived mainly from granitic rock. Elevation ranges from 2,800 to 4,500 feet.

This unit covers about 1 percent of the survey area. It is about 44 percent Pajuela soils and 30 percent Whitewolf soils. The remaining 26 percent is minor soils.

Pajuela soils are on old stream terraces. Slope ranges from 30 to 50 percent. Typically, these soils have a gravelly sandy loam and gravelly loamy sand surface layer. The underlying material is extremely gravelly loamy sand.

Whitewolf soils are on alluvial fans and flood plains. Slope ranges from 0 to 5 percent. Typically, these soils have a loamy sand surface layer. The underlying material is loamy coarse sand. Whitewolf soils in this unit are cooler than the Whitewolf soils near the San Joaquin Valley.

Minor in this unit are well drained Garlock and Wasioja soils and small areas of Torriorthents-Rock outcrop.

Soils in this unit are used mainly for rangeland, watershed, and wildlife habitat. In a few areas they are used for recreation. A very low to moderate available water capacity and a hazard of erosion are the main limitations. These soils, however, receive slightly more precipitation than soils in the desert and as a result have slightly higher forage production.

Soils of the Mojave Desert

The soils in this group are in the Mojave Desert in the eastern part of the survey area. They occupy several different landscapes ranging from low basins to high mountain ridges. The soils are nearly level to very steep. Elevation ranges from about 2,000 feet near Cantil to nearly 4,200 feet on Soledad Mountain in the south-central part of the survey area. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual temperature ranges from 60 to 66 degrees F. The average frost-free season ranges from 175 days near the mountains to 250 days in the Mojave Desert.

Soils in this group are shallow, deep or very deep, and well drained to excessively drained. The surface layer ranges from sand to clay loam.

Most soils in this group are used for rangeland, recreation, or wildlife habitat. Where water is available, a few soils are used for cropland or for homesites.

Major soil limitations are a high susceptibility of the sandy surface layers to soil blowing; shallow soil depth; low available water capacity; and a hazard of excessive

erosion because of slope and inadequate plant cover. The controlling limitations for most uses, however, are the low precipitation, inadequate ground water, and extremely hot climate.

The soils in this group provide native habitat for some quail, mourning dove, and chukar. The principal game animals are jackrabbits and desert cottontails. Smaller animals, such as rattlesnakes, lizards, and turtles, are also present. In addition, there are many other nongame animals, such as coyote, and many kinds of birds. Proper management and control of the habitat can improve or maintain the wildlife potential of these soils. In the Cantil area, ponds provide suitable waterfowl habitat.

Seven map units are in this group. They cover about 47 percent of the survey area.

9. Cajon-Arizo-Alko

Very deep and shallow, nearly level to strongly sloping, well drained and excessively drained soils; on alluvial fans, alluvial plains, and old terraces

This map unit is along the western edge of the Mojave Desert at the base of the Sierra Nevada Mountains (fig. 3) and in areas east of California City. The major soils in this unit formed in coarse and moderately coarse textured alluvium derived mainly from granitic rock. Elevation ranges from 2,400 to 4,000 feet.

This unit covers about 8 percent of the survey area. It is about 30 percent Cajon soils, 26 percent Arizo soils, and 19 percent Alko soils. The remaining 25 percent is minor soils.

Cajon soils are very deep, somewhat excessively drained soils on alluvial fans and plains. Slope ranges from 0 to 15 percent. Typically, the surface layer is loamy sand. The upper part of the underlying material is also loamy sand; the lower part is gravelly loamy sand and gravelly sandy loam.

Arizo soils are very deep, excessively drained soils on alluvial fans and plains. Slope ranges from 2 to 9 percent. Typically, the surface layer is gravelly loamy sand. The underlying material is very gravelly loamy sand.

Alko soils are well drained soils on old terraces. They are shallow over a hardpan. Slope ranges from 0 to 9 percent. Typically, these soils have a sandy loam surface layer. Below this is a lime-silica cemented hardpan.

Minor in this unit are well drained Garlock and Neuralia soils and small areas of Torriorthents-Rock outcrop and Quarries.

Soils in this unit are used mainly for rangeland, recreation, wildlife habitat, and homesites. In a few areas the soils are irrigated and used for pasture and alfalfa. Shallow soil depth and very low to moderate available water capacity are the main soil limitations. Because these soils have a sandy surface layer, they are susceptible to soil blowing.

10. Cajon

Very deep, nearly level to strongly sloping, somewhat excessively drained soils; on alluvial fans and plains

This map unit is located in the western and northern parts of the desert in the eastern part of the survey area (figs. 3 and 4). The major soil in this unit formed in coarse textured alluvium derived mainly from granitic rock. Elevation ranges from 2,000 to 3,500 feet.

This unit covers about 15 percent of the survey area. It is about 94 percent Cajon soils. The remaining 6 percent is minor soils.

Cajon soils have slopes ranging from 0 to 15 percent. Typically, they have a loamy sand surface layer. The upper part of the underlying material is loamy sand; the lower part is gravelly loamy sand and gravelly sandy loam.

Minor in this unit are well drained DeStazo and Garlock soils. There are also Torrifluvents, Torriorthents, Rock outcrop, and a few areas with Dumps (mine) and Pits.

Soils in this unit are used for rangeland, recreation, wildlife habitat, and homesites. In a few areas the soils are irrigated and used for pasture and alfalfa. Very low to moderate available water capacity and a hazard of soil blowing are the main limitations.

11. Rosamond-DeStazo

Very deep, nearly level to moderately sloping, well drained soils; on flood plains and in basins

This map unit is near Cantil in the northern part of the survey area and near Mojave and California City in the central part of the desert area (fig. 4). The soils formed in moderately coarse and moderately fine textured alluvium derived mainly from granitic rock. Elevation ranges from 2,000 to 3,000 feet.

This unit covers about 4 percent of the survey area. It is about 40 percent Rosamond soils and 19 percent DeStazo soils. The remaining 41 percent is minor soils.

Rosamond soils are on flood plains. Slope ranges from 0 to 2 percent. Typically, these soils have a clay loam surface layer and loam underlying material.

DeStazo soils are on alluvial fans and flood plains. Slope ranges from 0 to 9 percent. Typically, these soils have a sandy loam surface layer. The underlying material is very gravelly and extremely gravelly clay loam. It has a high concentration of irregular gravel-size lime nodules.

Minor soils in this unit are well drained Garlock and Neuralia soils and somewhat excessively drained Cajon soils. There are also small areas of Playas; Rock outcrop; Dumps, mine; and Torrifluvents.

Soils in this unit are used for rangeland, recreation, and wildlife habitat. In a few irrigated areas the soils are used for alfalfa. When these soils are irrigated, the main limitations are moderately slow permeability and highly calcareous underlying material. In some areas the soils are subject to soil blowing.

12. Norob-Neuralia

Very deep and deep, nearly level and gently sloping, well drained soils; on alluvial fans and plains

This map unit is in the southeast corner of the survey area. The soils formed dominantly in moderately coarse and moderately fine textured alluvium derived from mixed rocks or from granitic rock. Elevation ranges from 2,300 to 2,800 feet.

This unit covers about 1 percent of the survey area. It is about 37 percent Norob soils and 29 percent Neuralia soils. The remaining 34 percent is minor soils.

Norob soils are on alluvial plains. Slope ranges from 0 to 5 percent. Typically, these soils have a sand surface layer, a sandy clay loam subsoil, and a gravelly sandy loam substratum. They are moderately to strongly alkaline and have moderate to high amounts of sodium in the subsoil.

Neuralia soils are on alluvial fans and flood plains. Slope ranges from 2 to 5 percent. Typically, these soils have a sandy loam surface layer and a sandy clay loam subsoil. The substratum is gravelly sandy loam.

Minor in this unit are somewhat excessively drained Cajon soils. Also included are a few areas of Pits.

Soils in this unit are used mainly for desert rangeland, recreation, and wildlife habitat. A hazard of soil blowing and the high sodium content in the Norob soil are the main limitations.

13. Randsburg-Muroc

Shallow, gently sloping to strongly sloping, well drained soils; on low pediments

This map unit is located throughout most of the desert area (fig. 4). The soils formed in moderately coarse textured residuum weathered from granitic rock. Elevation ranges from 2,500 to 3,500 feet.

This unit covers about 7 percent of the survey area. It is about 44 percent Randsburg soils and 33 percent Muroc soils. The remaining 23 percent is minor soils.

Typically, the Randsburg soils have a sandy loam surface layer and sandy loam underlying material. Below this is highly weathered granite. Slope ranges from 2 to 15 percent.

Typically, the Muroc soils have a sandy loam surface layer over a silica-lime cemented hardpan. Below the hardpan is highly weathered granite. Slope ranges from 2 to 9 percent.

Minor in this unit are well drained Alko, Garlock, Hi Vista, Neuralia, and Potterville soils. There are some areas of Torriorthents-Rock outcrop.

Soils in this unit are used mainly for rangeland and wildlife habitat. In a few areas the soils are used for urban development. The main limitations are shallow soil depth, a hazard of both water erosion and soil blowing, and a very low available water capacity.

14. Torriorthents-Rock outcrop

Shallow and very shallow, very steep, well drained soils and Rock outcrop; on mountainous ridges

This map unit is on convex slopes in the desert. The soils formed in coarse and moderately fine textured residuum weathered mainly from sandstone, granite, and basalt. Elevation ranges from 2,400 to nearly 4,200.

This unit covers about 2 percent of the survey area. It is about 56 percent Torriorthents and 28 percent Rock outcrop. The remaining 16 percent is minor soils.

Torriorthents range from coarse sandy loam to clay loam and their gravelly equivalents. Gravel, cobbles, and stones are throughout these soils in most places. Slope dominantly ranges from 50 to 75 percent.

Rock outcrop consists of areas that have exposures of hard granite, basalt, or sandstone. Vegetative growth is limited to fractures in the rock structure. Slope dominantly ranges from 50 to 75 percent.

Minor in this unit are well drained Alko, Garlock, Neuralia, and Potterville soils and the somewhat excessively drained Cajon soils.

This unit is used mainly for watershed. A few areas are used for rangeland and recreation. The main limitations are limited soil depth, very low available water capacity, excessively steep slopes, lack of plant cover, and a hazard of erosion.

15. Garlock-Neuralia

Very deep and deep, nearly level to moderately sloping, well drained soils; on old stream terraces, alluvial fans, and alluvial plains

This map unit is throughout the desert area (fig. 3). The soils formed in coarse, moderately coarse, and moderately fine textured alluvium derived from granitic rock. Elevation ranges from 2,300 to 3,500 feet.

This unit covers about 10 percent of the survey area. It is about 46 percent Garlock soils and 37 percent Neuralia soils. The remaining 17 percent is minor soils.

Garlock soils are very deep soils on alluvial fans and old stream terraces. Slope ranges from 2 to 9 percent. Typically, these soils have a loamy sand surface layer, a sandy loam and sandy clay loam subsoil, and a gravelly loam sand substratum. Gravel content in the lower part of the substratum may range as high as 55 percent.

Neuralia soils are deep soils on alluvial fans and plains. Slope ranges from 0 to 9 percent. Typically, these soils have a sandy loam surface layer, a sandy clay loam subsoil, and a gravelly sandy loam substratum. Content of coarse fragments ranges from 0 to 30 percent.

Minor in this unit are well drained Norob soils and somewhat excessively drained Cajon soils. There are also small areas of Torriorthents-Rock outcrop.

Soils in this unit are used mainly for rangeland, wildlife habitat, recreation, and urban development. Moderately slow permeability and a hazard of water erosion and soil blowing are the main limitations. Low to moderate available water capacity on the Garlock soil is also a limitation.

detailed soil map units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Havala sandy loam, 2 to 5 percent slopes, is one of several phases in the Havala series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Tweedy-Anaverde complex, 30 to 50 percent slopes, is an example.

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

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

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

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

soil descriptions

100—Alko-Neuralia sandy loams, 0 to 9 percent slopes. These soils are nearly level to moderately sloping. They are on alluvial fans, flood plains, and old terraces. Areas are irregular in shape and range from 500 to 3,600 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 2,400 to 3,000 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 200 to 250 days. The Alko soil makes up about 50 percent of this unit, the Neuralia soil about 30 percent.

Included with these soils in mapping are areas of Cajon soils that make up 15 percent of the unit. Also included are small areas of Muroc soils, Torriorthents, and rock outcrop. In a few areas there are soils similar to Alko but which have a thin clay loam layer over the hardpan. In some places the soil is more than 15 percent calcium carbonate. A few areas along terrace escarpments have slopes up to 40 percent.

The Alko soil is shallow over a hardpan and well drained. It formed in alluvial material derived from granitic rock.

Typically, the surface layer of the Alko soil is pale brown sandy loam about 14 inches thick. The underlying

material to a depth of 60 inches is a strong brown lime-silica cemented hardpan alternating with thin layers of compact gravelly sandy loam and coarse sandy loam. In some places the surface layer is gravelly sandy loam or coarse sandy loam.

Permeability of the Alko soil is moderately rapid above the hardpan but very slow in the hardpan. The available water capacity is very low. Surface runoff is medium, and the hazard of erosion and soil blowing is moderate. The effective rooting depth ranges from 5 to 16 inches.

The Neuralia soil is deep and well drained. It formed in alluvial material weathered from granitic rock.

Typically, the surface layer of the Neuralia soil is yellowish brown and brown sandy loam about 7 inches thick. The subsoil is brown and yellowish brown sandy clay loam about 24 inches thick. The substratum is a light brown gravelly sandy loam about 29 inches thick. In some places the surface layer is loamy sand.

Permeability of the Neuralia soil is moderately slow, and available water capacity is moderate or high. Surface runoff is slow to medium, and the hazard of erosion and soil blowing is moderate. The effective rooting depth ranges from 40 to 60 inches.

Areas of these soils are used for rangeland.

These soils are poorly suited for rangeland. A major limitation of Alko soil is the shallow depth over the hardpan, which reduces annual forage production. Low annual precipitation is the main problem on both soils, and forage production is generally low. Desirable plants on the Alko soil are desert needlegrass, filaree, Indian ricegrass, winterfat, and spiny hopsage. Neuralia soils support ephedra and creosotebush, as well as some of the desirable plants found on the Alko soil. During years when precipitation is favorable, filaree may produce abundant quantities of forage on both soils. Excessive surface disturbance of this soil can result in soil blowing.

The estimated total annual forage production on the Alko-Neuralia soils is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The range site for the Alko soil is Shallow Hardpan (30) and for the Neuralia soil is Sandy (30).

These soils are in capability subclass VIIe (30), nonirrigated.

101—Anaheim Variant very fine sandy loam, 2 to 30 percent slopes. This soil is moderately deep, well drained, and gently sloping to moderately steep. It is on mountainous uplands. It formed in residual material derived from weathered basalt. Areas are irregular in shape and range from 15 to 2,700 acres in size. The vegetation is mainly annual and perennial grasses, scattered forbs, and conifers. Elevation ranges from 2,000 to 5,000 feet but is dominantly between 4,000 and 5,000 feet. The mean annual precipitation ranges from 9 to 15 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is reddish brown very fine sandy loam in the upper 2 inches and reddish brown clay loam in the lower 14 inches. The subsoil is dark brown clay loam about 13 inches thick. Below this is weathered basalt. In some areas near Tehachapi, cement dust from a nearby cement plant has been deposited by wind, and the upper 1/2 inch of the surface layer is calcareous.

Included with this soil in mapping are small areas of Chanac sandy clay loam. These areas are along the western edge of the Tehachapi Mountains near the San Joaquin Valley where the mountains contact old dissected terraces.

Permeability of this Anaheim Variant soil is moderately slow, and available water capacity is low or moderate. Surface runoff is medium, and the hazard of erosion is moderate. The effective rooting depth is 24 to 35 inches.

Areas of this soil are used for rangeland, watershed, wildlife habitat, and recreation.

This soil is suited for rangeland. The hazard of erosion, moderately slow permeability, and low available water capacity are the main limitations. This soil supports an open stand of juniper and rabbitbrush with scattered perennial and annual grasses. Desirable forage plants on this soil include desert needlegrass and redstem filaree. Springs and catchment basins need to be developed to obtain proper utilization of the major forage plants and distribution of livestock.

The estimated total annual forage production on the Anaheim Variant soil is 2,400 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated.

102—Anaverde gravelly loam, 30 to 50 percent slopes. This soil is very deep, well drained, and steep. It is on mountainous uplands. It formed in residual material derived from schist. Areas are irregular in shape and range from 50 to 400 acres in size. The vegetation is mainly annual grasses, shrubs, and hardwood trees. Elevation ranges from 3,000 to 5,000 feet. The mean annual precipitation ranges from 12 to 18 inches, and the mean annual air temperature is about 54 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark brown gravelly loam about 8 inches thick. The subsoil is dark brown gravelly loam about 27 inches thick. The substratum is brown and pale brown gravelly sandy loam and stony sandy loam to a depth of about 90 inches. Below this is fractured schist. In some places the surface layer is loam, clay loam, or gravelly clay loam.

Included with this soil in mapping are areas of Walong soils and rock outcrops. These included areas make up about 10 percent of the unit.

Permeability of this Anaverde soil is moderate, and available water capacity is low or moderate. Surface

runoff is rapid, and the hazard of erosion is high. The effective rooting depth ranges from 60 to 95 inches.

Areas of this soil are used for rangeland, wildlife habitat, and watershed.

This soil is suited for rangeland. Excessive amounts of woody plants and steep slopes are the main limitations. Woody plants can be managed to create open areas for desirable stands of forage plants. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Livestock trails or walkways can be constructed in places to encourage grazing on the steeper slopes where access is limited. In some areas, this soil supports a dense cover of oaks and manzanita. Sandberg bluegrass, soft chess, filaree, and other annual forbs are the main forage plants.

The estimated total annual forage production is 3,000 pounds per acre during favorable years, 2,400 pounds during normal years, and 1,800 pounds during unfavorable years. The range site is Gravelly Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

103—Anaverde gravelly loam, 50 to 75 percent slopes. This soil is very deep, well drained, and very steep. It is on mountainous uplands. It formed in residual material derived from schist. Slopes are complex. Areas are irregular in shape and range from 800 to 2,000 acres in size. The vegetation is mainly annual grasses and hardwood trees. Elevation ranges from 2,000 to 5,500 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 54 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is dark brown gravelly loam about 8 inches thick. The subsoil is dark brown gravelly loam about 27 inches thick. The substratum is brown and pale brown gravelly sandy loam and stony sandy loam to a depth of about 90 inches. Below this is fractured schist. In some places the surface layer is loam, clay loam, or gravelly clay loam.

Included with this soil in mapping are areas of Tweedy soils, Walong soils, and rock outcrop. Tweedy soils make up 4 percent of the unit, Walong soils 4 percent, and rock outcrop 2 percent.

Permeability of this Anaverde soil is moderate, and available water capacity is low or moderate. Surface runoff is very rapid, and the hazard of erosion is high. The effective rooting depth ranges from 60 to 95 inches.

Areas of this soil are used for rangeland, wildlife habitat, and watershed.

This soil is suited for rangeland. Steep slopes and the presence of woody plants are the main limitations. Livestock trails or walkways can be constructed in places to encourage grazing on the steeper slopes. Deciduous oaks and manzanita are the main woody plants. The main forage plants are Sandberg bluegrass and blue wildrye at the higher elevations and soft chess, filaree, and other annual forbs at the lower elevations.

The estimated total annual forage production is 3,000 pounds per acre during favorable years, 2,400 pounds during normal years, and 1,800 pounds during unfavorable years. The range site is Gravelly Loamy (18).

This soil is in capability subclass VIIe (18), nonirrigated.

104—Arizo gravelly loamy sand, 2 to 9 percent slopes. This soil is very deep, excessively drained, and gently to moderately sloping. It is on alluvial fans and plains. It formed in mixed alluvium derived from granitic rock. Areas are irregular in shape and range from 60 to 3,000 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 2,500 to 4,000 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is very pale brown gravelly loamy sand about 3 inches thick. The underlying material to a depth of 65 inches is very pale brown very gravelly loamy coarse sand.

Included with this soil in mapping are areas of Cajon soils that make up about 15 percent of the unit. Near Jawbone Canyon there are a few areas of included soils similar to Arizo but which are calcareous throughout or are very stratified. Also included are a few areas that are dissected by many shallow channels. The soil in these areas is coarser.

Permeability of this Arizo soil is very rapid, and available water capacity is very low or low. Surface runoff is very slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more. Flooding occurs whenever rainfall is intense. Floods are usually of short duration.

Areas of this soil are used for recreation, wildlife habitat, and occasional grazing.

This soil is poorly suited for rangeland. The major limitations are low available water capacity, low annual precipitation, and lack of livestock water. Forage production is generally low. Indian ricegrass and desert needlegrass are the main forage plants. During favorable precipitation years, filaree may produce abundant quantities of high quality forage. Excessive surface disturbance of this soil can result in excessive soil blowing.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 200 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

105—Arujo sandy loam, 9 to 15 percent slopes. This soil is deep, well drained, and rolling. It is on mountainous uplands. It formed in residual material derived from metamorphic and igneous rocks, mainly granitic rock. Areas are irregular in shape and range from 50 to 100 acres in size. The vegetation is mainly conifer and hardwood trees. Elevation ranges from 3,000

to 5,800 feet. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is grayish brown and dark grayish brown sandy loam and loam about 23 inches thick. The upper 22 inches of the subsoil is dark brown and brown clay loam; the lower 10 inches is yellowish brown loam. Highly weathered gneiss is at a depth of 55 inches. In some places the surface layer is clay loam or sandy clay loam.

Included with this soil in mapping are areas of Walong and Tunis soils that make up about 25 percent of the unit. A soil similar to Arujo is also included, but it is yellower in the subsoil. Also included are a few areas of rock outcrop and a soil similar to Walong but which has a loam and clay loam surface layer.

Permeability of this Arujo soil is moderately slow, and available water capacity is moderate to very high. Surface runoff is medium, and the hazard of erosion is moderate. The effective rooting depth ranges from 40 to 60 inches.

Areas of this soil are used for irrigated crops and, where cleared, pasture. Barley and wine grapes are the main crops. Other areas are used for woodland, watershed, and wildlife habitat. A few areas are used for homesites.

This soil is suitable for some of the crops commonly grown in the area. The hazard of erosion and depth to bedrock are the main limitations. Erosion can be controlled by crop rotation, use of cover crops, properly timed tillage, and returning all crop residues to the soil. Sprinklers and drip irrigation systems are the most suitable methods of irrigation. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff and deep percolation.

This soil is suited to the production of singleleaf pinyon pine. It can produce 8.5 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The main concerns in producing and harvesting timber are equipment limitations, slope, and the hazard of erosion. Conventional methods of harvesting trees can be used in the more gently sloping areas but are difficult to use in the steeper areas. Management that minimizes the risk of erosion is essential in harvesting timber.

Where this soil is used for urban development, the main limitations are slope; the hazard of erosion, especially in the steeper areas; and moderate shrink-swell potential. The moderately slow permeability of this soil limits its use for septic tank absorption fields. Erosion is a hazard if the surface is disturbed and left bare. During construction, no larger an area should be disturbed than is necessary. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting are filling.

This soil is in capability unit IVe-1 (18), both irrigated and nonirrigated.

106—Arujo-Friant-Tunis complex, 9 to 15 percent slopes. These strongly sloping soils are on mountainous uplands. Friant and Tunis soils occupy ridgetops. The Arujo soil is on side slopes. Areas are irregular in shape and range from 70 to 240 acres in size. The vegetation is mainly annual grasses and forbs with scattered stands of oak. Elevation ranges from 4,000 to 5,000 feet. The mean annual precipitation is about 15 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season is about 225 days. The Arujo soil makes up about 50 percent of this unit, the Friant soil about 25 percent, and the Tunis soil about 20 percent.

Included in this unit are small areas of Walong soils and rock outcrop. These included areas make up about 5 percent of the unit.

The Arujo soil is deep and well drained. It formed in residual material weathered from metamorphic and igneous rocks, mainly granitic rocks.

Typically, the surface layer of the Arujo soil is grayish brown and dark grayish brown sandy loam and loam about 23 inches thick. The upper 22 inches of the subsoil is dark brown and brown clay loam. The lower 10 inches is yellowish brown loam. Highly weathered gneiss is at a depth of 55 inches. In some places the surface layer is clay loam or sandy clay loam.

Permeability of this Arujo soil is moderately slow, and the available water capacity is moderate to very high. Surface runoff is medium, and the hazard of water erosion is moderate. The effective rooting depth ranges from 40 to 60 inches.

The Friant soil is shallow and well drained. It formed in residuum weathered from schist.

Typically, the surface layer of the Friant soil is grayish brown and brown sandy loam about 18 inches thick. Below this is hard mica schist.

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

The Tunis soil is shallow and somewhat excessively drained. It formed in residuum weathered from granite or gneiss.

Typically, the surface layer of the Tunis soil is brown loam about 18 inches thick. Strongly weathered granite is at a depth of 18 inches. In some places the surface layer is sandy loam.

Permeability of this Tunis soil is moderate; it is slow in the weathered bedrock. Available water capacity is low to very low. Surface runoff is medium, and the hazard of erosion is moderate. The effective rooting depth ranges from 10 to 20 inches.

Areas of these soils are used for irrigated crops and pasture. Barley and wine grapes are the main crops. Other areas are used for rangeland, wildlife, or watershed. A few places are used as homesites.

These soils are suitable for some of the crops commonly grown in the area. The hazard of erosion and

depth to bedrock are the main limitations. Erosion can be controlled by crop rotation or cover crops, properly timed tillage, and returning all crop residues to the soil. Sprinklers and drip irrigation systems are the most suitable methods of irrigation. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff or deep percolation.

These soils are suited for rangeland. Livestock grazing is limited mainly by the shallow rooting depth and low available water capacity on the Friant and Tunis soils. Friant soil also has an excessive amount of woody shrubs. Where woody plants are managed to create open areas, however, this soil will produce a good stand of annual grass and forbs. If overgrazed, this unit is subject to moderate erosion. Forage plants consist of soft chess, cheatgrass, and filaree at the lower elevations and mainly needlegrass and ripgut brome at the higher elevations. The Arujo soil also supports an open stand of deciduous oak.

Where these soils are used for urban development, the main limitations are slope; depth to bedrock; the hazard of erosion, especially in the steeper areas; and the moderate shrink-swell potential of the Arujo soil. The moderately slow permeability of the Arujo soil and the shallow depth of the Friant and Tunis soils over bedrock limit the use of this unit for septic tank absorption fields. Erosion is a hazard if the surface is disturbed and left bare. During construction, no larger an area should be disturbed than is necessary. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Onsite evaluation is needed to determine if a septic tank filter field will function properly or if another type of system can be used.

The estimated total annual forage on the Arujo soil is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Friant soil is 1,000 pounds per acre during favorable years, 800 pounds during normal years, and 400 pounds during unfavorable years. The estimated total on the Tunis soil is 550 pounds per acre during favorable years, 400 pounds during normal years, and 250 pounds during unfavorable years. The range site for the Arujo soil is Coarse Loamy (18), for the Friant soil is Shallow Coarse Loamy (18), and for the Tunis soil is Shallow Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated, and IVe-1 (18), irrigated.

107—Arujo-Friant-Tunis complex, 15 to 50 percent slopes. These moderately steep to steep soils are on mountainous uplands. Friant and Tunis soils occupy ridgetops. The Arujo soil is on side slopes. Areas are irregular in shape and range from 75 to 500 acres in size. The vegetation is dominantly annual grasses and forbs with scattered stands of oak. Elevation ranges from 3,000 to 5,000 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season is about 200 days. The Arujo soil makes up about 50 percent of this unit, the Friant soil about 25 percent, and the Tunis soil about 20 percent.

Included in this unit are areas of Walong soils and small areas of rock outcrop. These included areas make up about 5 percent of the unit.

The Arujo soil is deep and well drained. It formed in residual material weathered from metamorphic and igneous rocks, mainly granitic rocks.

Typically, the surface layer of the Arujo soil is grayish brown and dark grayish brown sandy loam and loam about 23 inches thick. The upper 22 inches of the subsoil is dark brown and brown clay loam; the lower 10 inches is yellowish brown loam. Highly weathered gneiss is at a depth of 55 inches. In some places the surface layer is clay loam or sandy clay loam.

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

The Friant soil is shallow and well drained. It formed in residuum weathered from schist.

Typically, the surface layer of the Friant soil is grayish brown and brown sandy loam about 18 inches thick. Below this is hard mica schist.

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

The Tunis soil is shallow and somewhat excessively drained. It formed in residuum from weathered granite or gneiss.

Typically, the surface layer of the Tunis soil is brown loam about 18 inches thick. Strongly weathered granite is at a depth of 18 inches. In some places the surface layer is sandy loam.

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

Areas of these soils are used for rangeland, watershed, and wildlife habitat.

These soils are suited for rangeland. Livestock grazing is limited mainly by the slope. The production of vegetation suitable for livestock is also limited by the shallow rooting depth and low available water capacity on the Friant and Tunis soils. If overgrazed, these soils are subject to excessive erosion. Trails and walkways can be constructed where access is limited. Brush management improves areas of range that are producing too many woody shrubs. The main forage plants consist of soft chess, cheatgrass, and filaree at the lower elevations and mainly wild oats and needlegrass at the higher elevations. Arujo and Friant soils also support an open stand of deciduous oak.

The estimated total annual forage production on the Arujo soil is 2,400 pounds per acre during favorable

years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Friant soil is 1,000 pounds per acre during favorable years, 800 pounds during normal years, and 400 pounds during unfavorable years. The estimated total on the Tunis soil is 550 pounds per acre during favorable years, 400 pounds during normal years, and 250 pounds during unfavorable years. The range site for the Arujo soil is Coarse Loamy (18), for the Friant soil is Shallow Coarse Loamy (18), and for the Tunis soil is Shallow Loamy (18).

This unit in in capability unit IVe-1 (18), nonirrigated.

108—Arujo-Friant-Tunis complex, 50 to 75 percent slopes. These very steep soils are on mountainous uplands. Friant and Tunis soils are on ridgetops. The Arujo soil is on side slopes. Areas are irregular in shape and range from 180 to 2,800 acres in size. The vegetation is mainly annual grasses and forbs with scattered stands of oak. Elevation ranges from 3,000 to 5,000 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season is about 200 days. The Arujo soil makes up about 45 percent of this unit, the Friant soil about 20 percent, and the Tunis soil about 20 percent.

Included in this unit are areas of Walong soils and small areas of rock outcrop. These included areas make up about 15 percent of the unit.

The Arujo soil is deep and well drained. It formed in residual material weathered from metamorphic and igneous rocks, mainly granitic rocks.

Typically, the surface layer of the Arujo soil is grayish brown and dark grayish brown sandy loam and loam about 23 inches thick. The upper 22 inches of the subsoil is dark brown and brown clay loam; the lower 10 inches is yellowish brown loam. Highly weathered gneiss is at a depth of 55 inches. In some places the surface layer is clay loam or sandy clay loam.

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

The Friant soil is shallow and well drained. It formed in residuum weathered from schist.

Typically, the surface layer of the Friant soil is grayish brown and brown sandy loam about 18 inches thick. Below this is hard mica schist.

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

The Tunis soil is shallow and somewhat excessively drained. It formed in residuum from weathered granite or gneiss.

Typically, the surface layer of the Tunis soil is brown loam about 18 inches thick. In some places, this layer is sandy loam. Strongly weathered granite is at a depth of 18 inches.

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

Areas of these soils are used for rangeland, watershed, and wildlife habitat.

These soils are suited for rangeland. All of these soils are limited by the slope. Friant and Tunis soils are also limited by the shallow rooting depth and low available water capacity. Steepness of slope limits access by livestock and promotes overgrazing on less sloping areas. If these soils are overgrazed, they are subject to excessive erosion. In places, trails or walkways can be constructed to encourage livestock grazing where access is limited. Brush management can improve areas of range that are producing too many woody shrubs. The main forage plants consist of soft chess, cheatgrass, and filaree at the lower elevations and mainly wild oats and needlegrass at the higher elevations. Arujo and Friant soils also support an open stand of deciduous oak.

The estimated total annual forage production on the Arujo soil is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Friant soil is 1,000 pounds per acre during favorable years, 800 pounds during normal years, and 400 pounds during unfavorable years. The estimated total on the Tunis soil is 550 pounds per acre during favorable years, 400 pounds during normal years, and 250 pounds during unfavorable years. The range site for the Arujo soil is Coarse Loamy (18), for the Friant soil is Shallow Coarse Loamy (18), and for the Tunis soil is Shallow Loamy (18).

This unit is in capability subclass VIIe (18), nonirrigated.

109—Arvin sandy loam, 2 to 5 percent slopes. This soil is very deep, well drained, and gently sloping. It is on alluvial fans and stream flood plains. It formed in mixed alluvium derived from granitic rock. Areas are irregular in shape and range from 10 to 600 acres in size. The vegetation is mainly annual grasses and forbs. In some areas, there is scattered oak. Elevation ranges from 700 to 1,500 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is dark grayish brown and brown sandy loam about 21 inches thick. The underlying material to a depth of 60 inches is yellowish brown sandy loam. In some places the surface layer is loam.

Included with this soil in mapping are areas of Rosamond Variant soils and Psamments-Xerolls in recently cut stream bottoms. These included areas make up 5 percent of the unit.

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

Areas of this soil are used for cultivated crops. Cotton, tomatoes, sugar beets, garlic, onions, grapes, and nonirrigated grains are the main crops. A few areas are used for grazing, wildlife habitat, and recreation.

This soil is suited to most crops grown in the area. The hazard of erosion and the sandy loam texture are the main limitations. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to prevent erosion and improve soil tilth, structure, fertility, and water infiltration. In areas where this soil is dry farmed, a fallow period every other year, returning crop residues to the soil, and tilling to a rough cloddy condition can reduce runoff and wind erosion. Sprinkler, drip, or contour furrow irrigation systems are best suited to this soil. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

This soil is suited for rangeland. There are no limitations for grazing livestock. Livestock water can perhaps be developed from wells or catchment basins to help livestock distribution. Soft chess, wild oats, and filaree are the main forage plants. This soil responds well to fertilization in years when precipitation is favorable.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,500 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (17).

This soil is in capability unit IVe-1 (17), nonirrigated, and IIe-1 (17), irrigated.

110—Arvin sandy loam, 5 to 9 percent slopes. This soil is very deep, well drained, and moderately sloping. It is on alluvial fans and stream terraces. It formed in mixed alluvium derived from granitic rock. Areas are irregular in shape and range from 50 to 105 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 700 to 1,500 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is dark grayish brown and brown sandy loam about 21 inches thick. The underlying material to a depth of 60 inches is yellowish brown sandy loam. In some areas stones are in the profile. In some places the surface layer is loam.

Included with this soil in mapping are areas of Tehachapi soils and Hesperia soils. Each of these soils makes up 5 percent of the unit.

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

Areas of this soil are used for rangeland, wildlife habitat, and recreation. This soil is suitable for irrigation if water becomes available.

This soil is suited for rangeland. There are no limitations for livestock grazing. Livestock water can perhaps be developed from wells of catchment basins to increase livestock distribution. Soft chess, wild oats, and filaree are the main forage plants. This soil responds well to fertilization when precipitation for the year is favorable.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,500 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (17).

This soil is in capability unit IVe-1 (17), nonirrigated, and IIIe-1, irrigated.

111—Arvin stony sandy loam, 5 to 9 percent slopes. This soil is very deep, well drained, and moderately sloping. It is on alluvial fans and stream terraces. It formed in mixed alluvium derived from granitic rock. Areas are irregular and elongated in shape and range from 40 to 1,300 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 700 to 1,500 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is dark grayish brown and brown stony sandy loam about 21 inches thick. One to three percent of the soil surface is covered by stones. The underlying material to a depth of 60 inches is brown and yellowish brown cobbly sandy loam. This soil is 15 to 30 percent cobbles throughout. In some places the surface layer is loam.

Included with this soil in mapping are areas of Psamments-Xerolls in recently cut stream drainages. These included areas make up about 5 percent of the unit.

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

Areas of this soil are used for rangeland, recreation, wildlife habitat, and oilfields.

This soil is suited for rangeland. There are no limitations for livestock grazing. Livestock water can perhaps be developed from wells or in catchment basins. Soft chess, ripgut brome, and filaree are the main forage plants. This soil responds well to fertilization when precipitation for the year is favorable.

The estimated total annual forage production is 1,600 pounds per acre during favorable years, 1,200 pounds during normal years, and 800 pounds during unfavorable years. The range site is Stony Loam (17).

This soil is in capability unit IVs-1 (17), nonirrigated.

112—Badland-Orthents complex, 30 to 75 percent slopes. This unit consists of areas of land that have been severely eroded. Only small areas have soil that

can be classified. Areas are irregular in shape and range from 30 to 525 acres in size. Elevation is 1,000 to 2,800 feet. Vegetation consists of sparse grasses and forbs. Precipitation ranges from 4 to 10 inches. The mean annual air temperature ranges from 58 to 68 degrees F., and the average frost-free season ranges from 200 to 250 days.

The complex is about 60 percent Badland, 30 percent Orthents, and 10 percent soils that are similar to the Orthents in texture but which have a dark surface layer.

The Badland is steep or very steep barren land, dissected by many intermittent drainage channels. These channels have been deeply entrenched in soft semi-consolidated old alluvial material. Relief ranges from 25 to 500 feet. Badland generally does not support plants.

The Orthents are shallow, well drained soils. They formed on narrow ridges between severely eroded gullies.

The soils classified as Orthents typically are less than 20 inches deep over soft decomposed old alluvial material. Textures are loamy. Content of coarse fragments generally ranges from 0 to 15 percent by volume. Colors vary but are commonly light brown to pale brown or light yellowish brown.

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

Areas are used for rangeland, but this unit is poorly suited for it. Badland generally has no vegetation. Orthents are limited by steep slopes, low herbage production, and lack of livestock water. Grazing is generally restricted by the rugged terrain and low quantities of forage.

This unit is in capability subclass VIIIe (17, 30), nonirrigated.

113—Cajon sand, 5 to 15 percent slopes. This soil is very deep, somewhat excessively drained, and moderately sloping to strongly sloping. It is on alluvial fans and plains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 125 to 2,500 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. In some places, a few scattered trees are found. Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is pale brown sand about 4 inches thick. The underlying material to a depth of 60 inches is light yellowish brown stratified sand and loamy sand. Reaction ranges from mildly alkaline to moderately alkaline. This unit has been severely eroded by wind so that much of the area has short slopes of 12 to 15 percent, characteristic of dune areas.

Included with this soil in mapping are small areas of Cajon loamy sand and Cajon gravelly loamy sand.

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

Areas of this soil are mainly used for rangeland and wildlife habitat. A few areas are irrigated and used for barley, sudangrass, and alfalfa.

This soil is suited to most irrigated crops grown in the area. The hazard of soil blowing and low available water capacity are the main limitations. Maintaining a plant cover, utilizing all crop residues, and limiting tillage are important in controlling soil blowing and maintaining or improving the organic matter content. Sprinkler type irrigation systems are best suited to this soil. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive fertilizer loss, runoff, or deep percolation.

This soil is poorly suited for rangeland. Major limitations are low available water capacity and the coarse surface texture. Excessive disturbance of this soil can result in soil blowing and could create unstabilized sand dunes. Forage production is low in quantity but high in quality. Desert needlegrass and Indian ricegrass, winterfat, white bursage, and shadscale are the main forage and browse plants. In years when precipitation is exceptionally favorable, filaree and annual grasses can produce abundant quantities of forage.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The range site is Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated, and capability unit IVe-1 (30), irrigated.

114—Cajon loamy sand, 0 to 5 percent slopes. This soil is very deep, somewhat excessively drained, and nearly level to gently sloping. It is on alluvial fans and plains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 60 to 20,000 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs with a few Joshua trees (fig. 3). Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown loamy sand about 4 inches thick. The underlying material to a depth of 20 inches is light yellowish brown loamy sand. Below that, it is stratified light yellowish brown gravelly loamy sand and gravelly sandy loam. Gravel content is as much as 20 percent by volume. Reaction is mildly or moderately alkaline throughout.

Included with this soil in mapping are small areas of Arizo, Garlock, Neuralia, and DeStazo soils. These areas make up 20 percent of the unit. Also included are a few areas of Cajon gravelly loamy sand.

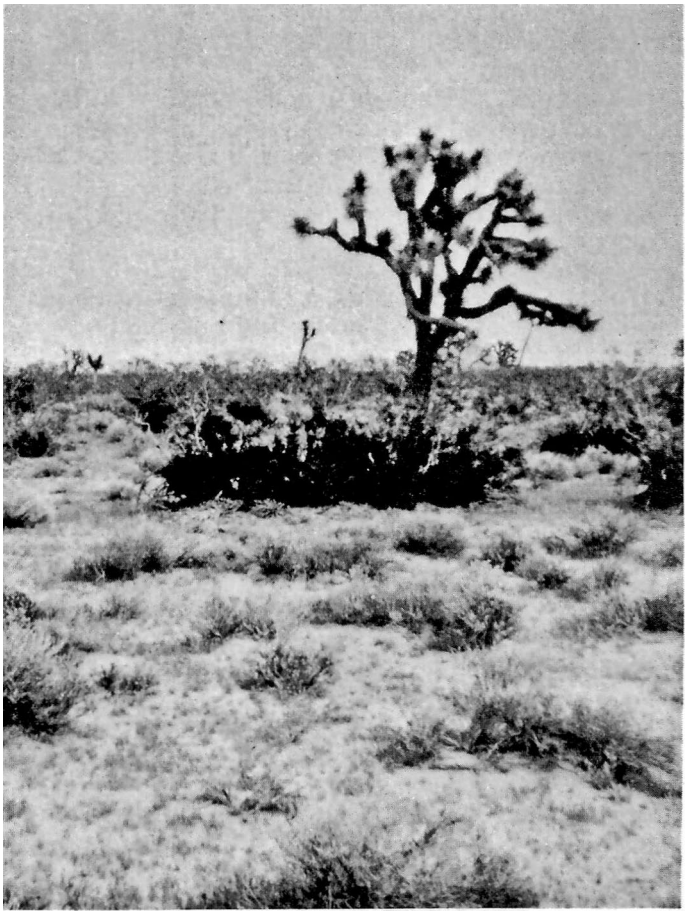

Figure 5.—Desert vegetation on Cajon loamy sand, 0 to 5 percent slopes

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

Areas of this soil are mainly used for irrigated crops and pasture. Alfalfa is the main crop. Areas not cultivated are used for desert range, recreation, and wildlife habitat. Some areas are used for homesites.

This soil is suited to most irrigated crops grown in the area. The hazard of soil blowing and low available water capacity are the main limitations. Maintaining a plant cover, utilizing all crop residues, and limiting tillage can help to maintain or improve organic matter content and prevent soil blowing. Sprinkler type irrigation systems are best suited to this soil. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive fertilizer loss, runoff, or deep percolation.

This soil is poorly suited for rangeland. Major limitations are the low or moderate available water capacity and coarse surface texture. Excessive disturbance of this soil can result in severe wind erosion. Native forage production is low in quantity but high in quality. Desert needlegrass, Indian ricegrass, winterfat, shadscale, and white bursage are the main forage and browse plants. In years when precipitation is favorable, filaree and annual grasses produce abundant forage.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The range site is Sandy (30). Forage production is quite variable. In areas of high precipitation yields are more reliable and may be double those in drier areas.

This soil is suited to urban development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than is necessary. Disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate ground water. Water supplies should be located a sufficient distance from leach fields.

This soil is in capability subclass VIIe (30), nonirrigated, and capability unit IVe-4 (30), irrigated.

115—Cajon loamy sand, saline-alkali, 0 to 2 percent slopes. This soil is very deep, somewhat excessively drained, and nearly level. It is on alluvial fans and plains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 20 to 700 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,000 to 2,500 feet. The mean annual precipitation is about 4 inches, and the mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown loamy sand about 48 inches thick. Gravel content is about 5 percent by volume. Salt crystals can be seen in the surface layer. The underlying material to a depth of 60 inches is light yellowish brown stratified loamy sand and loamy fine sand. Gravel content is as much as 15 percent by volume. This soil contains an excessive amount of salts and sodium.

Included with this soil in mapping are areas of Rosamond saline-alkali soils and areas of Arizo soils. The Rosamond soils make up about 5 percent of the unit, and the Arizo soils 3 percent.

Permeability of this Cajon soil is rapid, and available water capacity is low or moderate. Surface runoff is slow, and the hazard of erosion is slight. The hazard of soil blowing is high. The effective rooting depth is 60 inches or more. Flooding occurs whenever rainfall is intense. Floods are usually of short duration.

Areas of this soil are used for rangeland, recreation, and homesites

This soil is poorly suited to rangeland. Major limitations are the low available water capacity, the hazard of soil blowing, and the saline-alkali conditions. Forage production is low and limited to salt-tolerant plants. Major browse and forage plants are allscale, alkali blite, and alkali sacaton.

This soil is poorly suited to urban development. Flooding and the sandy texture are the main limitations.

The estimated total annual forage production is 500 pounds per acre during favorable years, 400 pounds during normal years, and 300 pounds during unfavorable years. The range site is Alkali-Sandy (30).

This soil is in capability subclass VIIs (30), nonirrigated.

116—Cajon gravelly loamy sand, 0 to 9 percent slopes. This soil is very deep, excessively drained, nearly level to moderately sloping. It is on alluvial fans and plains. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 200 to 1,500 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,000 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown and yellowish brown gravelly loamy sand about 36 inches thick. Gravel content ranges from 15 to 30 percent. The underlying material is light yellowish brown gravelly sand and gravelly fine sand. Gravel content ranges from 15 to 35 percent by volume.

Included with this soil in mapping are areas of Arizo soils and areas of Garlock soils. The Arizo soils make up about 10 percent of the unit, and the Garlock soils 5 percent.

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

Areas of this soil are used for rangeland, recreation, and homesites. A few small areas are used for irrigated crops and pasture.

This soil is poorly suited to rangeland. Limitations are low available water capacity and the coarse surface texture. Forage production is low. Desert needlegrass and filaree are the major forage plants. Forage production is quite variable. In areas of high precipitation yields may be greater and more reliable than in drier areas. In years when precipitation is exceptionally favorable, annual grasses and filaree may produce abundant forage. Major browse species are white bursage and winterfat. Excessive disturbance of this soil can result in severe wind erosion.

This soil is suited to homesite development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than necessary, and disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate gound water. Water supplies should be located a sufficient distance from leach fields. Because of the limited amount of precipitation and low or very low available water capacity, landscape plants should be watered frequently.

The estimated total annual forage production is 200 pounds per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

117—Cajon-Garlock sands, 2 to 9 percent slopes. These gently sloping and gently rolling soils are on alluvial fans and plains. Areas are irregular in shape and range from 200 to 3,200 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,500 to 2,600 feet. The mean annual precipitation is about 6 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season is about 225 days. The Cajon soil makes up about 55 percent of this unit, and the Garlock soil about 40 percent.

Included in this unit are small areas of DeStazo soils and soils that are as much as 25 percent gravel by volume. These included areas make up about 5 percent of the unit.

The Cajon soil is very deep and somewhat excessively drained. It formed in alluvial material derived mainly from granitic rock.

Typically, the surface layer of the Cajon soil is pale brown sand about 4 inches thick. The underlying material to a depth of 42 inches is light yellowish brown and gray sand. Below that, to a depth of 60 inches, it is light yellowish brown silt loam. Reaction is mildly alkaline or moderately alkaline throughout.

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

The Garlock soil is very deep and well drained. It formed in alluvial material derived mainly from granitic rock.

Typically, the surface layer of the Garlock soil is yellowish brown and brown sand about 18 inches thick. The subsoil is strong brown and brown sandy clay loam and sandy loam about 27 inches thick. The substratum to a depth of 60 inches is brown, yellowish brown, and light yellowish brown silt loam.

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

Areas of these soils are used for rangeland, but these soils are poorly suited for it. These soils are limited by coarse surface textures and the low available water capacity of the Cajon soil. Both soils are subject to wind erosion, but the Cajon soil erodes more readily if

disturbed. The vegetation is dominantly creosotebush and white bursage, but on the Cajon soil the forage is more diverse and includes spiny hopsage, winterfat, and Indian ricegrass. Major browse and forage plants on these soils are spiny hopsage, winterfat, and Indian ricegrass.

The estimated total annual forage production on the Cajon soil is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The estimated total on the Garlock soil is 400 pounds per acre during favorable years, 300 pounds during normal years, and 200 pounds during unfavorable years. The range site for the Cajon soil is Sandy (30) and for the Garlock soil is Sandy (30).

This unit is in capability subclass VIIe (30), nonirrigated.

118—Chanac-Badland complex, 30 to 50 percent slopes. These steep soils are on old dissected terraces. Chanac soils are on ridgetops and north-facing slopes. Badland areas are on south-facing slopes. Areas are irregular in shape and range from 150 to 6,000 acres in size. Elevation ranges from 575 to 2,000 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season is about 250 days. The Chanac soil makes up about 40 percent of this unit, the Badland about 35 percent.

Included in this unit are areas of Pleito and Rosamond Variant soils, small areas of soils similar to Chanac soil but which have no subsoil development, a few areas of shallow soils, and a few small areas in the drainage bottoms that are sandy loam throughout. The Pleito and Rosamond Variant soils make up about 10 percent of the unit, and the other included areas about 15 percent.

The Chanac soil is very deep and well drained. It formed in old slightly consolidated alluvial material.

Typically, the surface layer of the Chanac soil is gray sandy clay loam about 10 inches thick. The subsoil is light yellowish brown and very pale brown sandy clay loam about 21 inches thick. The substratum is brownish yellow and very pale brown coarse sandy loam and stratified clay loam to sandy loam to a depth of 60 inches. In some places the surface layer is loam or clay loam.

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

The Badland is small areas of barren land dissected by many intermittent drainage channels. These channels have been deeply entrenched in soft semiconsolidated conglomerates. Relief ranges from 25 to 500 feet. Badland generally does not support plants.

Areas of this unit are used for rangeland and recreation. Some areas are used as oilfields.

This unit is suited for rangeland. Some areas of Badland, however, have only limited grazing value. The main limitations are steep slopes and the many dissected channels. This makes many areas difficult for livestock to graze. Distribution of grazing can be improved by developing springs or catchment basins for livestock water. Major forage plants on Chanac soils are wild oats, soft chess, burclover, and filaree. Areas of Badland are usually barren or have only sparse vegetation.

The estimated total annual forage production on the Chanac soil is 2,000 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Chanac soil is Fine Loamy (18).

This unit is in capability subclass VIe (18), nonirrigated.

119—Chanac-Pleito complex, 9 to 30 percent slopes. These soils are rolling and moderately steep. They are on old terraces. Areas are irregular in shape and range from 50 to 1,000 acres. Elevation ranges from 800 to 1,000 feet. The mean precipitation is about 12 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season is about 250 days. The Chanac soil makes up about 50 percent of this unit, the Pleito soil about 40 percent.

Included in this unit are small areas of Arvin and Rosamond Variant soils. Also included are small areas of Chanac soils that have slopes of less than 9 percent or that have gravel in the surface layer. A few areas are dissected by many intermittent drainage channels. Included areas make up about 5 percent of the unit.

The Chanac soil is very deep and well drained. It formed in old, slightly consolidated alluvial material.

Typically, the surface layer of the Chanac soil is gray sandy clay loam about 10 inches thick. The subsoil is light yellowish brown and very pale brown sandy clay loam about 21 inches thick. The substratum is brownish yellow and very pale brown coarse sandy loam and stratified clay loam to sandy loam to a depth of 60 inches. In some places the surface layer is loam or clay loam.

Permeability of this Chanac soil is moderately slow, and available water capacity is high or very high. Surface runoff is medium or rapid, and the hazard of erosion ranges from moderate to high. The effective rooting depth is 60 inches or more.

The Pleito soil is very deep and well drained. It formed in alluvial material derived dominantly from weathered conglomerate.

Typically, the surface layer of the Pleito soil is dark grayish brown sandy clay loam about 16 inches thick. The subsoil is grayish brown sandy clay loam about 7 inches thick. The substratum is very pale brown gravelly sandy clay loam to a depth of 60 inches. This soil is calcareous below a depth of about 6 inches.

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

Areas of these soils are used for rangeland, watershed, and wildlife habitat.

These soils are suited for rangeland. Livestock water is limited, but it can be readily developed by use of wells or catchment basins. Both soils produce highly nutritous forage. Major forage plants are soft chess, wild oats, burclover, and filaree.

The estimated total annual forage production on the Chanac soil is 2,000 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Pleito soil is 2,000 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Chanac soil is Fine Loamy (18) and for the Pleito soil is Fine Loamy (18).

This unit is in capability unit IVe-1 (18), nonirrigated.

120—Chanac-Pleito complex, 30 to 50 percent slopes. These steep and very steep soils are very deep and well drained. They are on old terraces. Areas are irregular in shape and range from 250 to 1,100 acres in size. Elevation ranges from 575 to 2,000 feet. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season is about 250 days. The Chanac soil makes up about 50 percent of this unit, the Pleito soil about 40 percent.

Included in this unit are small areas of Arvin and Rosamond Variant soils. Also included are small areas of Chanac soil with slopes of less that 30 percent or with gravel in the surface layer. A few areas are dissected by many intermittent drainage channels. Included areas make up about 5 percent of the unit.

The Chanac soil is very deep and well drained. It formed in old, slightly consolidated alluvial material.

Typically, the surface layer of the Chanac soil is gray sandy clay loam about 10 inches thick. The subsoil is light yellowish brown and very pale brown sandy clay loam about 21 inches thick. The substratum to a depth of 60 inches is brownish yellow and very pale brown coarse sandy loam and stratified clay loam to sandy loam. In some places the surface layer is loam or clay loam.

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

The Pleito soil is very deep and well drained. It formed in old, slightly consolidated alluvial material.

Typically, the surface layer of the Pleito soil is dark grayish brown sandy clay loam about 16 inches thick. The subsoil is grayish brown sandy clay loam about 7 inches thick. The substratum, to a depth of 60 inches, is very pale brown gravelly sandy clay loam. This soil is calcareous below a depth of about 6 inches.

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

Areas of these soils are used for rangeland, watershed, and wildlife habitat.

These soils are suited for rangeland. Livestock water is limited, but it can be readily developed by using horizontal wells or catchment basins. These soils support an open stand of soft chess, wild oats, filaree, and burclover, which are the major forage plants. There is a high hazard of erosion on the steeper slopes, and an adequate plant cover should be left at the end of the grazing season.

The estimated total annual forage production on the Chanac soil is 2,000 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Pleito soil is 2,000 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Chanac soil is Fine Loamy (18) and the range site for the Pleito soil is Fine Loamy (18).

This unit is in capability subclass VIe (18), nonirrigated.

121—Chino Variant clay loam, 0 to 2 percent slopes. This soil is very deep, poorly drained, and nearly level. It is in basin valleys. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 280 to 310 acres in size. The vegetation is mainly annual grasses, shrubs, and water-loving plants. Elevation ranges from 4,000 to 4,200 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark gray, very dark gray, and gray silty clay loam and clay loam about 19 inches thick. The underlying material is gray and light brownish gray sandy loam, sandy clay loam, and clay loam to a depth of 65 inches. Pale brown and black mottles are present in the underlying material.

Included with this soil in mapping are areas of Steuber soils and areas of soils similar to Chino Variant but which have a surface layer more than 20 inches thick. The Steuber soils make up about 5 percent of the unit, and the other soils 10 percent.

Permeability of this Chino Variant soil is moderately slow, and available water capacity is high. Surface runoff is slow, and the hazard of erosion is none or slight. The effective rooting depth is 60 inches or more for water-loving plants, but it is 40 inches for most other plants. A high water table is at a depth of 40 to 55 inches.

Areas of this soil are used for rangeland, wildlife habitat, recreation, and urban development.

This soil is suited for rangeland. Poor drainage, wetness, and stream overflow during the early spring months are the main limitations. The major forage plant is creeping wildrye. Plants that frequently invade this soil include cheatgrass and redstem filaree. If the range

vegetation is seriously depleted, seeding is needed. Grazing should be avoided in the early spring because of soil wetness. This soil responds well to fertilizer.

This soil is suited to urban development. The high water table is the main limitation. Special design is needed for building sites. Tile drainage systems are needed to lower the water table and to avoid possible failure of building foundations. Because of moderately slow permeability and high water table, septic tank absorption fields will not function properly. Where population is dense, a community sewage system is needed. Onsite evaluation is advisable when considering urban uses.

The estimated total annual forage production is 2,800 pounds per acre during favorable years, 2,000 pounds during normal years, and 1,500 pounds during unfavorable years. The range site is Semi-wet Meadow (18).

This soil is in capability unit IIIw-2 (18), nonirrigated.

122—Cibo cobbly clay, 2 to 30 percent slopes. This soil is moderately deep, well drained, and gently sloping to moderately steep. It is on mountainous uplands on the eastern foot slopes of the Tehachapi Mountains. It formed in residual material derived mainly from basalt. Areas are irregular in shape and range from 15 to 1,100 acres in size. The vegetation is mainly annual grasses. Elevation ranges from 4,100 to 4,600 feet. The mean annual precipitation is about 9 to 12 inches, and the mean annual air temperature is about 59 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is reddish brown cobbly clay in the upper 2 inches and dark brown clay in the lower 21 inches. Below this is yellowish brown, highly weathered basalt about 8 inches thick. This is underlain by hard basalt.

Included with this soil in mapping are areas of Rock outcrop and areas of Friant soils. Also included are small areas that have a lithic contact at a depth ranging from 12 to 24 inches. In a few places small areas of light-colored material eroded from sedimentary rock is included in the outer perimeter of the basalt flow. Included areas make up about 10 percent of the unit.

Permeability of this Cibo soil is slow, and available water capacity is low or moderate. Surface runoff is slow to rapid, and the hazard of erosion is slight or moderate. The effective rooting depth is 24 to 36 inches.

Areas of this soil are used for rangeland and wildlife habitat.

This soil is suited for rangeland. The fine texture and slow permeability are the main limitations. Livestock water development is needed for proper stock distribution. Cobbles on the soil surface do not inhibit livestock movement, but they reduce the potential for forage producton. This soil produces high quality forage for spring and early summer grazing. Main forage plants are desert needlegrass, bottlebrush squirreltail, and cheatgrass.

The estimated total annual forage production is 1,200 pounds per acre during favorable years, 1,000 pounds during normal years, and 800 pounds during unfavorable years. The range site is Cobbly Clayey (29).

This soil is in capability subclass VIe (29), nonirrigated.

123—Cibo cobbly clay, 30 to 75 percent slopes. This soil is moderately deep, well drained, steep and very steep. It is on mountainous uplands on the western foot slopes of the Tehachapi Mountains. It formed in residual material derived mainly from basalt. Areas are irregular in shape and range from 70 to 1,000 acres in size. The vegetation is mainly annual grasses. Elevation ranges from 1,400 to 3,200 feet. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 59 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is reddish brown cobbly clay in the upper 2 inches and dark brown clay in the lower 21 inches. Below this is yellowish brown highly weathered basalt about 8 inches thick. This is underlain by hard basalt.

Included with this soil in mapping are small areas of Friant and Anaverde soils, rock outcrops, and soils similar to Cibo but which are shallow over decomposed sedimentary and volcanic material. These included areas make up about 15 percent of the unit.

Permeability of this Cibo soil is slow, and available water capacity is low or moderate. Surface runoff is rapid or very rapid, and the hazard of erosion is high. The effective rooting depth is 24 to 36 inches.

Areas of this soil are used for rangeland and wildlife habitat.

This soil is suited for rangeland. Slopes, fine textures, and slow permeability are the main limitations. Steep slopes inhibit livestock movement. Livestock trails and water development are needed for proper livestock distribution. This soil produces high quality forage for spring and early summer grazing. Major forage plants are desert needlegrass, wildrye, and arrowleaf balsamroot.

The estimated total annual forage production is 2,100 pounds per acre during favorable years, 1,700 pounds during normal years, and 1,200 pounds during unfavorable years. The range site is Cobbly Clayey (18).

This soil is in capability subclass VIIe (18), nonirrigated.

124—Cinco gravelly loamy sand, 50 to 75 percent slopes. This soil is very deep, excessively drained, and steep to very steep. It is on mountainous uplands. It formed in residual material derived from granitic rock. Areas are irregular in shape and range from about 100 to 3,500 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 4,000 to 5,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is brown gravelly loamy sand about 8 inches thick. The underlying material to a depth of 86 inches is brown gravelly loamy sand. Below this is highly weathered granite. Reaction is moderately alkaline throughout the profile. This alkalinity is caused by dust from a nearby cement plant. In some areas the soil is free of carbonates.

Included with this soil in mapping are areas of rock outcrops and areas of Cinco soils with slopes ranging from 10 to 20 percent along the ridgetops. These included areas make up about 20 percent of the unit. A few small areas of cool Whitewolf soils along stream drainages are also included, and these make up about 1 percent of the unit.

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

Areas of this soil are used for recreation, watershed, and occasional grazing.

This soil is suited for rangeland. Very steep slopes, gravelly textures, and low available water capacity are the main limitations. There is no water for livestock during most of the year. Catchment basins and aprons can perhaps be used to extend the spring grazing season. Total forage production is low in quantity but of high value during the spring and fall months. Major forage plants are desert needlegrass and bottlebrush squirreltail. Systematic grazing and rest periods are essential to maintain or improve the composition of perennial grass on this soil.

The estimated total annual forage production is 700 pounds per acre during favorable years, 500 pounds during normal years, and 300 pounds during unfavorable years. The range site is Gravelly Sandy (29).

This soil is in capability subclass VIIe (29), nonirrigated.

125—DeStazo sandy loam, 0 to 2 percent slopes. This soil is very deep, well drained, and nearly level. It is on flood plains and in basins (fig. 6). It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 50 to 1,700 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,400 to 3,000 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 66 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown and light yellowish brown sandy loam about 11 inches thick. The underlying material to a depth of 52 inches is very pale brown, very gravelly and extremely gravelly clay loam that is 50 to 70 percent irregularly shaped hard nodules. Below 52 inches is very pale brown clay loam. Reaction is moderately alkaline throughout. The soil is calcareous throughout, and the calcium carbonate content is more than 40 percent by weight. In some places this surface layer is loam or sandy clay loam. In some places unrelated stratified horizons with faint mottles are at a depth of more than 60 inches.

Included with this soil in mapping are areas of Cajon soils. These included areas make up about 10 percent of the unit.

Permeability of this DeStazo soil is moderately slow, and available water capacity is low or moderate. Surface runoff is slow, and the hazard of erosion is moderate. The hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more. Areas of this soil are protected from flooding.

A few areas are used for irrigated crops. Alfalfa, barley, and potatoes are the main crops. Most areas are used for rangeland.

This soil is suited to most irrigated crops commonly grown in the area. The main limitations are the restriction of roots because of compaction and the highly calcareous underlying material. Crop rotation, use of crop residues, and properly timed tillage are suitable management practices. Sprinkler irrigation is the most common irrigation method used, but border and furrow irrigation is also suitable. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff or deep percolation.

This soil is poorly suited for rangeland. The gravel-sized, highly calcareous, hard nodules in the profile are the main limitations. Low annual precipitation is also a problem. Forage production is low. In years when precipitation is favorable, however, filaree and annual grasses may produce manageable quantities of forage. Excessive disturbance of the surface cover can result in soil blowing. Filaree, shadscale, and spiny hopsage are the main forage and browse plants.

The estimated total annual forage production is 150 pounds per acre during favorable years, 100 pounds during normal years, and 75 pounds during unfavorable years. The range site is Limy Coarse Loamy (30).

This soil is in capability subclass VIIe (30), nonirrigated, and capability unit IVs-4 (30), irrigated.

126—DeStazo sandy loam, 5 to 9 percent slopes, eroded. This soil is very deep, well drained, and moderately sloping. It is on flood plains and in basins. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 50 to 250 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,400 to 3,000 feet. The average mean precipitation is about 6 inches, and the average annual air temperature is about 66 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is pale brown and light yellowish brown sandy loam about 3 inches thick. In most places, erosion has removed most of the original surface layer. The underlying material to a depth of 65 inches is very pale brown sandy loam, very gravelly clay loam, or very gravelly sandy clay loam that is 50 percent irregularly shaped hard nodules. Reaction is moderately alkaline throughout. The calcium carbonate content is

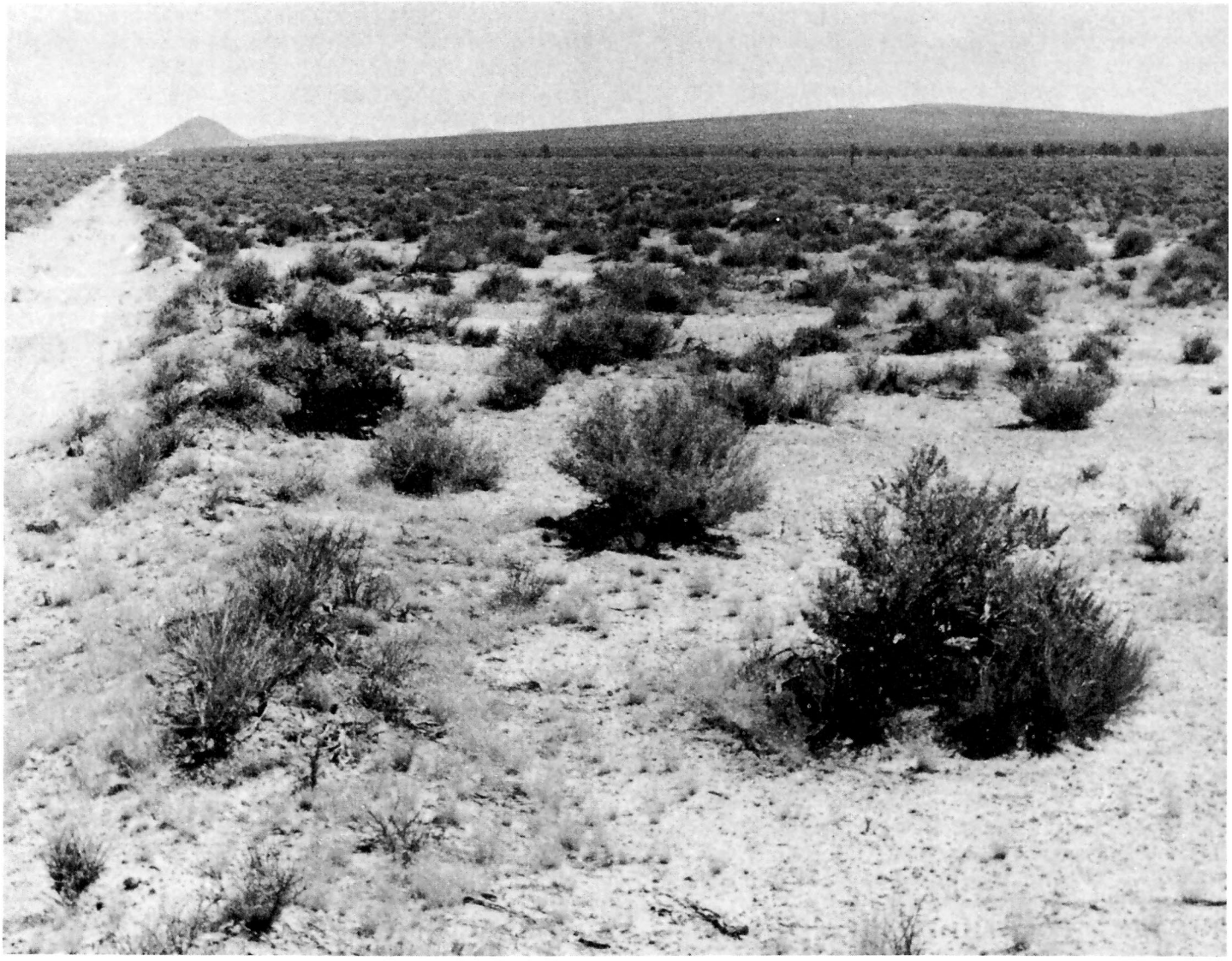

Figure 6.—Typical landscape of DeStazo sandy loam, 0 to 2 percent slopes In the background are low pediments and desert buttes.

more than 40 percent by weight, and this soil is calcareous throughout. In some places unrelated stratified horizons with faint mottles are at a depth of more than 60 inches.

Included with this soil in mapping are areas of Rosamond soils along small, narrow flood plains. These included areas make up about 15 percent of the unit.

Permeability of this DeStazo soil is moderately slow, and available water capacity is low or moderate. Surface runoff is medium, and the hazard of erosion is high. The hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more. Flooding occurs only rarely.

Areas of this soil are used for rangeland, and this soil is suited for rangeland. The gravel-sized highly calcareous hard nodules are the main limitation. Low annual precipitation is also a problem. The vegetation is dominated by alkaline-tolerant plants. Forage production is low. In years when precipitation is favorable, however, filaree and annual grasses produce manageable quantities of forage. Excessive disturbance of the surface can result in soil blowing. Filaree, shadscale, and spin hopsage are the main forage and browse plants.

The estimated total annual forage production is 150 pounds per acre during favorable years, 100 pounds during normal years, and 75 pounds during unfavorable years. The range site is Limy Coarse Loamy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

127—DiGiorgio sandy clay loam, 0 to 2 percent slopes. This soil is very deep, well drained, and nearly level. It is on flood plains and in basins. It formed in alluvial material derived from granitic rock. Areas are elongated north to south and range from 250 to 500 acres in size. Elevation ranges from 500 to 700 feet. The mean annual precipitation ranges from 6 to 8 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is grayish brown sandy clay loam about 18 inches thick. The underlying material to a depth of 78 inches is yellowish brown and pale brown sandy clay loam and fine sandy loam. This soil is calcareous below a depth of 18 inches. In some places the surface layer is loam, silt loam, or clay loam.

Included with this soil in mapping are small areas of Arvin, Hesperia, Rosamond Variant, and Whitewolf soils. These areas make up about 10 percent of the unit. Also included are a few areas of soils that are more than 35 percent clay throughout and areas of mottled soils along ditches.

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

Areas of this soil are used for irrigated crops. Alfalfa, cotton, garlic, sugar beets, tomatoes, and wheat are the main crops.

This soil is suited to most crops commonly grown in the area. Lack of adequate moisture is the only limitation. A cropping system that includes crop rotation, crop residue utilization, and proper tillage helps to improve soil tilth, structure, fertility, and water infiltration. This soil is suited to furrow, border, sprinkler, or drip irrigation. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff or deep percolation.

This soil is in capability class I (17), irrigated, and IVe-1 (17), nonirrigated.

128—Dumps, mine. This unit consists of areas of earthy material and rock dumped from open pit mines and from the preparation of tunnels and shafts in hard rock mines. Material from an open pit Borax mine near Boron, in the eastern part of the survey area, covers hundreds of acres to an average depth of about 50 feet. The material from hard rock mines in Soledad Mountain, south of Mojave, and other mountains in the vicinity is in small dumps. Most of this material is fine textured because it has been processed for the extraction of gold and silver.

129—Edmundston sandy loam, 30 to 50 percent slopes. This deep, well drained, steep soil is on mountainous uplands. It formed in residual material weathered from granitic rock. Areas are irregular in shape and range from 50 to 800 acres in size. The vegetation is mainly annual grasses and oaks. Elevation ranges from 4,000 to 5,500 feet. The mean annual precipitation is about 12 inches, and the average annual air temperature is about 54 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is brown and grayish brown sandy loam about 17 inches thick. The subsoil is grayish brown sandy loam about 17 inches thick. The substratum is brown gravelly coarse sandy loam to a depth of 50 inches. Below this is weathered granitic rock. In some places the surface layer is loam.

Included with this soil in mapping are areas of Godde soils and areas of Edmundston soils with slopes ranging as low as 15 percent. These areas make up about 20 percent of the unit. Also included are small areas of rock outcrop.

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

Areas of this soil are used for rangeland, recreation, watershed, and wildlife habitat.

This soil is suited for rangeland. The steep slope is the major limitation. Livestock trails are needed on steeper areas to obtain uniform distribution of livestock. Major forage plants are cheatgrass and blue wildrye.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

130—Edmundston gravelly sandy loam, 30 to 50 percent slopes. This deep, well drained, steep soil is on mountainous uplands. It formed in residual material weathered from granitic rocks. Areas are irregular in shape and range from 100 to 3,000 acres in size. The vegetation is mainly conifers and shrubs. Elevation ranges from 5,000 to nearly 8,000 feet. The mean annual precipitation ranges from 10 to 21 inches, and the average annual air temperature is about 54 degrees F. The average frost-free season ranges from 150 to 200 days.

Typically, the surface layer is brown and grayish brown gravelly sandy loam about 17 inches thick. The subsoil is grayish brown sandy loam about 17 inches thick. The substratum is brown gravelly coarse sandy loam to a depth of 50 inches. Below this is weathered granitic rock.

Included with this soil in mapping are areas of Anaverde, Godde, and Tollhouse soils. These areas make up about 15 percent of the unit. Also included are small areas of soils similar to Edmundston but which formed in different parent material.

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

Areas of this soil are mainly used for grazable woodland. These areas also provide good habitat for wildlife.

This soil is suited to the production of Jeffrey pine. It is capable of producing about 4,440 cubic feet of wood or 23,100 board feet (international rule) of merchantable wood per acre from a fully stocked stand of 100-year-old trees. Limiting soil features are steep slopes and a high hazard of erosion. Special care is required during logging activities to prevent erosion.

Livestock should be kept out of newly established tree plantations until the seedlings are well established. Low forage production and steep slopes limit grazing on this soil. Brushy areas of scrub black oak and a lack of livestock water restrict distribution of livestock. Stock trails, water development, and selective brush control are needed to improve these areas for livestock. Pine bluegrass and mountain brome are desirable forage plants.

This soil is in capability subclass VIe (22), nonirrigated.

131—Edmundston gravelly sandy loam, 50 to 75 percent slopes. This deep, well drained, very steep soil is on mountainous uplands. It formed in residual material derived from granitic rocks. Areas are irregular in shape and range from 200 to 700 acres in size. The vegetation is mainly conifers and shrubs. Elevation ranges from 4,500 to nearly 8,000 feet. The mean annual precipitation ranges from 10 to 21 inches, and the average annual air temperature is about 54 degrees F. The average frost-free season ranges from 150 to 200 days.

Typically, the surface layer is brown and grayish brown gravelly sandy loam about 17 inches thick. The subsoil is grayish brown sandy loam about 17 inches thick. The substratum is brown gravelly sandy loam to a depth of 50 inches. Below this is weathered granitic rock.

Included with this soil in mapping are areas of Anaverde, Godde, and Tollhouse soils that make up about 15 percent of the unit and areas of an Edmundston soil, 30 to 50 percent slopes, which make up 10 percent of the unit. Also included are small areas of soils similar to Edmundston but which have a strongly developed subsoil.

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

Areas of this soil are used for grazable woodland, wildlife habitat, and watershed.

This soil is suited to the production of Jeffrey pine. It is capable of producing about 4,440 cubic feet of wood or 23,100 board feet (international rule) of merchantable wood per acre from a fully stocked stand of 80-year-old trees. The major limiting soil feature is the very steep slopes. Because of the severe erosion hazard, special care is needed to prevent erosion.

Livestock should be kept out of newly established tree plantations until the seedlings are well established. Low forage production and steep slopes limit grazing on this soil. Brushy areas of scrub black oak and a lack of livestock water restrict distribution of livestock. Stock trails, water development, and selective brush control are needed to improve these areas for livestock. Pine bluegrass and mountain brome are desirable forage plants.

This soil is in capability subclass VIIe (22), nonirrigated.

132—Edmundston gravelly sandy loam, dry, 30 to 50 percent slopes. This deep, well drained, steep soil is on mountainous uplands mainly in an area on the east-facing slopes of the Tehachapi Mountains. It formed in residual material weathered from granitic rocks. Areas are irregular in shape and range from 100 to 700 acres in size. The vegetation is mainly conifers and shrubs. Elevation dominantly ranges from 4,500 to 6,000 feet. The mean annual precipitation is dominantly 10 to 12 inches, but as much as 18 inches in a few areas. The average annual air temperature is about 54 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is brown and grayish brown gravelly sandy loam about 17 inches thick. The subsoil is grayish brown sandy loam about 17 inches thick. The substratum is brown gravelly coarse sandy loam to a depth of 50 inches. Below this is weathered granitic rock. In some places the surface layer is sandy loam.

Included with this soil in mapping are areas of Godde and Tollhouse soils and areas of rock outcrop. The Godde and Tollhouse soils make up about 15 percent of the unit, and the rock outcrop 5 percent.

Permeability of this Edmundston soil is moderately rapid, and available water capacity is low or moderate. Surface runoff is medium or rapid, and the hazard of erosion is high. The effective rooting depth is 40 to 60 inches.

Areas of this soil are used for grazable woodland, watershed, and wildlife habitat.

This soil is suited for rangeland. In most areas, it supports a stand of pinyon-juniper with a mixed grass-forb and shrub understory. The steep slopes, gravelly textures, and low available water capacity are the main limitations. As juniper and pinyon increase, production of valuable forage plants is suppressed. At higher elevations, this soil supports a mixed stand of white fir and Jeffrey, sugar, and ponderosa pines. The major forage plant is pine bluegrass. Stock trails may be needed to encourage distribution of grazing livestock.

This soil is in capability class VIe (18), nonirrigated.

133—Edmundston-Godde-Tollhouse complex, 30 to 50 percent slopes. These soils are deep or shallow, well or somewhat excessively drained, and steep. They are on mountainous uplands. Areas are irregular in shape and range from 300 to 1,000 acres in size. The vegetation is mainly conifers, hardwoods, shrubs, annual

grasses, and forbs. Elevation ranges from 4,500 to nearly 8,000 feet. The mean annual precipitation ranges from 12 to 21 inches, and the mean annual air temperature is about 54 degrees F. The average frost-free season ranges from 150 to 200 days. The Edmundston soil makes up about 50 percent of this unit, the Godde soil about 20 percent, and the Tollhouse soil about 15 percent.

Included in this unit are areas of rock outcrop and areas of soils similar to Edmundston but which have a strongly developed subsoil. The areas of rock outcrop make up about 10 percent of the unit, and the other included areas make up about 5 percent.

The Edmundston soil is deep and well drained. It formed in residual material weathered mainly from granitic rock.

Typically, the surface layer of the Edmundston soil is brown and grayish brown gravelly sandy loam about 17 inches thick. The subsoil is grayish brown sandy loam about 17 inches thick. The substratum is brown gravelly sandy loam to a depth of 50 inches. Below is weathered granitic rock. In some places the surface layer is loam.

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

The Godde soil is shallow and somewhat excessively drained. It formed in residual material weathered mainly from granitic rock.

Typically, the surface layer of the Godde soil is grayish brown gravelly sandy loam about 10 inches thick. Below this is fractured unweathered granitic rock. In some places the surface layer is sandy loam.

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

The Tollhouse soil is shallow and somewhat excessively drained. It formed in residual material weathered mainly from granitic rock.

Typically, the surface layer of the Tollhouse soil is grayish brown gravelly sandy loam about 13 inches thick. Below this is weathered granite.

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

Areas of this unit are used for grazable woodland, wildlife habitat, recreation, and watershed.

The Edmundston soil in this unit is suited to the production of Jeffrey pine. If used for woodland it is capable of producing about 4,440 cubic feet or 23,100 board feet (international rule) of merchantable wood per acre from a fully stocked stand of 100-year-old trees. Limiting soil features are the steep slopes, shallow soil depth, and high hazard of erosion. Special care is required during logging activities to prevent erosion. Livestock should be kept out of newly established tree plantations until seedlings are well established. Low forage production and steep slopes limit grazing on this soil. Brushy areas of scrub oak, manzanita, and buckbrush and a lack of water restrict livestock distribution. Stock trails, water development, and selective brush control are needed to improve these areas for livestock. Ripgut brome, blue wildrye, and cheatgrass are the main forage plants. Most forage for grazing is on the Godde and Tollhouse soils.

This unit is in capability subclass VIIe (22), nonirrigated.

134—Edmundston-Godde-Tollhouse complex, 50 to 75 percent slopes. These soils are deep or shallow, well drained or somewhat excessively drained, and very steep. They are on mountainous uplands. Areas are irregular in shape and range from 70 to 1,300 acres in size. The vegetation is mainly conifers, hardwoods, shrubs, annual grasses, and forbs. Elevation ranges from 4,500 to nearly 8,000 feet. The mean annual precipitation ranges from 12 to 21 inches, and the mean annual air temperature is about 54 degrees F. The average frost-free season ranges from 150 to 200 days. The Edmundston soil makes up about 50 percent of this unit, the Godde soil about 20 percent, and the Tollhouse soil about 15 percent.

Included in this unit are areas of rock outcrop and areas of soils similar to Edmundston, but which have a strongly developed subsoil. The areas of rock outcrop make up 10 percent of the unit, and the other included areas make up 5 percent.

The Edmundston soil is deep and well drained. It formed in residual material weathered mainly from granitic rock.

Typically, the surface layer of the Edmundston soil is brown and grayish brown gravelly sandy loam about 17 inches thick. The subsoil is grayish brown sandy loam about 17 inches thick. The substratum is brown gravelly sandy loam to a depth of 50 inches. Below this is weathered granitic rock. In some places the surface layer is loam.

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

The Godde soil is shallow and somewhat excessively drained. It formed in residual material weathered mainly from granitic rock.

Typically, the surface layer of the Godde soil is grayish brown gravelly sandy loam about 10 inches thick. Below this is a fractured unweathered granitic rock. In some places the surface layer is sandy loam.

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

The Tollhouse soil is shallow and somewhat excessively drained. It formed in residual material weathered mainly from granitic rock.

Typically, the surface layer of the Tollhouse soil is grayish brown gravelly sandy loam about 13 inches thick. Below this is weathered granite.

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

Areas of this unit are used for grazable woodland, wildlife habitat, recreation, and watershed.

The Edmundston soil in this unit is suited to the production of Jeffrey pine. It is capable of producing about 4,440 cubic feet or 23,100 board feet (international rule) of merchantable wood per acre from a fully stocked stand of 100-year-old trees. Limiting soil features are the steep slopes, shallow soil depth, and a high hazard of erosion. Special care is required during logging activites to prevent erosion. Livestock should be kept out of newly established tree plantations until seedlings are well established. Low forage production and steep slopes limit grazing. Brushy areas of scrub oak, manzanita, and buckbrush and a lack of water restrict livestock distribution. Stock trails, water development, and selective brush control are needed to improve these areas for livestock. Ripgut brome, blue wildrye, and cheatgrass are the main forage plants. Most forage for grazing is on the Godde and Tollhouse soils.

This unit is in capability subclass VIIe (22), nonirrigated.

135—Fluvents, ponded. These nearly level soils consist mostly of manmade recharge basins. These alluvial soils are stratified with coarse and moderately coarse material. They are somewhat excessively or excessively drained. In years when precipitation is normal and water is made available to the Central Valley Projects (Friant-Kern Canal), these areas are covered with water more than half of the time. Areas are rectangular to irregular in shape and range from 260 to 400 acres in size.

Included with these soils in mapping are small basin areas near Lebec. These areas have medium textured material and are dry about half of the time.

These soils are poorly suited for most uses. They are mainly used for spreading imported water to raise the local water table.

136—Friant sandy loam, 50 to 75 percent slopes. This shallow, well drained, very steep soil is on mountainous uplands. It formed in residual material weathered from hard mica schist. Areas are irregular in shape and range from 90 to 670 acres in size. The vegetation is mainly annual grasses, forbs, and hardwood trees. Elevation ranges from 2,000 to 5,800 feet but is dominantly between 4,000 and 5,800 feet. The mean annual precipitation ranges from 12 to 15 inches, and the average annual air temperature is about 60 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is grayish brown and brown sandy loam about 18 inches thick. Below this is hard mica schist.

Included with this soil in mapping are areas of Walong soils that make up about 10 percent of the unit and areas of rock outcrops that also make up about 10 percent of the unit.

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

Areas of this soil are used for rangeland, recreation, wildlife habitat, and watershed.

This soil is suited for rangeland. Major limitations are shallow depth and very steep slopes. This soil has a tendency to produce woody plants. It supports a mixed stand of blue oak and scattered Juniper. Where shrubby buckwheat and goldenbush can be managed to create open areas, this soil will produce annual grasses and forbs. Major forage plants are cheatgrass, ripgut brome, and filaree. Water development and livestock trails are needed to increase livestock distribution on the steeper slopes. This would prevent overgrazing on the flatter areas and help to prevent erosion.

The estimated total annual forage production is 1,000 pounds per acre during favorable years, 800 pounds during normal years, and 400 pounds during unfavorable years. The range site is Shallow Coarse Loamy (18).

This soil is in capability subclass VIIe (18), nonirrigated.

137—Garlock loamy sand, 2 to 9 percent slopes. This very deep, well drained, gently sloping and gently rolling soil is on alluvial fans and terraces. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 50 to 20,000 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation ranges from 5 to 7 inches, and the average annual air temperature is about 63 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is yellowish brown and brown loamy sand and sandy loam about 9 inches thick. The subsoil is strong brown and brown sandy loam and sandy clay loam about 24 inches thick. The substratum to a depth of 51 inches is brown and yellowish brown, gravelly loamy sand and gravelly coarse loamy sand. The lower part, to a depth of 60 inches, is light yellowish brown, calcareous very gravelly loamy sand. Reaction is moderately and mildly alkaline throughout the profile.

Included with this soil in mapping are areas of Cajon and Neuralia soils that make up about 20 percent of the unit. Also included are small areas of a deep soil with a light brownish gray surface layer and subsoil and few small areas with a very thin, white subsurface layer.

Permeability of this Garlock soil is moderately slow, and available water capacity is low or moderate. Surface

runoff is slow or medium, and the hazard of erosion is slight or moderate. The soil blowing hazard is high. The effective rooting depth is 60 inches or more.

A few areas are used for irrigated crops. Alfalfa is the main crop. Other areas of this soil are used for rangeland, recreation, wildlife habitat, and homesites.

This soil is suited to irrigated crops. The hazard of erosion and the moderately slow permeability are the main limitations. A cropping system consisting of crop rotation, use of crop residues, and properly timed tillage are suitable management practices to improve the permeability and reduce wind and water erosion. Sprinklers are the most common method of irrigation. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to prevent excessive runoff and a perched water table.

This soil is poorly suited for rangeland. The loamy sand surface texture and low available water capacity are the main limitations. Because of limited precipitation forage production is normally low. During years of favorable precipitation, however, this soil will produce an abundance of annual grasses and forbs which make high quality forage. Major forage and browse plants are filaree, desert needlegrass, buckwheat, and some annual grasses. Permanent cover is desirable to prevent wind erosion.

This soil is generally suited to urban development, but onsite evaluation is advisable. The hazard of erosion and the sandy textures are the main limitations. Erosion is a hazard if the surface is disturbed and left bare. Only the area necessary for construction should be disturbed. Moderate shrink-swell potential in the subsoil is a limitation for dwellings and local roads and streets.

The estimated total annual forage production is 400 pounds per acre during favorable years, 300 pounds during normal years, and 200 pounds during unfavorable years. The range site is Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated, and capability unit IIIe-1 (30), irrigated.

138—Godde-Tollhouse gravelly sandy loams, 30 to 75 percent slopes. These soils are shallow, somewhat excessively drained, and steep and very steep. They are on mountainous uplands. Areas are irregular in shape and range from 60 to 1,400 acres in size. The vegetation is mainly annual grasses, shrubs, and scattered conifers and hardwoods. Elevation ranges from 4,500 to 8,000 feet. The mean annual precipitation ranges from 12 to 21 inches, and the mean annual air temperature is about 54 degrees F. The average frost-free season ranges from 150 to 225 days. The Godde soil makes up about 40 percent of this unit, the Tollhouse soil about 30 percent.

Included in this unit are areas of Godde-Tollhouse soils in the Cummings Mountain area where slopes range from 15 to 50 percent. These areas make up about 15 percent of the unit. Also included are areas of soils that are more than 20 inches deep over bedrock and a few areas where the surface is up to 40 percent gravel. These areas make up another 15 percent of the unit.

The Godde soil is shallow and somewhat excessively drained. It formed in residual material weathered mainly from granitic rock.

Typically, the surface layer of the Godde soil is grayish brown gravelly sandy loam about 10 inches thick. Below this is fractured, unweathered granitic rock.

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

The Tollhouse soil is shallow and somewhat excessively drained. It formed in residual material weathered mainly from granitic rock.

Typically, the surface layer of the Tollhouse soil is grayish brown gravelly sandy loam about 13 inches thick. Below this is weathered granite.

Permeability of this soil is moderately rapid, and available water capacity is very low. Surface runoff is rapid, and the hazard of erosion is high. The effective rooting depth ranges from 5 to 15 inches.

These soils are used for recreation, watershed, wildlife habitat, and occasional grazing.

These soils are poorly suited for rangeland. The major limitations include steep slopes and shallow depth over rock. Low forage production is also a problem. The Tollhouse soil supports a tall, thick stand of mixed brush which further limits livestock use. Stock trails and water development are needed. Brush management is a suitable practice on the lower slopes. Major forage and browse plants are pine bluegrass, mountain brome, mountainmahogany, and mountain whitethorn.

This unit is in capability subclass VIIe (18, 22), nonirrigated.

139—Haploxerolls, hilly. These soils are on old dissected terraces and alluvial fans adjacent to steep uplands. Slope ranges from 15 to 50 percent. Only two areas of this soil are mapped. They are oval in shape and are 240 to 2,872 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 1,000 to 2,000 feet. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season is about 225 days.

Haploxerolls are shallow to deep, well drained soils. They formed in consolidated alluvial material weathered from mixed sources. The majority of this unit consists of coarse textured soils that have a dark surface layer. Content of coarse fragments ranges from 0 to 75 percent, and the clay content is 5 to 10 percent.

Included in this unit are areas of soils that have a light-colored surface layer and a developed subsoil. These areas make up about 15 percent of the unit. A few small areas are included of a soil that has a layer of gypsum overlain by silty soil material. Rock outcrops make up about 1 percent of the unit. A few small areas of clayey soils are also included.

Permeability of these soils is rapid, and the available water capacity ranges from very low to very high. Surface runoff is rapid, and the hazard of erosion is moderate or high. The effective rooting depth ranges from 10 to 60 inches or more.

These soils are used for rangeland, recreation, and wildlife habitat.

These soils are suited for rangeland. They are limited for this use mainly by hilly slopes and the hazard of erosion. Developing watering facilities and establishing walkways help to improve livestock distribution. Fencing, prescribed burning, and planned grazing systems can improve the site. Main forage and browse plants include forbs and shrubs.

This unit is in capability subclass VIe (18), nonirrigated.

140—Havala sandy loam, 0 to 2 percent slopes. This very deep, well drained, nearly level soil is on alluvial fans and old stream terraces. It formed in alluvial material derived from granitic rocks. Areas are irregular in shape and range from 10 to 3,000 acres in size. The vegetation is mainly annual grasses, forbs, and hardwoods. Elevation ranges from 4,000 to 4,300 feet. The mean annual precipitation ranges from 9 to 12 inches, and the mean annual air temperature is about 59 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is brown and grayish brown sandy loam about 24 inches thick. The subsoil is dark brown and yellowish brown sandy clay loam about 24 inches thick. The substratum to a depth of about 65 inches is grayish brown sandy loam. In some places the surface layer is loam.

Included with this soil in mapping are areas of Steuber soils that make up about 10 percent of the unit. Also included are a few areas of Havala soils with calcareous surface layers. These areas are near the Monolith Cement Plant.

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

Most areas of this soil are used for irrigated crops. Peaches, pears, apples, and potatoes are the main crops. A few areas are used for rangeland.

This soil is suited to most crops commonly grown in the area. It has few hazards or limitations when farmed. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to improve soil tilth, structure, fertility, and water infiltration. It is suited to furrow, border, sprinkler, or drip irrigation. Irrigation water should be applied at a rate sufficient from maximum production but in amounts small enough to avoid excessive runoff or deep percolation.

This soil is suited for rangeland. It supports an open stand of deciduous oak and an abundant understory of annual grasses and forbs. Forage plants that grow on this soil are soft chess, wild oats, and filaree. This soil responds well to range seeding and fertilization.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,500 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Havala soil is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated, and capability class I (18), irrigated.

141—Havala sandy loam, 2 to 5 percent slopes. This very deep, well drained, gently sloping soil is on alluvial fans and old stream terraces. It formed in alluvial material derived from granitic rocks. Areas are irregular in shape and range from 40 to 750 acres in size. The vegetation is mainly annual grasses, forbs, and hardwoods. Elevation ranges from 4,000 to 4,300 feet. The mean annual precipitation ranges from 9 to 12 inches, and the mean annual air temperature is about 59 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is brown and grayish brown sandy loam about 24 inches thick. The subsoil is dark brown and yellowish brown sandy clay loam about 24 inches thick. The substratum to a depth of about 65 inches is grayish brown sandy loam. In some places the surface layer is loam.

Included with this soil in mapping are areas of Steuber and Tujunga soils and areas of Tehachapi soils. The Steuber and Tujunga soils make up 8 percent of the unit, and the Tehachapi soils make up 2 percent.

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

Areas of this soil are used for irrigated crops. Peaches, pears, apples, and potatoes are the main crops. Other areas are used for range.

This soil is suited to most crops commonly grown in the area. The hazard of erosion and the sandy loam surface textures are the main limitations. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to prevent water and wind erosion and improve soil tilth, structure, fertility, and water infiltration. Border, furrow, sprinkler, or drip irrigation is suited to this soil. Irrigation water should be applied at a rate sufficient from maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

This soil is suited for rangeland. The main limitation is the hazard of erosion, but this can be reduced by good grazing management. This soil supports an open stand of deciduous oaks and an understory of annual grasses and forbs. Main forage plants are soft chess, wild oats, and filaree. This soil responds well to seeding and fertilization.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,500 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated, and IIe-1 (18), irrigated.

142—Havala sandy loam, 5 to 9 percent slopes. This very deep, well drained, moderately sloping soil is on alluvial fans and old stream terraces. It formed in alluvial material derived from granitic rocks. Areas are regular in shape and range from 10 to 460 acres in size. The vegetation is mainly annual grasses, forbs, and hardwoods. Elevation ranges from 3,000 to 4,300 feet. The mean annual precipitation ranges from 9 to 12 inches, and the mean annual air temperature is about 59 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is brown and grayish brown sandy loam about 24 inches thick. The subsoil is dark brown and yellowish brown sandy clay loam about 24 inches thick. The substratum to a depth of about 65 inches is grayish brown sandy loam. In some places the surface layer is loam.

Included with this soil in mapping are areas of Steuber soils and areas of Tehachapi soils. The Steuber soils make up about 8 percent of the unit, and the Tehachapi soils make up 2 percent.

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

Areas of this soil are used for irrigated orchards. Peaches are the main crop. Other areas are used for rangeland.

This soil is suited to the crops commonly grown in the area. Slope and the hazard of erosion are the main limitations. Orchards can be protected from erosion by cover crops, properly timed tillage, and utilizing all crop residue. A system for collecting excess water and conducting it in diversions or permanent grass waterways to controlled outlets may be necessary. Sprinkler and drip irrigation are the most suitable methods for irrigating orchards. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

This soil is suited for rangeland. The main limitation is the hazard of erosion, but this can be reduced by good grazing management. It supports an open stand of deciduous oaks and an abundant understory of annual grasses and forbs. Main forage plants are soft chess, wild oats, and filaree.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,500 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated, and IIIe-1 (18), irrigated.

143—Havala sandy loam, 9 to 15 percent slopes. This very deep, well drained, rolling soil is on alluvial fans and old stream terraces. It formed in alluvial material derived from granitic rocks. Areas are irregular in shape and range from 45 to 230 acres in size. The vegetation is mainly annual grasses, forbs, and hardwoods. Elevation ranges from 4,000 to 4,300 feet. The mean annual precipitation ranges from 9 to 12 inches, and the mean annual air temperature is about 59 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is brown and grayish brown sandy loam about 24 inches thick. The subsoil is dark and yellowish brown sandy clay loam about 24 inches thick. The substratum to a depth of 65 inches is grayish brown sandy loam. In some places the surface layer is loam.

Included with this soil in mapping are areas of Havala soils with 15 to 30 percent slopes and areas of Steuber soils. These steeper Havala soils make up 5 percent of the unit, and the Steuber soils make up 10 percent. Also included are small areas with large boulders on the surface.

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

Areas of this soil are used for irrigated orchards. Peaches are the main crop. A few areas are used for rangeland.

This soil is suited to the crops commonly grown in the area. Slope and the hazard of erosion are the main limitations. Orchards can be protected from erosion by cover crops, properly timed tillage, and utilizing all crop residue. A system for collecting excess water and conducting it by diversion or in permanent grass waterways to controlled outlets may be necessary. Sprinkler and drip irrigation are the most suitable methods for irrigating orchards. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

This soil is suited for rangeland. The main limitation is the hazard of erosion, but this can be reduced by good grazing management. This soil supports an open stand of deciduous oaks, and an abundant understory of grasses and forbs. Main forage plants are soft chess, wild oats, and filaree.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,500 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated and irrigated.

144—Hesperia sandy loam, 0 to 2 percent slopes. This very deep, well drained, nearly level soil is on alluvial fans. It formed in alluvial material derived from granitic rocks. Areas are irregular in shape and range from 1,000 to 12,000 acres in size. The vegetation is

mainly annual grasses and forbs. Elevation ranges from 500 to 1,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is brown sandy loam about 4 inches thick. The underlying material to a depth of 70 inches is brown and light yellowish brown sandy loam and fine sandy loam. In some places the surface layer is loam.

Included with this soil in mapping are small areas of DiGiorgio soils, Whitewolf soils, and a deep sandy soil similar to Hesperia but with thin stratified layers below a depth of 20 inches. These included areas make up about 10 percent of the unit.

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

Areas of this soil are used for irrigated crops and dryland pasture. The main crops are cotton, tomatoes, sugar beets, garlic, onions, grapes, and potatoes.

This soil is suited to most crops commonly grown in the area. The sandy loam texture is the main limitation. A cropping system that includes a crop rotation or cover crop, crop residue utilization, and proper tillage helps to improve soil tilth, structure, fertility, and water infiltration and reduce soil blowing. This soil is suited best to sprinkler irrigation, but border, furrow, and drip irrigation are also effective. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff or deep percolation.

This soil is in capability unit IIs-4 (17), irrigated, and IVe-1 (17), nonirrigated.

145—Hesperia sandy loam, 2 to 5 percent slopes. This very deep, well drained, gently sloping soil is on alluvial fans. It formed in alluvial material derived from granitic rocks. Areas are irregular in shape and range from 140 to 630 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 500 to 1,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is brown sandy loam about 4 inches thick. The underlying material to a depth of 60 inches is brown and light yellowish brown sandy loam and fine sandy loam. In some places the underlying material is loam.

Included with this soil in mapping are small areas of DiGiorgio soils, Wasioja soils, Whitewolf soils, and a deep sandy loam soil similar to Hesperia but which has thin stratified layers below a depth of 20 inches. These included areas make up about 15 percent of the unit. Also included are a few areas of Psamments-Xerolls.

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

Areas of this soil are used for irrigated crops and dryland pasture. The main crops are cotton, tomatoes, sugar beets, garlic, onions, grapes, and potatoes.

This soil is suited to most crops commonly grown in the area. The hazard of erosion and the sandy loam textures are the main limitations. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to prevent erosion and improve soil tilth, structure, fertility, and water infiltration. This soil is suited best to sprinkler or drip irrigation systems. Border and furrow irrigation systems can be used on the gentler slopes. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

This soil is in capability unit IIe-1 (17), irrigated, and IVe-1 (17), nonirrigated.

146—Hesperia sandy loam, 5 to 9 percent slopes. This very deep, well drained, sloping soil is on alluvial fans. It formed in alluvial material derived from granitic rocks. Areas are regular in shape and range from 340 to 600 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 800 to 1,200 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is brown sandy loam about 4 inches thick. The underlying material to a depth of 60 inches is light yellowish brown sandy loam. In some places the underlying material is loam.

Included with this soil in mapping are small areas of Rosamond Variant, Wasioja soils, and Whitewolf soils. These included areas make up about 15 percent of the unit.

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

Areas of this soil are used for irrigated crops and dryland pasture. Grapes is the main crop.

This soil is suited to most crops commonly grown in the area. The hazard of erosion and the sandy loam texture are the main limitations. A cropping system that includes a crop rotation or cover crop, crop residue utilization, and proper tillage helps to prevent erosion and improve soil tilth, structure, fertility, and water infiltration. This soil is suited best to sprinkler or drip irrigation systems. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

This soil is in capability unit IIIe-1 (17), irrigated, and IVe-1 (17), nonirrigated.

147—Hi Vista sandy loam, 2 to 9 percent slopes. This moderately deep, well drained, undulating and gently rolling soil is on low pediments. It formed in residual material weathered from granitic rocks. Areas are irregular in shape and range from 40 to 1,600 acres in size. The vegetation is mainly annual grasses and shrubs. Elevation ranges from 2,400 to 2,600 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is yellowish brown sandy loam about 4 inches thick. The subsoil is brown, dark yellowish brown, and light yellowish brown gravelly sandy clay loam about 26 inches thick. Below this is hard, fractured granite. In some places the surface layer is gravelly coarse sandy loam.

Included with this soil in mapping are areas of Arizo, Cajon, and Muroc soils. These included areas make up about 20 percent of the unit.

Permeability of this Hi Vista soil is moderately slow, and the available water capacity is very low to moderate. Surface runoff is slow to medium. The hazard of erosion and soil blowing is moderate. The effective rooting depth ranges from 20 to 40 inches.

Areas of this soil are used for rangeland and recreation. A few areas are used for urban development.

This soil is poorly suited for rangeland. The hazard of erosion and the very low or low available water capacity are the major soil limitations. Low forage production is also a problem. Excessive disturbance or overgrazing can result in severe wind erosion. Woody plants such as winterfat and spiny hopsage are the dominant vegetation on this soil. In years with favorable precipitation, desert needlegrass, red brome, and filaree produce an abundant quantity of desirable forage.

The estimated total annual forage production on the Hi Vista soils is 200 pounds per acre during favorable years, 100 pounds during normal years, and 75 pounds during unfavorable years. The range site is Coarse Loamy (30).

This soil is poorly suited to urban development. Shallow depth over granitic rock is the main limitation for building sites, roads, streets, and septic tank absorption fields. Community sewage systems are needed if these areas are developed for homesites. Onsite investigations should be made before construction is started to determine whether soil limitations can be adequately overcome.

This soil is in capability subclass VIIe (30), nonirrigated.

148—Jawbone gravelly loamy sand, 15 to 75 percent slopes. This shallow, excessively drained, hilly to very steep soil is on mountainous uplands. It formed in residual material weathered from granitic rock. Areas are irregular in shape and range from 1,700 to 6,500 acres in size. The vegetation is mainly annual grasses, forbs, shrubs, and scattered conifers. Elevation dominantly ranges from 3,000 to 4,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is a light yellowish brown gravelly loamy sand about 10 inches thick. Below this is highly weathered granite. In some places the surface layer is gravelly loamy coarse sand.

Included with this soil in mapping are small areas of Arizo, Cinco, and Hi Vista soils. These included areas make up about 20 percent of the unit. Also included are a few areas of rock outcrop and Jawbone soils on gently or moderately sloping ridgetops.

Permeability of this Jawbone soil is rapid, and available water capacity is very low. Surface runoff is rapid to very rapid, and the hazard of erosion is high or very high. The effective rooting depth is 4 to 12 inches.

Areas of this soil are used for rangeland and watershed.

This soil is poorly suited for rangeland. The shallow depth to bedrock, steep slopes, high or very high hazard of erosion, and very low available water capacity are the main soil limitations. Steep escarpments limit livestock distribution and excessive disturbance or overgrazing may result in a severe erosion problem. Forage production is low and livestock water is lacking. Fencing and the development of livestock water facilities will help to obtain proper livestock distribution. Winterfat, spiny hopsage, and junipers dominate the vegetation. Indian ricegrass, red brome, and filaree are the main forage plants. Rotation grazing may be beneficial to increase the amount of desert needlegrass and to control erosion.

The estimated total annual forage production is 1,000 pounds per acre during favorable years, 500 pounds during normal years, and 200 pounds during unfavorable years. The range site is Shallow Gravelly Loamy (29).

This soil is in capability subclass VIIe (29), nonirrigated.

149—Los Osos Variant clay loam, 30 to 50 percent slopes. This moderately deep, well drained, steep soil is on mountainous uplands. It formed in residual material weathered from quartzite or marble. Areas are irregular in shape and range from 30 to 500 acres in size. The vegetation is mainly hardwood trees and annual and perennial grasses. Elevation ranges from 3,000 to 4,000 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 57 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown, calcareous clay loam about 22 inches thick. The subsoil is brown, calcareous clay to a depth of 32 inches. Below this is hard, slightly fractured quartzite.

Included with this soil in mapping are areas of Tweedy, Godde, and Tollhouse soils that make up about 15 percent of the unit. Also included are a few areas of rock outcrop.

Permeability of this Los Osos Variant soil is slow, and available water capacity is low or moderate. Surface runoff is medium, and the hazard of erosion is high. The effective rooting depth ranges from 25 to 40 inches.

Areas of this soil are used for rangeland, recreation, wildlife, and watershed.

This soil is suited for rangeland. Steep slopes and the high hazard of erosion are the major limitations. Stock trails or walkways can be constructed on the steeper slopes to encourage livestock distribution. This soil supports an open stand of deciduous oaks with an understory of soft chess and filaree.

The estimated total annual forage production is 2,200 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Limy Fine Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

150—Muroc sandy loam, 2 to 9 percent slopes. This shallow, well drained, gently or moderately sloping soil is on low pediments. It formed in residual material weathered from granite. Areas are irregular in shape and range from 20 to 2,000 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 66 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is yellowish brown and pale brown, calcareous sandy loam about 15 inches thick. The underlying material to a depth of 27 inches is a white silica-lime cemented hardpan. Below this is highly weathered, calcareous granite. In some places the surface layer is coarse sandy loam.

Included with this soil in mapping are small areas of Cajon, Hi Vista, and Randsburg soils. Also included are a few small areas of rock outcrop and soils that are similar to Muroc but which have a hardpan at a depth of more than 20 inches. Included areas make up about 15 percent of the unit.

Permeability of this Muroc soil above the hardpan is moderately rapid but is very slow in the hardpan. The available water capacity is very low. Surface runoff is slow or medium, and the hazard of erosion is moderate. The hazard of soil blowing is moderate. The effective rooting depth is 8 to 20 inches.

Areas of this soil are used for rangeland and urban development.

This soil is poorly suited for rangeland. The shallow depth over the hardpan, the hazard of wind or water erosion, and the very low available water capacity are the main limitations. Because of low precipitation, forage production is low and water for livestock is limited. Major woody plants are white bursage and spiny hopsage. In years when precipitation is favorable, desert needlegrass, red brome, and filaree produce abundant quantities of desirable forage.

The estimated total annual forage production is 300 pounds per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The range site is Shallow Limy Sandy Pan (30).

This soil is suited to urban development. Shallow soil depth is the main limitation for building sites, roads, streets, and septic tank absorption fields. Community sewage systems are needed if this soil is developed for homesites. Design and installation of structures should be based on onsite investigations.

This soil is in capability subclass VIIs (30), nonirrigated.

151—Muroc-Randsburg sandy loams, 5 to 9 percent slopes. These moderately sloping soils are on low pediments. Areas are irregular in shape and range from 300 to 10,000 acres in size. The vegetation is mainly annual grasses, forbs, shrubs, and scattered Joshua trees. Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation is about 5 inches, and the mean annual air temperature is about 66 degrees F. The average frost-free season is about 225 days. The Muroc soil makes up about 50 percent of this unit, and the Randsburg soil about 40 percent.

Included in this unit are small areas of Cajon and Hi Vista soils and a few areas of soils that are similar to Muroc but which have a hardpan at a depth of more than 20 inches. Included areas make up about 10 percent of the unit.

The Muroc soil is shallow and well drained. It formed in residual material weathered from granite.

Typically, the surface layer is yellowish brown and pale brown, calcareous sandy loam about 15 inches thick. The underlying material to a depth of 27 inches is a white silica-lime cemented hardpan. Below this is a highly weathered, calcareous granite. In some places the surface layer is coarse sandy loam.

Permeability is moderately rapid above the hardpan but very slow in the hardpan. The available water capacity is very low. Surface runoff is medium, and the hazard of erosion is moderate. The hazard of soil blowing is moderate. The effective rooting depth ranges from 8 to 20 inches.

The Randsburg soil is shallow and well drained. It formed in residual material weathered from granite.

Typically, the surface layer of the Randsburg soil is yellowish brown, calcareous sandy loam about 5 inches thick. The underlying material to a depth of 12 inches is light yellowish brown sandy loam. Below this is weathered granite. In some places the surface layer is coarse sandy loam.

Permeability of this soil is moderately rapid above the granite and slow in the granite. The available water capacity is very low. Surface runoff is medium, and the

hazard of erosion is moderate. The hazard of soil blowing is moderate. The effective rooting depth ranges from 8 to 20 inches.

These soils are used for rangeland and urban development.

These soils are poorly suited for rangeland. The shallow depth over rock, the hazard of wind and water erosion, and the very low available water capacity are the main limitations. Because of low precipitation, forage production is generally low and water for livestock is limited. Major woody plants are white bursage and spiny hopsage. In years when precipitation is favorable, desert needlegrass, red brome, and filaree produce an abundant quantity of desirable forage.

The estimated total annual forage production on the Muroc soil is 300 pound per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The estimated total on the Randsburg soil is 300 pounds per acre during favorable years, 200 pounds during normal years, and 150 pounds during unfavorable years. The range site for the Muroc soil is Shallow Limy Sandy Pan (30) and for the Randsburg soil is Shallow Limy Sand (30).

This soil is poorly suited to building sites, roads, and streets. The shallow soil depth over a cemented hardpan or weathered granite is the main limitation for building sites, roads and streets, and septic tank absorption fields. Community sewage systems are needed if this soil is developed for homesites.

This soil is in capability subclass VIIe (30), nonirrigated.

152—Nacimiento loam, 30 to 50 percent slopes, eroded. This moderately deep, well drained, steep soil is on mountainous uplands. It formed in residual material weathered from marble. Areas are irregular in shape and range from 50 to 300 acres in size. The vegetation is mainly annual and perennial grasses, scattered shrubs, and a few hardwood and conifer trees. Elevation ranges from 4,000 to 4,800 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season is about 200 days.

Typically, the surface layer is brown, calcareous loam about 12 inches thick. The underlying material to a depth of 24 inches is white calcareous loam. Below this is weathered marble.

Included in this unit are small areas of a soil that is similar to Nacimiento soil, but which has a surface layer less than 7 inches thick. Also included are a few areas of rock outcrop.

Permeability of this Nacimiento soil is moderately slow, and available water capacity is low or moderate. Surface runoff is medium or rapid, and the hazard of erosion is high. The effective rooting depth ranges from 24 to 40 inches.

This soil is used for rangeland, recreation, watershed, and wildlife.

This soil is suited for rangeland, but it is limited by the hazard of erosion and steep slopes. Excessive disturbance and overgrazing have resulted in severe erosion. Stock trails should be constructed on the steeper slopes to increase livestock distribution, prevent overgrazing, and avoid further erosion. Cheatgrass, bluegrass, and filaree are the main forage plants.

The estimated total annual forage production is 2,500 pounds per acre during favorable years, 2,000 pounds during normal years, and 1,200 pounds during unfavorable years. The range site is Limy Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

153—Nacimiento loam, 50 to 75 percent slopes, eroded. This moderately deep, well drained, very steep soil is on mountainous uplands. It formed in residual material weathered from marble. Areas are irregular in shape and range from 50 to 400 acres in size. The vegetation is mainly annual and perennial grasses, scattered shrubs, and a few hardwood and conifer trees. Elevation ranges from 4,000 to 4,800 feet. The mean annual precipitation ranges from 12 to 14 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season is about 200 days.

Typically, the surface layer is brown, calcareous loam about 12 inches thick. The underlying material to a depth of 24 inches is white, highly calcareous loam. Below this is weathered marble.

Included in this unit are small areas of a soil similar to Nacimiento soil but which has a surface layer less than 7 inches thick. Also included are a few areas of Anaverde soils and a few small areas of rock outcrop.

Permeability of this soil is moderately slow, and available water capacity is low or moderate. Surface runoff is rapid, and the hazard of erosion is high. The effective rooting depth ranges from 24 to 40 inches.

This soil is used for rangeland, recreation, watershed, wildlife habitat, and as a source of lime for the manufacture of cement.

This soil is suited for rangeland, but is limited by the hazard of erosion and very steep slopes. Excessive disturbance and overgrazing have resulted in severe water erosion. Grazing on the steeper slopes should be limited to reduce the chance of further erosion. Cheatgrass, desert needlegrass, and filaree are the main forage plants.

The estimated total annual forage production is 2,500 pounds per acre during favorable years; 2,000 pounds during normal years; and 1,200 pounds during unfavorable years. The range site is Limy Loamy (18).

This soil is in capability subclass VIIe (18), nonirrigated.

154—Neuralia sandy loam, 2 to 5 percent slopes. This deep, well drained, gently sloping soil is on alluvial fans and plains. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 75 to 12,000 acres in size. The vegetation is

mainly annual grasses and shrubs. Elevation ranges from 2,300 to 2,800 feet. The mean annual precipitation ranges from 4 to 6 inches, and the average annual air temperature is about 60 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is yellowish brown and brown sandy loam and sandy clay loam about 11 inches thick. The subsoil is brown and yellowish brown sandy clay loam about 20 inches thick. The substratum to a depth of 55 inches is light brown, calcareous gravelly sandy loam. Below this is consolidated mixed alluvium.

Included with this soil in mapping are small areas of Alko, Cajon, and Garlock soils. Also included are a few areas where the clay content exceeds 35 percent in the subsoil and an opalized layer is just above the substratum.

Permeability of this Neuralia soil is moderately slow, and available water capacity is moderate or high. Surface runoff is medium, and the hazard of erosion is slight. The hazard of soil blowing is moderate. The effective rooting depth is 40 to 60 inches.

Areas of this soil are used for rangeland and urban development.

This soil is poorly suited for rangeland. The low annual precipitation and hazard of soil blowing are the main limitations. Excessive disturbance caused by overgrazing can cause severe wind erosion. Creosotebush, bursage, and ephedra are the dominant shrubs. Grasses make up a significant percentage of the annual forage production. During good moisture years, annual and perennial grasses can produce abundant amounts of high quality forage.

This soil is suited to urban development. The depth to consolidated alluvium and moderately fine textured subsoil are the main limiting features for building sites, roads, and septic tank absorption fields. Community sewage systems are needed if these areas are developed for homesites. Design and installation of structures should be based on onsite investigations.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 200 pounds during unfavorable years. The range site is Coarse Loamy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

155—Norob-Neuralia complex, 0 to 5 percent slopes. These soils are very deep and deep, well drained, nearly level and gently sloping. They are on alluvial fans and plains. Areas are irregular in shape and range from 100 to 1,200 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,300 to 2,800 feet. The mean annual precipitation is about 5 inches, and the mean annual air temperature is about 62 degrees F. The average frost-free season is about 225 days. The Norob soil makes up about 55 percent of this unit, and the Neuralia soils about 30 percent.

Included in this unit are areas of Cajon and Garlock soils that make up about 15 percent of the unit and small areas of Torrifluvents.

The Norob soil is very deep. It formed in alluvial material of mixed origin.

Typically, the surface layer of the Norob soil is light yellowish brown, winnowed sand about 6 inches thick. The subsoil is brown and dark brown sandy clay loam about 34 inches thick. The substratum to a depth of 60 inches is yellowish brown gravelly sandy loam. This soil is strongly alkaline below a depth of about 6 inches. In some places the surface layer is loamy sand.

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

The Neuralia soil is deep and well drained. It formed in alluvial fans and plains in alluvial material derived from granitic rock.

Typically, the surface layer of the Neuralia soil is yellowish brown and brown sandy loam and sandy clay loam about 11 inches thick. The subsoil is brown and yellowish brown sandy clay loam about 20 inches thick. The substratum to a depth of 55 inches is light brown, calcareous gravelly sandy loam. Below this is consolidated mixed alluvium.

Permeability of this soil is moderately slow, and available water capacity is moderate or high. Surface runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The effective rooting depth ranges from 40 to 60 inches.

These soils are used for rangeland and recreation.

These soils are poorly suited for rangeland. The Norob soil is limited by a high sodium content in the subsoil. Low annual precipitation is a major problem on both soils. Intensive range management practices may not be feasible because of the low annual precipitation and a limited number of plants suitable for grazing on the Norob soil. Excessive disturbance of these soils can result in severe accelerated wind erosion. Forage consists of Indian ricegrass, schismus grass, and brown-eyed primrose. The Norob soil supports an abundant stand of allscale. Vegetation is more diverse on the Neuralia soil.

The estimated total annual forage production on the Norob soil is 350 pounds per acre during favorable years, 250 pounds during normal years, and 100 pounds during unfavorable years. The estimated total on the Neuralia soil is 300 pounds per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The range site for the Norob soil is Alkali Flats (30) and for the Neuralia soil is Coarse Loamy (30).

This unit is in capability subclass VIIs (30), nonirrigated.

156—Pajuela-Whitewolf association, steep. These soils are very deep and somewhat excessively drained.

The Pajuela soil is on eroded stream terraces, and the Whitewolf soil is between the ridges of the eroded terraces. Slope ranges from 0 to 50 percent. Areas are irregular in shape and range from 50 to 200 acres in size. The vegetation is mainly annual and perennial grasses, shrubs, and scattered conifers. Elevation ranges from 2,800 to 4,500 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 225 days. The Pajuela soil makes up about 60 percent of this unit, the Whitewolf soil about 35 percent.

Included in this unit are small areas of Wasioja soils and a soil that is similar to the Pajuela soil but which is very gravelly sandy clay loam. These included areas make up 10 percent of the mapped acreage.

The Pajuela soil has slopes of 30 to 50 percent. It formed in alluvial material derived from granite rock.

Typically, the surface layer of the Pajuela soil is yellowish brown gravelly sandy loam and gravelly loamy sand about 22 inches thick. The underlying material to a depth of 60 inches is very pale brown extremely gravelly loamy sand. In some places the surface layer is gravelly coarse sandy loam or very gravelly loamy coarse sand.

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

The Whitewolf soil has slopes ranging from 0 to 5 percent. It formed in alluvial material weathered from granitic rock sources.

Typically, the surface layer of the Whitewolf soil is grayish brown loamy sand about 32 inches thick. The underlying material to a depth of 70 inches is pale brown sand. In some places the surface layer is loamy fine sand or loamy coarse sand.

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

These soils are used for watershed, wildlife habitat, rangeland, and recreation.

These soils are suited for rangeland but are limited by the hazard of erosion and the low or very low available water capacity. Limited livestock water and steep eroded slopes tend to create livestock distribution problems. Stock trails and catchment basins will help to distribute livestock and reduce the hazard of overgrazing and erosion. In favorable years there is good production of desert needlegrass on these soils. Other desirable forage plants are winterfat and filaree.

The estimated total annual forage production on the Pajuela soil is 800 pounds per acre during favorable years, 600 pounds during normal years, and 400 pounds during unfavorable years. The estimated total on the Whitewolf soil is 800 pounds per acre during favorable years, 500 pounds during normal years, and 300 pounds during unfavorable years. The range site for the Pajuela soil is Gravelly Coarse Loamy (29) and for the Whitewolf soil is Sandy (29).

The Pajuela soil is in capability subclass VIIe (29), nonirrigated, and the Whitewolf soil is in VIIs (29), nonirrigated.

157—Pits. Pits are open excavations where soil material has been removed. Areas are rectangular in shape and range from 10 to 300 acres in size. Vegetation is sparse and consists mainly of annual grasses and forbs. Elevation ranges from 2,000 to 4,000 feet.

Excavations were made mainly in very gravelly soils. In the Mojave Desert, east of the Mojave Airport, gravel has been removed from large pits. Surface layers in these areas are not particularly gravelly, but the underlying layers are good sources of gravel. Clay has been removed from pits in the Monolith area for the manufacture of cement. Fill material has been excavated from several large borrow pits on low granitic pediments along Highway 58 for use in highway construction.

Pits are used for wildlife habitat and by industry for manufacturing cement. Most are in arid areas. Water and a very intensive reclamation program are needed to reclaim these areas for other uses.

158—Playas. This undrained flat area covers 1,056 acres on the perimeter of Kohen Dry Lake in the Mojave Desert. Only one area of this unit was mapped. It has stratified sediments ranging in texture from moderately coarse to fine. The salt content inhibits plant growth, and the area is subject to soil blowing. During some periods in wet years, there is a water table at a depth of 2 or 3 feet.

159—Pleito sandy clay loam, 2 to 5 percent slopes. This very deep, well drained, gently sloping soil is on alluvial fans. It formed in alluvial material derived from granitic rocks. Areas are irregular in shape and range from 50 to 422 acres in size. The vegetation is mainly annual grasses, scattered perennial grasses, and forbs. Elevation ranges from 800 to 1,200 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season is about 250 days.

Typically, the surface layer is dark grayish brown sandy clay loam about 16 inches thick. The subsoil is grayish brown sandy clay loam about 7 inches thick. The substratum to a depth of 60 inches is very pale brown sandy clay loam or clay loam. In some places the surface layer is clay loam or loam.

Included with this soil in mapping are areas of Wasioja soils and areas of Havala soils. The Wasioja soils make up about 2 percent of the unit, and the Havala soils make up 1 percent.

Permeability of this Pleito soil is slow, and available water capacity is high or very high. Surface runoff is medium, and the hazard of erosion is moderate. The effective rooting depth is 60 inches or more.

This soil is used for irrigated crops. Potatoes are the main crop.

This soil is suited to most crops grown in the area. The hazard of erosion and limited soil moisture during the growing season are the main limitations.

A cropping system that includes a crop rotation or cover crops, crop residue utilization, and proper tillage helps to prevent erosion and improve soil tilth, structure, fertility, and water infiltration. In areas where this soil is dry farmed, a fallow period every other year, the return of crop residues to the soil, and tilling to a rough cloddy condition can reduce runoff. Sprinkler, drip, and surface irrigation systems are best suited to this soil. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Fine Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated, and IIe (18), irrigated.

160—Pleito sandy clay loam, 9 to 50 percent slopes. This soil is very deep, well drained, and strongly sloping to steep. It is on old dissected terraces. It formed in alluvial material derived from granitic rock. Only one area of this soil was mapped. It is irregular in shape and about 835 acres in size. The vegetation is mainly annual grasses, scattered perennial grasses, and forbs. Elevation ranges from 800 to 2,700 feet. The mean annual precipitation ranges from 12 to 14 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is dark grayish brown sandy clay loam about 16 inches thick. The subsoil is grayish brown sandy clay loam about 7 inches thick. The substratum to a depth of 60 inches is very pale brown gravelly sandy clay loam. In some places the surface layer is clay loam or loam.

Included with this soil in mapping are areas of Chanac soils that make up about 5 percent of the unit. Also included are a few areas of soils that are similar to this Pleito soil but which have more clay in the subsoil and a few small areas of rock outcrops, mainly on north-facing slopes. Included areas make up about 10 percent of the unit.

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

This soil is used for rangeland and watershed.

This soil is suited for rangeland. The hazard of erosion on the steeper slopes is a major problem. Lack of livestock water and poor stock distribution on the steeper slopes are also problems. Erosion can be, in part, prevented or controlled by proper grazing. Development of springs and catchment basins can help to distribute livestock and reduce the hazard of erosion and overgrazing. This soil produces abundant quantities of soft chess, wild oats, and purple needlegrass. Needlegrass should be encouraged to increase. On the lower slopes, forage plants will respond well to fertilization.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,800 pounds during normal years, and 1,200 pounds during unfavorable years. The range site is Fine Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

161—Pleito-Chanac sandy clay loams, 5 to 9 percent slopes. These soils are very deep, well drained, and moderately sloping. They are on old terraces. Only two areas of this unit were mapped. They are irregular in shape and are 560 and 1,362 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 800 to 1,200 feet. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season is about 250 days. The Pleito soil makes up about 45 percent of this unit, the Chanac soil about 40 percent.

Included in this unit are small areas of Psamments-Xerolls, Rosamond Variant, Steuber, and Tehachapi soils. These included areas make up 15 percent of the unit.

The Pleito soil formed in old, slightly consolidated alluvial material. It is on the tops and sides of the old terraces.

Typically, the surface layer of the Pleito soil is dark grayish sandy clay loam about 16 inches thick. The subsoil is grayish brown sandy clay loam about 7 inches thick. The substratum to a depth of 60 inches is very pale brown gravelly sandy clay loam. Lime occurs as irregular soft masses and the gravel content ranges from 15 to 35 percent in the subsoil and substratum.

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

The Chanac soil formed in old, slightly consolidated alluvial material.

Typically, the surface layer of the Chanac soil is gray sandy clay loam about 10 inches thick. The subsoil is light yellowish brown and very pale brown sandy clay loam about 21 inches thick. The upper 10 inches of the substratum is brownish yellow coarse sandy loam, and the lower part to a depth of 60 inches is very pale brown clay loam.

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

These soils are used for irrigated crops such as potatoes. Other areas are rangeland.

This soil is suited to most crops commonly grown in the area. The hazard of erosion is the main limitation. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to prevent erosion and improve soil tilth, structure, and fertility. This soil is suited best to sprinkler and drip irrigation. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

These soils are suited for rangeland. The hazard of erosion is a problem, but it can be prevented or controlled by proper grazing. Catchment basins and spring development will help distribute livestock, avoid overgrazing, and prevent erosion. The Pleito soil is more productive and has more potential for purple needlegrass than the Chanac soil. These soils produce good winter annual forage consisting of soft chess, wild oats, and filaree.

The estimated total annual forage production on the Pleito soils is 2,700 pounds per acre during favorable years, 2,200 pounds during normal years, and 2,000 pounds during unfavorable years. The estimated total on the Chanac soil is 2,400 pounds per acre during favorable years, 1,800 pounds during normal years, and 1,200 pounds during unfavorable years. The range site for the Pleito soil is Fine Loamy (18) and for the Chanac soil is Fine Loamy (18).

This unit is in capability unit IVe-1 (18), nonirrigated, and IIIe-1 (18), irrigated

162—Pleito-Chanac sandy clay loams, 15 to 30 percent slopes. These soils are very deep, well drained, and moderately steep. They are on alluvial fans and old terraces. Areas are irregular in shape and range from 40 to 2,300 acres in size. The vegetation is mainly annual and perennial grasses and forbs. Elevation ranges from 800 to 2,700 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 200 to 250 days. The Pleito soil makes up about 45 percent of the map unit, and the Chanac soil about 25 percent.

Included in this unit are areas of Tehachapi and Havala soils and areas of soil that are similar to Pleito soil but which are more than 35 percent gravel. The Tehachapi and Havala soils make up 15 percent of the unit, and the other included soils make up another 15 percent. Also included are a few places where there are a few faint mottles in the substratum.

The Pleito soil formed in old, slightly consolidated alluvial material, which now is highly weathered and soft. It is on the tops and sides of the old terraces.

Typically, the surface layer of the Pleito soil is dark grayish brown sandy clay loam about 16 inches thick. The subsoil is grayish brown sandy clay loam about 7 inches thick. The substratum to a depth of 60 inches is very pale brown gravelly sandy clay loam. Lime occurs as irregular soft masses, and the gravel content ranges from 15 to 35 percent in the subsoil and substratum.

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

The Chanac soils formed in old, slightly consolidated alluvial material that is now highly weathered and soft.

Typically, the surface layer of the Chanac soil is gray sandy clay loam about 10 inches thick. The subsoil is light yellowish brown and very pale brown sandy clay loam about 21 inches thick. The upper 10 inches of the substratum is brownish yellow coarse sandy loam, and the lower part to a depth of 60 inches is very pale brown clay loam.

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

These soils are used for rangeland, wildlife habitat, and recreation.

These soils are well suited for rangeland. The hazard of erosion is a problem, but can be prevented or controlled by proper grazing. Development of springs and use of catchment basins can help distribute livestock, avoid overgrazing, and prevent erosion. The Pleito soil is more productive and has more potential for purple needlegrass than Chanac soil. These soils produce good annual winter forage consisting of soft chess, wild oats, and filaree.

The estimated total annual forage production on the Pleito soil is 2,000 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Chanac soil is 2,000 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Pleito soil is Fine Loamy (18) and for the Chanac soil is Fine Loamy (18).

This unit is in capability unit IVe-1 (18), nonirrigated.

163—Porterville clay, 5 to 9 percent slopes. This very deep, well drained, moderately sloping soil is on alluvial fans. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 25 to 150 acres in size. The vegetation is mainly annual and perennial grasses, forbs, and shrubs. Elevation ranges from 4,000 to 4,500 feet. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 57 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is brown clay about 36 inches thick. The underlying material to a depth of 60 inches is pale brown, calcareous silty clay loam.

Included with this soil in mapping are small areas of Porterville cobbly clay and a few areas of Psamments-Xerolls on stream drainageways. Also included are a few areas of soils similar to Porterville, but which have a

yellower surface. All these included areas make up about 10 percent of the unit.

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

Most areas of this soil are used for rangeland, wildlife habitat, recreation, and as sources of clay for the manufacture of cement.

This soil is well suited for rangeland. Slow permeability, moderate hazard of erosion, clay textures, and a high shrink-swell potential are the main problems. Livestock grazing should be managed to protect the soil from excessive erosion. This soil responds well to seeding and fertilization. Soft chess, sandberg bluegrass, burclover, and redstem filaree are the main forage plants. In years when precipitation is favorable, burclover may be very abundant and provide excellent livestock forage.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 2,000 pounds during normal years, and 1,400 pounds during unfavorable years. The range site is Clayey (18).

This soil is in capability unit IVe-5 (18), nonirrigated.

164—Porterville cobbly clay, 5 to 9 percent slopes. This very deep, well drained, moderately sloping soil is on alluvial fans. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 40 to 200 acres in size. The vegetation is mainly annual and perennial grasses, forbs, and hardwoods. In areas in the foothills of the Tehachapi Mountains the elevation ranges from 4,000 to 4,500 feet, the mean annual precipitation is about 12 inches, and the average annual air temperature is about 57 degrees F. The average frost-free season ranges from 150 to 225 days. In areas in the desert the elevation ranges from 2,500 to 3,000 feet, the average annual precipitation is about 6 inches, and the average annual temperature is about 57 degrees F. The average frost-free season is about 200 days.

Typically, the surface layer is brown cobbly clay about 12 inches thick. The underlying material to a depth of 60 inches is pale brown calcareous clay and silty clay loam. Cobble content in the surface layer ranges from 15 to 25 percent. In some places cobbles cover 15 to 30 percent of the surface.

Included with this soil in mapping are small areas of Porterville clay and Psamments-Xerolls in the stream drainageways. These included areas make up about 10 percent of the unit.

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

Most areas of this soil are used for rangeland, recreation, and wildlife habitat.

This soil is suited for rangeland. Moderate hazard of erosion, cobbly clay textures, slow permeability, and a high shrink-swell potential are the main problems. Livestock grazing should be managed to protect the soil from excessive erosion. Cobbles may interfere with intensive range management practices. This soil supports an open stand of blue oaks and juniper. The understory consists of soft chess, Sandberg bluegrass, redstem filaree, and burclover.

The estimated total annual forage production is 2,100 pounds per acre during favorable years, 1,700 pounds during normal years, and 1,200 pounds during unfavorable years. The range site is Cobbly Clayey (18).

This soil is in capability subclass VIe (18), nonirrigated.

165—Psamments-Xerolls complex, nearly level. These soils are very deep and excessively to moderately well drained. They are on recent and old stream bottoms. Areas are in narrow strips that range from 20 to 400 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 600 to 6,500 feet. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 175 to 300 days. Psamments make up about 60 percent of this unit, and the Xerolls about 35 percent.

Included in this unit is a small basin of fine textured material known as Proctar Lake.

The main difference between the soils in this complex is that the Psamments have light-colored coarse surfaces with gravelly coarse layers below a depth of 40 inches. The Xerolls have dark, coarse and moderately coarse surface textures underlain by highly stratified gravelly coarse to moderately fine textures. Coarse fragments make up 0 to 35 percent of the Psamments and 0 to 65 percent of the Xerolls. Content of fragments more than 3 inches in diameter averages 15 percent. Flooding is common in most areas, and floods last 2 to 7 days. In most areas, an apparent water table is at a depth of 3 to 6 feet especially between December and February when there also is a flood hazard.

Permeability of these soils ranges from rapid to very rapid, and available water capacity ranges from very low to moderate. Surface runoff is slow. The hazard of erosion is very high, and the effective rooting depth is 60 inches or more.

These soils are used for rangeland, recreation, and wildlife habitat.

These soils are suited for rangeland, but they are limited mainly by the excessive amount of coarse fragments, the low available water capacity, and hazard of flooding. Vegetation is diverse and ranges from cottonwood, willow, annual grass, and forbs to creosotebush, white bursage, and other desert shrubs. Because of the high variability of these soils, onsite range analysis is needed when specific information is required.

This unit is in capability subclass VIs (17, 18), nonirrigated.

166—Quarries. These are areas where soil material has been removed. Areas are irregular in shape and range from 10 to 550 acres in size. Elevation ranges from 2,000 to 4,500 feet. These areas are used by industry for the manufacture of cement and borax. Near Monolith, east of Tehachapi and about 12 miles west of Mojave, limestone is quarried for the manufacture of cement. In the Boron area, borax is removed from huge open mines. This installation supplies most of the world's borax.

167—Randsburg sandy loam, 2 to 15 percent slopes. This soil is shallow, well drained, and gently to strongly sloping. It is on low pediments. It formed in residual material derived from granitic rock. Areas are irregular in shape and range from 20 to 7,000 acres in size. The vegetation is mainly annual grasses, forbs, shrubs, and scattered Joshua trees. Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 66 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is yellowish brown, calcareous sandy loam about 5 inches thick. The underlying material to a depth of 12 inches is light yellowish brown, calcareous sandy loam. Below this is highly weathered granite.

Included with this soil in mapping are small areas of Alko, Cajon, Hi Vista, and Muroc soils. Also included are a few areas of soils similar to Randsburg but with slopes ranging from 15 to 30 percent, and the depth to highly weathered granite is more than 20 inches but less than 30. A few rock outcrops are also included. All these included areas make up about 20 percent of the unit.

Permeability of this Randsburg soil is moderately rapid in the soil material and slow in the weathered granite. Available water capacity is very low. Surface runoff is slow to medium, and the hazard of erosion is moderate. The hazard of soil blowing is moderate. The effective rooting depth ranges from 8 to 20 inches.

Most areas of this soil are used for rangeland and wildlife habitat. In some places, they are used for urban development.

This soil is poorly suited for rangeland. It is limited for this use mainly by the moderate hazard of erosion, shallow depth over rock, and low available water capacity. Because of low precipitation, water is not readily available for livestock and forage production is low. Excessive disturbance or overgrazing can result in severe wind erosion. Livestock grazing should be managed to protect this soil from excessive erosion. Shrubs such as winterfat and spiny hopsage are dominant on this soil. In years when precipitation is favorable, however, schismus and filaree produce an abundant quantity of desirable forage.

This soil is suited to urban development. The main limitations are the shallow soil depth, sandy surface texture, and low available water capacity. If moved during construction, soil material above the weathered granite should be stockpiled and used to reclaim areas disturbed by cutting and filling. Revegetating as soon as possible helps to control soil blowing on disturbed areas around construction sites. Plants used in landscaping require frequent irrigation. Because of the shallow depth over rock, septic tank filter fields will not function properly. Community sewage systems are needed in these areas.

The estimated total annual forage production is 300 pounds per acre during favorable years, 200 pounds during normal years, and 150 pounds during unfavorable years. The range site is Shallow Sand (30).

This soil is in capability subclass VIIe (30), nonirrigated.

168—Rescue Variant loam, 15 to 30 percent slopes. This deep, well drained, moderately steep soil is on mountainous uplands along the Oso Canyon Road and Bear Trap Canyon. It formed in residual material weathered from basalt. Only one area of this unit was mapped. It is about 475 acres in size. The vegetation is mainly annual grasses and scattered hardwoods. Elevation is about 4,500 feet. The mean annual precipitation is about 13 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season is about 200 days.

Typically, the surface layer is dark brown loam about 16 inches thick. The subsoil is reddish brown and reddish yellow clay loam about 52 inches thick. The substratum to a depth of 129 inches is very pale brown loam. Below this is weathered basalt.

Included with this soil in mapping are areas of Rescue Variant with slopes ranging from 9 to 15 percent. These areas make up 10 percent of the unit. Also included are areas of soil similar to Rescue Variant but in which the depth to weathered basalt ranges from 30 to 40 inches and small areas where hard basalt rock fragments, cobbles, or stones are on the surface. These areas make up another 10 percent of the unit. There are also small gullied areas where erosion has removed all soil.

Permeability of this Rescue Variant soil is moderately slow, and available water capacity is moderate to very high. Surface runoff is rapid, and the hazard of erosion is high. The effective rooting depth ranges from 40 to 70 inches.

Most areas of this soil are used for rangeland, recreation, and wildlife habitat.

This soil is suited for rangeland. The hazard of erosion is the main limitation. Livestock grazing should be managed to protect the soil from excessive erosion. Livestock water from spring and catchment basins can be developed. This soil supports an open stand of oaks with scattered shrubs and annual grasses. The main forage plants are soft chess, burclover, ripgut brome, and filaree with small quantities of cheatgrass.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated.

169—Rescue Variant loam, 30 to 50 percent slopes. This deep, well drained, steep soil is on mountainous uplands between the mouths of Comanche Creek and Tejon Creek. It formed in residual material weathered from basalt. Only one area of this soil was mapped. It is about 724 acres in size. The vegetation is mainly annual grasses and scattered hardwoods. Elevation ranges from 2,500 to 3,000 feet. The mean annual precipitation is about 13 inches, and the average annual air temperature is about 58 degrees F. The average frost-free season is about 200 days.

Typically, the surface layer is dark brown loam about 16 inches thick. The subsoil is reddish brown and reddish yellow clay loam about 52 inches thick. The substratum to a depth of 129 inches is very pale brown loam. Below this is weathered basalt.

Included with this soil in mapping are areas of Arujo and Walong soils and areas of soils similar to Rescue Variant but in which the depth to weathered basalt ranges from 30 to 40 inches. The Arujo and Walong soils make up 5 percent of the unit, and the other soils make up 10 percent. The surface layer has been removed by erosion on about 15 percent of the unit. A few small areas with a discontinuous duripan are also included.

Permeability of this Rescue Variant soil is moderately slow, and available water capacity is moderate to very high. Surface runoff is rapid, and the hazard of erosion is high. The effective rooting depth ranges from 40 to more than 60 inches.

Most areas of this soil are used for rangeland, recreation, and wildlife habitat.

This soil is suited for rangeland. The hazard of erosion is the main limitation. Livestock grazing should be managed to protect the soil from excessive erosion. Development of springs and use of catchment basins will help increase livestock distribution. This soil supports an open stand of oaks with scattered shrubs and annual grasses. The main forage plants are soft chess, burclover, ripgut brome, and filaree with small quantities of cheatgrass.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,600 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

170—Rock outcrop. This unit is on mountainous areas. Slope ranges from 50 to 75 percent. Areas are irregular in shape and range from 50 to 2,000 acres in size. These areas are essentially barren of vegetation except for a few scattered grasses and shrubs in rock fractures.

This unit consists of exposures of granite, basalt, schist, gneiss, conglomerate, marble, sandstone, mudstone, and shale. Included in this map unit are areas of rubble land on talus slopes. These areas make up 10 percent of the unit.

This unit is used for watershed and recreation.

171—Rosamond clay loam. This very deep, well drained, nearly level soil is on alluvial plains. It formed in alluvial material derived from granitic rock. Slope ranges from 0 to 2 percent. Areas are irregular in shape and range from 50 to 3,500 acres in size. The vegetation is mainly annual grasses and shrubs. Elevation ranges from 2,500 to 2,900 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is brown sandy loam about 2 inches thick. The underlying material to a depth of 14 inches is pale brown clay loam. Below that, to a depth of 60 inches, it is pale brown loam with thin layers of fine sandy loam and silt loam.

Included with this soil in mapping are areas of Cajon soils, DeStazo soils, and Garlock soils. Each of these soils make up about 5 percent of the unit.

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

Most areas of this soil are used for rangeland and recreation.

This soil is poorly suited for rangeland. The hazard of wind or water erosion and low annual precipitation are the main limitations. Forage production is low, and excessive disturbance of this soil can result in soil blowing. Livestock grazing should be managed to protect this soil from erosion. White bursage, spiny hopsage, winterfat, desert needlegrass, and Indian ricegrass are the main forage plants. Onsite evaluation is necessary to determine feasibility for water development.

The estimated total annual forage production is 200 pounds per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The range site is Coarse Loamy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

172—Rosamond clay loam, saline-alkali. This very deep, well drained, nearly level soil is on alluvial plains. It formed in alluvial material derived from granitic rock. Slope ranges from 0 to 2 percent. Areas are irregular in shape and range from 2,000 to 3,500 acres in size. The vegetation is mainly shrubs and scattered annual grasses and forbs. Elevation ranges from 2,000 to 2,900 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is brown sandy loam about 2 inches thick. The underlying material to a depth of 12 inches is pale brown clay loam. Below that, to a depth of 60 inches, it is pale brown loam with thin layers of fine

sandy loam and silt loam. This soil has an excessive amount of salts and sodium.

Included with this soil in mapping are small areas of Arizo, Cajon, and Rosamond soils that contain less salt and sodium. These included areas make up about 10 percent of the unit.

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

Most areas of this soil are used for rangeland, recreation, and wildlife habitat. A few places are used for homesites.

This soil is poorly suited for rangeland. It is limited for this use mainly by the saline-alkali conditions. Low annual precipitation and lack of available livestock water is also a problem. Forage production is low and limited to salt-tolerant species. The main plant community is allscale, alkali blite, and iodine bush. Excessive disturbance of this soil through overgrazing can result in severe wind erosion. Onsite evaluation is needed to determine feasibility for water development.

The nearness of Edwards Air Force Base has resulted in construction of houses on this soil. The hazard of erosion, saline-alkali conditions, moderately slow permeability, and moderate shrink-swell potentials are the main limitations for homesites. These limitations can cause failures or problems with foundations, septic tank absorption fields, sanitary landfields, and home gardening and landscaping. Soil limitations can be improved or corrected for homesites, however, by the use of proper design and installation procedures. Suitability of this soil for a particular urban use can be determined by onsite evaluation.

The estimated total annual forage production is 500 pounds per acre during favorable years, 300 pounds during normal years, and 200 pounds during unfavorable years. The range site is Alkali Flats (30).

This soil is in capability subclass VIIs (30), nonirrigated.

173—Rosamond Variant sandy loam, 5 to 15 percent slopes. This soil is very deep, well drained, and moderately or strongly sloping. It is on alluvial fans and basin drainageways near the Tejon Hills. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 15 to 600 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 600 to 1,800 feet. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 59 degrees F. The average frost-free season ranges from 200 to 300 days.

Typically, the surface layer is mixed grayish brown, brown, and light yellowish brown sandy loam and coarse sandy loam about 7 inches thick. The underlying material to a depth of 60 inches is light brownish gray and light yellowish brown sandy clay loam.

Included with this soil in mapping are small areas of Arvin soils, Psamments-Xerolls, soils similar to Rosamond Variant soils but which have a sandy overwash, and others with finer textures throughout. These included areas make up about 25 percent of the unit.

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

Most areas of this soil are used for rangeland, oilfields, and wildlife habitat.

This soil is suited for rangeland. The hazard of erosion is the main limitation. Livestock grazing should be managed to protect the soil from excessive erosion. This soil supports an abundant stand of annual grasses and forbs with brush. Soft chess, wild oats, filaree, and burclover make up most of the forage.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 800 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated.

174—Steuber sandy loam, 0 to 2 percent slopes. This soil is very deep, well drained, and nearly level. It is on alluvial fans and stream flood plains in the Tehachapi Valley. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 10 to 1,100 acres in size. The vegetation is mainly annual grasses, forbs, and scattered hardwoods. Elevation ranges from 3,000 to 4,500 feet. The mean annual precipitation ranges from 10 to 15 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown sandy loam about 12 inches thick. The underlying material to a depth of 60 inches is brown sandy loam. In some places, near the Monolith Cement Plant, the surface of this soil is slightly to moderately calcareous because of cement dust.

Included with this soil in mapping are small areas of Havala and Tujunga soils.

Permeability of this Steuber soil is moderately rapid, and available water capacity is low or moderate. Surface runoff is medium, and the hazard of erosion is slight. The effective rooting depth is 60 inches or more. Areas of this soil have been protected from flooding.

Most areas of this soil are used for irrigated crops such as pears and alfalfa. A few areas are used for rangeland and urban development.

This soil is suited to most crops commonly grown in the area. The low to moderate available water capacity and a soil blowing hazard are the main limitations. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to

conserve moisture; improve soil tilth, structure, and fertility; and control soil blowing. It is suited to furrow, border, sprinkler, and drip irrigation. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff or deep percolation.

This soil is suited for rangeland. Low or moderate available water capacity is the main limitation. Overgrazing by livestock is also a problem because this soil occurs in mountain valleys on alluvial fans where livestock tends to congregate. Stock water can be readily developed on this soil and piped to a water facility. Vegetation is scattered oak and shrubs, basin wildrye, Sandberg bluegrass, and filaree. The forage is mainly a mixture of perennial grasses and forbs. On the areas along the western part of the Mojave Desert, however, onsite range evaluation is necessary because of the amount of desert plants.

This soil is suited to urban development, and there are few limitations. Mulching, fertilization, and irrigation are needed to establish lawn grasses and other small plants.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVs-1 (18), nonirrigated, and IIs-1 (18), irrigated.

175—Steuber sandy loam, 2 to 5 percent slopes. This very deep, well drained, gently sloping soil is on alluvial fans and stream flood plains in the Tehachapi Valley. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 10 to 1,200 acres in size. The vegetation is mainly annual grasses, forbs, and scattered hardwoods. Elevation ranges from 3,000 to 4,500 feet. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown sandy loam about 12 inches thick. The underlying material to a depth of 60 inches is brown sandy loam. In some places the surface layer is loam.

Included with this soil in mapping are small areas of Steuber and Tujunga soils with slopes steeper than 5 percent. Also included are small areas of soils similar to Steuber but which have a few faint mottles in the lower part of the surface layer, and in the underlying material.

Permeability of this Steuber soil is moderately rapid, and available water capacity is low or moderate. Surface runoff is medium, and the hazard of erosion is slight. The effective rooting depth is 60 inches or more. Flooding occurs only rarely and is of short duration.

Most areas of this soil are used for rangeland, recreation, and wildlife habitat

This soil is suited for rangeland. Low or moderate available water capacity is a main limitation. Overgrazing by livestock is a problem because this soil occurs on alluvial fans in mountain valleys where livestock tend to congregate. Stock water can be readily developed on this soil and piped to a water facility. Vegetation is scattered oak and shrubs, basin wildrye, Sandberg bluegrass, and filaree. Forage is mainly a mixture of perennial grasses and annual forbs. On areas along the western part of the Mojave Desert, onsite range evaluation is necessary because of the amount of desert plants.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated.

176—Steuber sandy loam, 5 to 9 percent slopes. This very deep, well drained, moderately sloping soil is on alluvial fans and stream flood plains in the Tehachapi Valley. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 25 to 1,100 acres in size. The vegetation is mainly annual grasses, forbs, and scattered hardwoods. Elevation ranges from 3,000 to 4,500 feet. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown sandy loam about 12 inches thick. The underlying material to a depth of 60 inches is brown sandy loam and gravelly sandy loam.

Included with this soil in mapping are areas of Havala soils that make up about 10 percent of the unit.

Permeability of this Steuber soil is moderately rapid, and available water capacity is low or moderate. Surface runoff is medium, and the hazard of erosion is moderate. The effective rooting depth is 60 inches or more. Flooding occurs only rarely and is of short duration.

Most areas of this soil are used for rangeland and wildlife habitat.

This soil is suited for rangeland. The low or moderate available water capacity and moderate hazard of erosion are the main limitations. Overgrazing by livestock is a problem because this soil occurs on alluvial fans in mountain valleys where livestock tends to congregate. Stock water can be readily developed on this soil and piped to a water facility. Vegetation is scattered oak and shrubs, annual grasses, and perennial grasses. Forage is mainly a mixture of many annual grasses and forbs. On areas along the western part of the Mojave Desert, onsite range evaluation is necessary because of the amount of desert plants.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated.

177—Steuber stony sandy loam, 5 to 9 percent slopes. This very deep, well drained, moderately sloping soil is on alluvial fans and stream flood plains in the Tehachapi Valley. It formed in alluvial material weathered mainly from granitic rock. Areas are irregular in shape and range from 10 to 500 acres in size. The vegetation is mainly annual grasses, forbs, and scattered hardwoods. Elevation is mainly between 3,000 to 4,500 feet. The mean annual precipitation ranges from 10 to 15 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown stony sandy loam about 12 inches thick. The underlying material to a depth of 60 inches is brown stony sandy loam and gravelly sandy loam. Stones occupy 0.1 to 3 percent of the surface and are 5 to 30 feet apart.

Included with this soil in mapping are small areas of Steuber soils that have a loam surface layer.

Permeability of this Steuber soil is moderately rapid, and available water capacity is low or moderate. Surface runoff is medium, and the hazard of erosion is moderate. The effective rooting depth is 60 inches or more. Flooding occurs only rarely and is of short duration.

Most areas of this soils are used for rangeland and wildlife habitat.

This soil is suited for rangeland. The low to moderate available water capacity and the moderate hazard of erosion are the main limitations. Overgrazing by livestock is a problem because this soil is on alluvial fans in mountain valleys where livestock tends to congregate. Stock water can be readily developed on this soil and piped to a water facility. Vegetation is scattered oak and shrubs, annual grasses, and perennial grasses. Forage is mainly a mixture of many annual grasses and forbs. On areas along the western part of the Mojave Desert, onsite range evaluation is necessary because of the amount of desert plants.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated.

178—Sween Variant-Rock outcrop complex, 5 to 30 percent slopes. This unit is moderately deep, well drained, and gently rolling to moderately steep. It is on mountainous uplands. Areas are irregular in shape and range from 150 to 1,300 acres in size. The vegetation is mainly brush and annual grasses. Elevation ranges from 5,000 to 6,500 feet. The mean annual precipitation ranges from 13 to 15 inches, and the mean annual air temperature is about 55 degrees F. The average frost-free season is about 200 days. The Sween Variant soil makes up about 70 percent of this unit, the Rock outcrop about 15 percent.

Included in this unit in mapping are areas of Xererts-Xerolls and areas of soils that have a gray clay loam surface layer and a brown clay subsoil. The Xererts-Xerolls make up 10 percent of the unit, and the other included soils make up about 5 percent.

The Sween Variant soil is moderately deep and well drained. It formed in residual material weathered from basalt or andesitic rock.

Typically, the surface layer of the Sween Variant soil is brown stony sandy clay loam about 12 inches thick. The subsoil to a depth of 38 inches is light reddish brown stony clay. Below this is hard basalt.

Permeability of this soil is slow, and available water capacity is low or very low. Surface runoff is medium or rapid, and the hazard of erosion is moderate or high. The effective rooting depth ranges from 24 to 40 inches.

Rock outcrop consists of hard basalt or andesitic rock exposures. These areas are impermeable, and the vegetation is limited to fractures in the rock structure. Surface runoff is very rapid, and there is no hazard of erosion.

Most areas of this unit are used for rangeland, watershed, and wildlife habitat.

This unit is suited for rangeland. It is limited mainly by the moderate or high hazard of erosion, low or very low available water capacity, and slow permeability. To avoid compaction, grazing should be deferred when the surface layer is wet. Disturbing the ground cover may increase surface runoff. Because of the rough terrain it is difficult for cattle to graze areas of rock outcrop uniformly. Use of catchment basins where feasable and properly locating salt blocks will help to increase livestock distribution. The soil tends to support a dense cover of woody plants. Vegetation consists of juniper, ceanothus, scrub oak, pine bluegrass, and schismus grass.

The estimated total annual forage production on the Sween Variant soil is 2,500 pounds per acre during favorable years, 2,000 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Stony Fine Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

179—Tehachapi sandy loam, 2 to 15 percent slopes. This soil is very deep, well drained, and gently to strongly sloping. It is on old alluvial fans and terraces (fig. 7). It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 50 to 1,600 acres in size. The vegetation is mainly annual grasses, scattered hardwoods, and a few perennial grasses. Elevation ranges from 3,000 to 4,300 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown sandy loam about 11 inches thick. The subsoil is dark grayish brown, yellowish red, and brown sandy clay loam and clay loam about 33 inches thick. The substratum to a depth of 60 inches is reddish yellow, calcareous sandy loam.

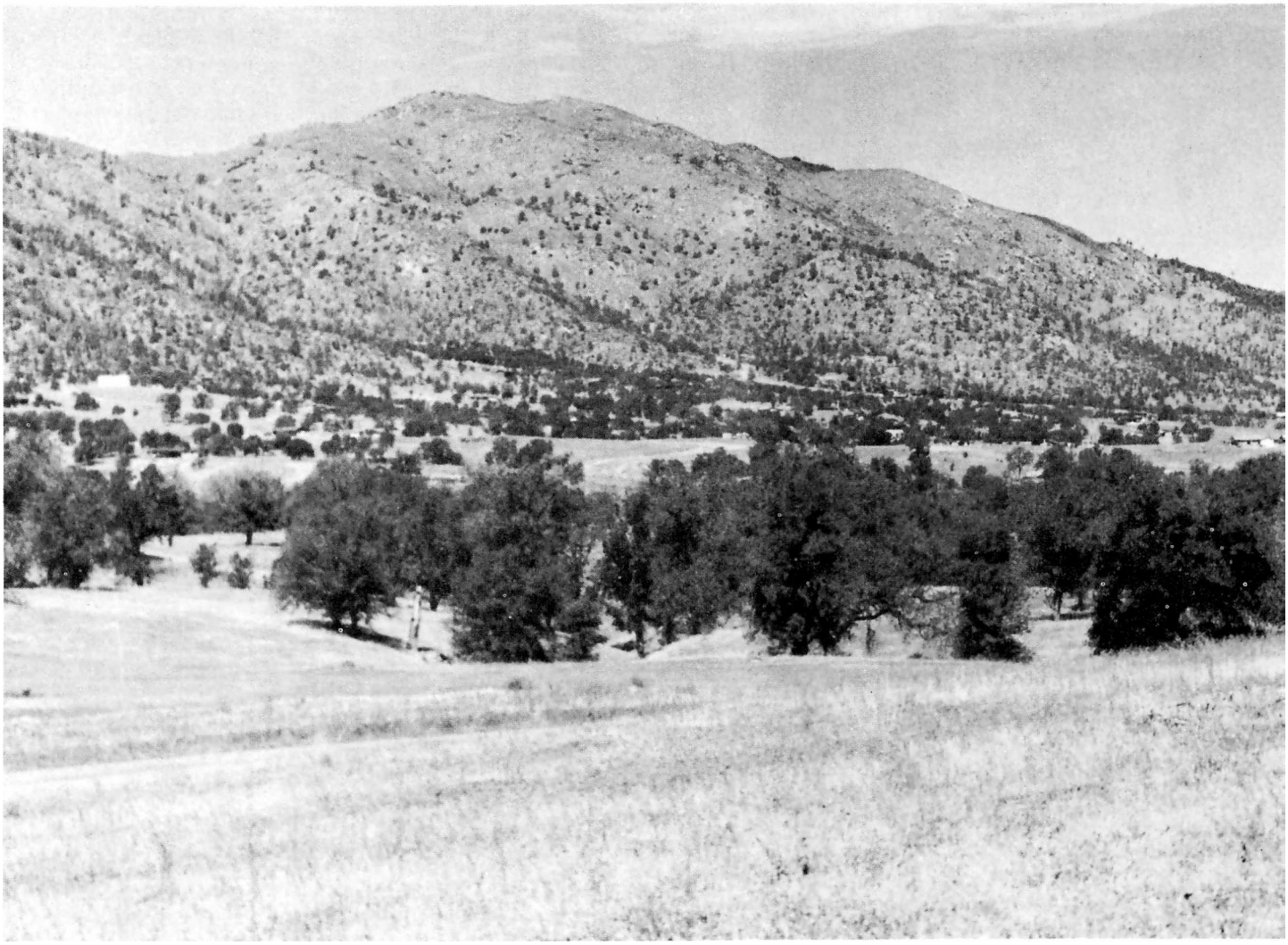

Figure 7.—Tehachapi sandy loam, 2 to 15 percent slopes, is in foreground. Vegetation is mainly annual grasses with an open stand of blue oak.

Included with this soil in mapping are small areas of Psamments-Xerolls and Steuber soils. The included areas make up about 10 percent of the unit.

Permeability of this Tehachapi soil is slow, and available water capacity is moderate or high. Surface runoff is slow, and the hazard of erosion is slight or moderate. The effective rooting depth is 60 inches or more, but roots rarely extend below 38 inches. Flooding occurs only rarely.

Most areas of this soil are used for irrigated apple orchards, dryland grain, recreation, wildlife habitat, and rangeland.

This soil is suited for most crops commonly grown in the area. The hazard of erosion on steeper slopes and slow permeability are the main limitations. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to prevent erosion and improve soil tilth, structure, fertility, and water intake. A system for collecting excess water and conducting it in diversions, or a grassed waterway, to controlled outlets may be necessary. In areas where this soil is dry farmed, runoff can be reduced by a fallow period every other year, returning crop residues to the soil, and tilling to a rough cloddy condition. Sprinkler and drip irrigation are the most suitable methods of irrigating this soil. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to prevent excessive runoff, erosion, and a perched water table.

This soil is suited for rangeland. It supports open stands of blue oak with scattered shrubs, pine bluegrass, cheatgrass, and filaree. This soil responds well to fertilizer and range seeding.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,200 pounds

during normal years, and 800 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated, and IIIe-1 (18), irrigated.

180—Tehachapi loam, 15 to 30 percent slopes, eroded. This very deep, well drained, hilly soil is on old alluvial fans and terraces which are dissected by numerous gullies. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 70 to 600 acres in size. The vegetation is mainly annual grasses, scattered shrubs, hardwoods, and a few perennial grasses. Elevation ranges from 4,000 to 5,000 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown loam about 5 inches thick. The subsoil is dark grayish brown, yellowish red, and brown sandy clay loam and clay loam about 33 inches thick. The substratum to a depth of 60 inches is reddish yellow, calcareous, stratified sandy loam.

Included with this soil in mapping are small areas of Steuber soils and a few areas of Psamments-Xerolls in the stream bottoms.

Permeability of this Tehachapi soil is slow, and the available water capacity is moderate or high. Surface runoff is medium, and the hazard of erosion is moderate to high. The effective rooting depth is 60 inches or more, but roots rarely extend below 38 inches. Flooding occurs only rarely.

Most areas of this soil are used for rangeland, recreation, watershed, and wildlife habitat.

This soil is suited for rangeland. The hazard of erosion is the main limitation. It can be controlled by proper grazing use. It supports open stands of blue oak, scattered shrubs, pine bluegrass, cheatgrass, and filaree. Where slopes permit, this soil responds well to fertilization and range seeding.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated.

181—Tehachapi cobbly sandy clay loam, 2 to 30 percent slopes. This soil is very deep, well drained, and gently sloping to moderately steep. It is on old alluvial fans from outflow from the nearby mountains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 50 to 250 acres in size. The vegetation is mainly annual grasses and scattered hardwoods. Elevation ranges from 4,000 to 4,500 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown cobbly sandy clay loam about 19 inches thick. The subsoil is dark grayish brown, yellowish red, and brown cobbly sandy clay loam and cobbly clay loam about 25 inches thick. The substratum to a depth of 60 inches is reddish yellow, calcareous cobbly sandy loam. The profile has about 20 percent cobbles and stones.

Included with this soil in mapping are areas of Steuber and Havala soils and areas of Psamments-Xerolls on stream bottoms. The Steuber and Havala soils make up about 5 percent of the unit, and the Psamments make up another 5 percent.

Permeability of this Tehachapi soil is slow, and the available water capacity is moderate or high. Surface runoff is slow or medium, and the hazard of erosion is moderate. The effective rooting depth is 60 inches or more, but roots rarely extend below 38 inches. Flooding occurs only rarely.

Most areas of this soil are used for rangeland, recreation, watershed, and wildlife habitat.

This soil is suited for rangeland. The erosion hazard and cobbles are the main problems. Cobbles and coarse surface layers may limit ground seeding and the method of fertilization. Livestock grazing should be managed to protect the soil from excessive erosion. This soil supports a good forage stand of bottlebrush squirreltail, bluegrass, and filaree.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,400 pounds during normal years, and 800 pounds during unfavorable years. The range site is Cobbly Fine Loamy (18).

This soil is in capability unit IVe-1 (18), nonirrigated.

182—Tehachapi cobbly sandy clay loam, warm, 2 to 9 percent slopes. This very deep, well drained, gently or moderately sloping soil is on old alluvial fans and stream terraces at the eastern edge of the San Joaquin Valley. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 800 to 2,300 acres in size. The vegetation is mainly annual grasses and scattered hardwoods. Elevation ranges from 800 to 1,100 feet. The mean annual precipitation ranges from 9 to 12 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 250 to 275 days.

Typically, the surface layer is dark grayish brown cobbly sandy clay loam about 19 inches thick. The subsoil is dark grayish brown, yellowish red, and brown cobbly sandy clay loam and cobbly clay loam about 11 inches thick. The substratum to a depth of 60 inches is reddish yellow, calcareous cobbly loamy sand. This soil is about 15 to 20 percent cobbles, ranging from 3 to 10 inches in diameter.

Included with this soil in mapping are areas of Arvin and Chanac soils that make up about 5 percent of the unit. Also included are areas of soils similar to the Tehachapi soils except that the surface layer is more than 20 inches thick.

Permeability of this Tehachapi soil is slow, and the available water capacity is low or moderate. Surface runoff is slow, and the hazard of erosion is slight or moderate. The effective rooting depth is 60 inches or more, but roots rarely extend below 38 inches. Flooding occurs only rarely.

Most areas of this soil are used for irrigated citrus orchards and dryland grain such as wheat and barley. Other areas are used for rangeland and wildlife habitat.

This soil is suited for most crops commonly grown in the area. The hazard of erosion on steeper slopes and the sandy clay loam surface texture are the main limitations. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to prevent erosion and improve soil tilth, structure, fertility, and water infiltration. A system for collecting excess water and conducting it in diversions, or a grassed waterway, to controlled outlets may be necessary. In areas where this soil is dry farmed, a fallow period every other year, returning crop residues, and tilling to a rough cloddy condition can reduce runoff and wind erosion. Sprinkler and drip irrigation are the most suitable methods of irrigating this soil. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to prevent excessive runoff, erosion, and a perched water table.

This soil is suited for rangeland. Major forage plants are soft chess, wild oats, and filaree. Livestock water is the most critical component in a grazing system. This soil generally responds well to fertilization.

The estimated total annual forage production is 2,600 pounds per acre during favorable years, 2,100 pounds during normal years, and 1,300 pounds during unfavorable years. The range site is Cobbly Fine Loamy (17).

This soil is in capability unit IVe-1 (17), nonirrigated, and IIIe-1 (17), irrigated.

183—Tehachapi Variant sandy clay loam, 15 to 50 percent slopes. This very deep, well drained, moderately steep to steep soil is on alluvial fans and old stream terraces. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 75 to 600 acres in size. They have a moundlike appearance. The vegetation is mainly annual grasses, scattered hardwoods, and a few conifers. Elevation ranges from 3,500 to 4,500 feet. The mean annual precipitation ranges from 10 to 15 inches, and the mean annual air temperature is about 59 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown sandy clay loam about 17 inches thick. The subsoil to a depth of 60 inches is dark grayish brown and brown sandy clay loam.

Included with this soil in mapping are areas of Arujo sandy loam soils, areas of Steuber sandy loam soils, and areas of Tehachapi sandy loam soils. These included areas make up about 15 percent of the unit.

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

Most areas of this soil are used for rangeland, recreation, and wildlife habitat.

This soil is suited for rangeland. The hazard of erosion is the main limitation. Seeding and fertilization is limited to the more gentle slopes. Steeper areas are subject to slipping and sliding during wet years. The main plants are scattered blue oaks, cheatgrass, pine bluegrass, squirreltail, red brome, and filaree.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,800 pounds during normal years, and 1,200 pounds during unfavorable years. The range site is Fine Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

184—Torrifluvents-Cajon complex, nearly level. These soils are in basinlike depressional areas in the Mojave Desert. Slope ranges from 0 to 2 percent. Areas are irregular in shape and range from 100 to 1,200 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Some areas have no vegetation. Elevation ranges from 2,200 to 2,600 feet. The mean annual precipitation is about 5 inches, and the mean annual air temperature is about 62 degrees F. The average frost-free season is about 225 days. The Torrifluvents make up about 60 percent of this unit, the Cajon soil about 30 percent.

Included in this unit are small areas of Cajon soils with short slopes up to 9 percent and a few small areas of Garlock soils.

Torrifluvents are very deep, moderately well drained soils. They formed in alluvial material derived mainly from granitic rock.

Typically, these soils have a light-colored surface layer. They are highly stratified with coarse to fine textures throughout. Buried soils similar to the nearby Garlock soils may be found below a depth of 40 inches. Most areas of Torrifluvents have no vegetation.

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

The Cajon soil is very deep and somewhat excessively drained. It formed in alluvial material derived mainly from granitic rock.

Typically, the surface layer of the Cajon soil is pale brown loamy sand about 4 inches thick. The underlying material to a depth of 60 inches is light yellowish brown loamy sand.

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

These soils are used for rangeland, recreation, and wildlife habitat.

These soils are poorly suited for rangeland. Torrifluvents are limited by the moderately slow permeability caused by stratification in the profiles. There is seldom vegetation in these depressional areas. Cajon soils are limited for rangeland by the low to moderate available water capacity and the loamy sand texture of the surface layer. Stabilization of this coarse soil is difficult because of the high hazard of soil blowing. Lack of livestock water, low forage production, and low annual precipitation are also a problem. Desert needlegrass, Indian ricegrass, winterfat, and white bursage are the main forage and browse plants. During years of favorable precipitation, filaree and annual grasses produce abundant forage.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The range site is Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

185—Torriorthents-Rock outcrop complex, very steep. This unit consists of shallow or very shallow soils and exposed hard rock. It is on very steep mountainous ridges in the Mojave Desert. Slope dominantly ranges from 50 to 75 percent. Areas are irregular in shape and range from 50 to 3,000 acres in size. The vegetation is sparse and consists of annual grasses, forbs, and shrubs. Elevation ranges from 2,400 to 3,000 feet in the desert and from 3,000 to 4,000 feet in the foothills of the Tehachapi Mountains. The mean annual precipitation is about 5 inches in the desert but up to 9 inches in the foothills. The mean annual air temperature is about 64 degrees F. The average frost-free season is about 225 days. Torriorthents make up about 50 percent of the unit, the Rock outcrop about 35 percent.

Included in this unit are a few small areas of soils that have gravelly, cobbly, or very stony surface layers, and clay subsoils. Also included are areas of Torriorthents-Rock outcrop with slopes ranging from 15 to 50 percent.

The Torriorthents are shallow and very shallow, well drained soils. They formed in residual material weathered mainly from granite, basalt, and sandstone.

Typically, these Torriorthents are fine sandy loams, coarse sandy loams, loams, clay loams, and their gravelly equivalents. They may be 3 to 35 percent cobbles or stones and 8 to 50 percent gravel.

Permeability of these soils range from moderately slow to moderately rapid, and available water capacity is very low. Surface runoff is very rapid, and the hazard of erosion is moderate. The hazard of soil blowing is moderate. The effective rooting depth ranges from 10 to 20 inches.

The Rock outcrop consists mainly of exposures of hard granite, basalt, or sandstone. These areas are impermeable and vegetative growth is limited to fractures in the rock. Surface runoff is very rapid, and there is no hazard of erosion.

Areas of this unit are used for rangeland, recreation, and wildlife habitat.

The soils in this complex are poorly suited for rangeland. Major limitations are very steep slopes, rock outcrops, and shallow soil depth. Lack of livestock water and low annual precipitation are also major problems. Because of the excessive slope, livestock access to higher grounds is limited. There are two major types of vegetation in these marginal range soils. Desert knolls and hills are vegetated by creosotebush, bursage, desert needlegrass, and various desert forbs. Forage production is very low, but in years when precipitation is favorable annual grasses and filaree may produce abundant quantities. The other vegetation type occurs in the foothill zone west of the Mojave Desert. This type consists of scattered Pinyon pine with Juniper and an understory of desert needlegrass, ephedra, scrub oak, and spiny hopsage. Forage production is low, but the native perennial grasses may furnish high quality forage in favorable years.

This soil is in capability subclass VIIe (29, 30), nonirrigated.

186—Tujunga loamy sand, 2 to 5 percent slopes. This soil is very deep, somewhat excessively drained, and gently sloping. It is on alluvial fans and flood plains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 50 to 360 acres in size. The vegetation is mainly annual grasses. Elevation ranges from 4,000 to 5,000 feet. The mean annual precipitation ranges from 10 to 14 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is pale brown loamy sand about 40 inches thick. The underlying material to a depth of 60 inches is light yellowish brown loamy sand.

Included with this soil in mapping are areas of Steuber soils that make up about 10 percent of the unit. Also included are a few small areas of Tujunga soils with sandy loam or cobbly sandy loam overwash.

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

Most areas of this soil are used for rangeland, recreation, and wildlife.

This soil is suited for rangeland. It is limited for this used by rapid permeability and low available water capacity. The main forage plants are squirreltail and cheatgrass.

The estimated total forage production is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Sandy (18).

This soil is in capability subclass VIs (18), nonirrigated, and capability unit IIIs-4 (18), irrigated.

187—Tunis sandy loam, 5 to 30 percent slopes. This soil is shallow, somewhat excessively drained, and gently sloping to moderately steep. It is on mountainous uplands. It formed in residual material derived mainly from undifferentiated igneous and metamorphic rocks. Areas are irregular in shape and range from 60 to 870 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 1,000 to 5,000 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season dominantly ranges from 150 to 225 days, but in a few areas at lower elevations it lasts as long as 250 days.

Typically, this Tunis soil is brown sandy loam about 18 inches deep over highly weathered gneiss.

Included with this soil in mapping are areas of Walong soils with some deep gullies and areas of highly weathered rock outcrops ranging from 50 to 200 feet in size. The Walong soils make up 10 percent of the unit, and the rock outcrops make up 15 percent. These areas are in the foothills bordering the San Joaquin Valley. Also included are a few areas of similar soils near Oak Creek Pass where 50 to 75 percent of the surface is covered by fine gravel.

Permeability of this Tunis soil is moderate in the soil material and slow in the weathered rock. The available water capacity is very low to low. Surface runoff is medium, and the hazard of erosion is moderate. The effective rooting depth ranges from 10 to 20 inches.

Most areas of this soil are used for rangeland, watershed, and wildlife habitat.

This soil is poorly suited for rangeland. It is limited for this use by the hazard of erosion, shallow depth, and very low available water capacity. Excessive disturbance or overgrazing can result in severe erosion. Water development and livestock walkways can increase livestock distribution and help to control erosion. Main forage plants are soft chess, cheatgrass, and filaree.

The estimated total annual forage production is 550 pounds per acre during favorable years, 400 pounds during normal years, and 250 pounds during unfavorable years. The range site is Shallow Coarse Loamy (18).

This soil is in capability subclass VIIe (18), nonirrigated.

188—Tunis-Walong complex, 50 to 75 percent slopes. These soils are shallow and moderately deep, somewhat excessively drained to well drained, and very steep. They are on mountainous uplands. Areas are irregular in shape and range from 100 to 750 acres in size. The vegetation is mainly annual grasses, forbs, and hardwoods. Elevation ranges from 1,000 to 5,800 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 150 to 250 days. The Tunis soil makes up about 65 percent of this unit, the Walong soil about 20 percent.

Included in this unit are a few small areas with large gullies. Also included are some small areas of Arujo soils and some rock outcrops on south-facing slopes. Included areas make up about 15 percent of the unit.

The Tunis soil is shallow and somewhat excessively drained. It formed in residual material weathered mainly from gneiss.

Typically, the Tunis soil is brown loam about 18 inches deep over highly weathered gneiss.

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

The Walong soil is moderately deep and well drained. It formed in residual material weathered mainly from granite.

Typically, the surface layer is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is yellowish brown, strongly weathered granitic rock.

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

These soils are used for rangeland, watershed, and wildlife habitat.

The soils in this complex are poorly suited for rangeland. They are limited by steep slopes and low available water capacity. Excessive disturbances or overgrazing can result in a severe erosion problem. Water development and livestock walkways can help to increase livestock distribution and control erosion. Vegetation consists of a few scattered oak with an understory of soft chess, cheatgrass, and filaree

The estimated total annual forage production on the Tunis soil is 550 pounds per acre during favorable years, 400 pounds during normal years, and 250 pounds during unfavorable years. The estimated total on the Walong soil is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Tunis soil is Shallow Loamy (18) and for the Walong soil is Coarse Loamy (18).

This soil is in capability subclass VIIe (18), nonirrigated.

189—Tweedy sandy loam, 30 to 50 percent slopes. This moderately deep, well drained, steep soil is on mountainous uplands. It formed in residual material derived from mica schist. Areas are irregular in shape and range from 50 to 860 acres in size. The vegetation is mainly annual and perennial grasses, shrubs, hardwoods, and scattered conifers. Elevation ranges from 4,000 to 6,000 feet. The mean annual precipitation ranges from 10 to 15 inches, and the average annual air temperature is about 55 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is brown sandy loam about 10 inches thick. The subsoil is reddish brown and reddish yellow sandy clay loam about 28 inches thick.

Below this is a reddish yellow, weathered mica schist. In some pedons the surface layer is loam.

Included with this soil in mapping are areas of Anaverde soils and areas of soils similar to the Tweedy soil but which have massive and hard surface layers. The Anaverde soils make up 10 percent of the unit, and the other soils make up 8 percent. Also included are areas of rock outcrops, some small areas of Godde and Tollhouse soils, and a few areas of Tweedy soils with 15 to 30 percent slopes. These included areas make up 2 percent of the unit.

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

Most areas of this soil are used for rangeland, recreation, watershed, and wildlife habitat.

This soil is suited for rangeland. It is limited mainly by steep slopes and the hazard of erosion. Forage plants include bluegrass, bottlebrush squirreltail, and various annual grasses. Encroachment of woody plants is a problem in most areas. Forage production and utilization may be increased by thinning the brush on the more gentle slopes. Fertilization may be feasible on thinned areas. Steep escarpments tend to divide management areas.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This unit is in capability subclass VIe (18), nonirrigated.

190—Tweedy sandy loam, 50 to 75 percent slopes. This moderately deep, well drained, very steep soil is on mountainous uplands. It formed in residual material derived from mica schist. Areas are irregular in shape and range from 60 to 2,800 acres in size. The vegetation is mainly annual and perennial grasses, shrubs, hardwoods, and scattered conifers. Elevation ranges from 4,000 to 6,000 feet. The mean annual precipitation ranges from 10 to 15 inches, and the average annual air temperature is about 55 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is brown sandy loam about 10 inches thick. The subsoil is reddish brown and reddish yellow sandy clay loam about 28 inches thick. Below this is a reddish yellow, weathered mica schist. In some areas the surface layer is loam.

Included with this soil in mapping are areas of Anaverde soils and areas of soils similar to the Tweedy soil but which have massive and hard surface layers. The Anaverde soils make up 10 percent of the unit, and the other soils make up 8 percent. Also included are areas of rock outcrops, some small areas of Godde and Tollhouse soils, and a few areas of Tweedy soils with 15 to 30 percent slopes. These included areas make up 2 percent of the unit.

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

Most areas of this soil are used for rangeland, watershed, wildlife habitat, and recreation.

This soil is suited for rangeland. It is limited mainly by steep slopes. Dense growths of woody plants are also a problem. Livestock trails or walkways may be needed to encourage better grazing distribution. Range management practices that disturb the soil should be restricted to the more gentle slopes. Dominant vegetation consists of deciduous oak, pines, bluegrass, bottlebrush squirreltail, and mountainmahogany.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability subclass VIIe (18), nonirrigated.

191—Tweedy-Anaverde complex, 30 to 50 percent slopes. These soils are very deep and moderately deep, well drained, and steep. They are on mountainous uplands. Areas are irregular in shape and range from 120 to 1,100 acres in size. The vegetation is mainly annual and perennial grasses, shrubs, hardwoods, and scattered conifers. Elevation ranges from 4,000 to 5,000 feet. The mean annual precipitation ranges from 10 to 13 inches, and the mean annual air temperature is about 55 degrees F. The average frost-free season ranges from 150 to 225 days. The Tweedy soil makes up about 60 percent of this unit, and the Anaverde soil about 35 percent.

Included in this unit are small areas of Godde and Tollhouse soils; some rock outcrops; and a few areas of a soil similar to Tweedy but which has a thicker, dark surface layer; and soils similar to Anaverde but which have a weakly developed subsoil. Included areas make up about 5 percent of the unit.

The Tweedy soil is moderately deep and well drained. It formed in residual material weathered from mica schist.

Typically, the surface layer of the Tweedy soil is brown sandy loam about 10 inches thick. The subsoil is reddish brown and reddish yellow sandy clay loam about 28 inches thick. Below this is reddish yellow, weathered mica schist. In some areas the surface layer is loam.

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

The Anaverde soil is very deep and well drained. It formed in residual material weathered from schist.

Typically, the surface layer of the Anaverde soil is dark brown gravelly loam about 8 inches thick. The subsoil is dark brown gravelly loam about 27 inches thick. The underlying material is brown and pale brown gravelly sandy loam and stony sandy loam to a depth of 90

inches. Below this is fractured schist. In some places, the surface layer is loam, clay loam, or gravelly clay loam.

Permeability of this soil is moderate, and available water capacity is low or moderate. Surface runoff is rapid, and the hazard of erosion is high. The effective rooting depth ranges from 60 to 95 inches.

These soils are used for rangeland, recreation, watershed, and wildlife habitat.

These soils are suited for rangeland. They are limited mainly by steep slopes. In some places, dense growths of woody plants are also a problem. Trails and walkways may be needed to encourage grazing on steeper slopes to obtain better livestock distribution. Tweedy soils support blue oak, bluegrass, bottlebrush squirreltail, big sagebrush, and mountainmahogany. Anaverde soils are characterized by oak, sandberg bluegrass, soft chess, redstem filaree, and other perennial forbs.

The estimated total annual forage production on the Tweedy soil is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Anaverde soil is 3,000 pounds per acre during favorable years, 2,400 pounds during normal years, and 1,800 pounds during unfavorable years. The range site for the Tweedy soil is Coarse Loamy (18) and for the Anaverde soil is Gravelly Loamy (18).

This unit is in capability subclass VIe (18), nonirrigated.

192—Tweedy-Anaverde complex, 50 to 75 percent slopes. These soils are very deep and moderately deep, well drained, and very steep. They are on mountainous uplands. Areas are irregular in shape and range from 90 to 1,000 acres in size. The vegetation is mainly annual and perennial grasses, shrubs, hardwoods, and scattered conifers. Elevation ranges from 4,500 to 6,500 feet. The mean annual precipitation ranges from 10 to 15 inches, and the mean annual air temperature is about 55 degrees F. The average frost-free season is about 200 days. The Tweedy soil makes up about 60 percent of this unit, the Anaverde soil about 35 percent.

Included in this unit are small areas of Godde and Tollhouse soils; some rock outcrops; and a few areas of soils similar to Tweedy but which have thicker, dark surface layers; and soils similar to Anaverde but which have a weakly developed subsoil. Included areas make up about 5 percent of the unit.

The Tweedy soil is moderately deep and well drained. It formed in residual material weathered from mica schist.

Typically, the surface layer of the Tweedy soil is brown sandy loam about 10 inches thick. The subsoil is reddish brown and reddish yellow sandy clay loam about 28 inches thick. Below this is a reddish yellow, weathered mica schist. In some places the surface layer is loam.

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

The Anaverde soil is very deep and well drained. It formed in residual material weathered from schist.

Typically, the surface layer of the Anaverde soil is dark brown gravelly loam about 8 inches thick. The subsoil is dark brown gravelly loam about 27 inches thick. The underlying material is brown and pale brown gravelly sandy loam and stony sandy loam to a depth of 90 inches. Below this is fractured schist. In some places the surface layer is loam, clay loam, or gravelly clay loam.

Permeability of this soil is moderate, and available water capacity is low or moderate. Surface runoff is rapid, and the hazard of erosion is very high. The effective rooting depth ranges from 60 to 95 inches.

These soils are used for rangeland, recreation, watershed, and wildlife habitat.

These soils are suited for rangeland. They are limited mainly by very steep slopes, and livestock trails should be restricted to the more stable slopes. To reduce erosion and compaction, grazing should be deferred when surface layers are wet. An adequate plant cover is very important to protect these soils from erosion. Dominant vegetation on the Tweedy soil consists of open stands of blue oak and Digger pine. Understory vegetation is mainly bluegrass, annual grasses, and shrubs. The Anaverde soil supports oak, soft chess, redstem filareee, and shrubs.

The estimated total annual forage production on the Tweedy soil is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Anaverde soil is 3,000 pounds per acre during favorable years, 2,400 pounds during normal years, and 1,800 pounds during unfavorable years. The range site for the Tweedy soil is Coarse Loamy (18) and for the Anaverde soil is Gravelly Loamy (18).

This unit is in capability subclass VIIe (18), nonirrigated.

193—Walong sandy loam, 15 to 30 percent slopes. This moderately deep, well drained, hilly soil is on mountainous uplands. It formed in residual material weathered from granite. Areas are irregular in shape and range from 80 to 1,900 acres in size. The vegetation is mainly hardwoods and annual and perennial grasses. Elevation is dominantly between 3,000 and 5,000 feet. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 57 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is yellowish brown, strongly weathered granitic rock. In some areas the surface layer is coarse sandy loam or gravelly sandy loam.

Included with this soil in mapping are areas of Arujo soils, Tunis soils, and some rock outcrops that make up

15 percent of the unit. Also included are areas of soils similar to Walong soils but in which depth to weathered rock ranges from 40 to 70 inches. These areas make up 20 percent of the unit. There are a few small areas of Walong with slopes less than 15 percent.

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

Most areas of this soil are used for rangeland, recreation, watershed, and wildlife habitat.

This soil is suited for rangeland. It is limited mainly by hilly slopes. In some places, the dense growths of woody plants are also a problem. Where woody plants are managed to create open areas, the soil will produce an adequate cover of desirable grasses and forbs. Livestock trails may be needed to distribute livestock on higher and steeper slopes. Blue oak is the dominant tree. Soft chess, bluegrass, and filaree are the main forage plants.

The estimated total forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability unit IVe (18), nonirrigated.

194—Walong sandy loam, 30 to 50 percent slopes. This moderately deep, well drained, steep soil is on mountainous uplands. It formed in residual material weathered from granite. Areas are irregular in shape and range from 50 to 3,000 acres in size. The vegetation is mainly annual and perennial grasses, and hardwoods. Elevation is dominantly between 3,000 and 5,000 feet. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 57 degrees F. The average frost-free season ranges from 150 to 225 days.

Typically, the surface layer is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is a yellowish brown, strongly weathered granitic rock. In some areas the surface layer is coarse sandy loam or gravelly sandy loam.

Included with this soil in mapping are areas of Arujo soils, Tunis soils, and some rock outcrops that make up about 15 percent of the unit. Also included are areas of soils similar to Walong soil but in which depth to weathered rock ranges from 40 to 70 inches. These areas make up 20 percent of the unit. There are also a few small areas of Walong soil with slopes less than 30 percent.

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

Most areas of this soil are used for rangeland, recreation, watershed, and wildlife habitat.

This soil is suited for rangeland. It is limited mainly by steep slopes. In some places dense growths of woody plants are also a problem. Excessive slope limits livestock distribution to the smoother more gently sloping areas. This increases the hazard of erosion on areas that are overgrazed. Trails and walkways can be constructed in places to encourage livestock grazing where access is limited. Where woody plants are managed to create open areas, this soil will produce an adequate cover of desirable grasses and forbs. Blue oak is the dominant tree on these areas. Soft chess, ripgut brome, and filaree are the main forage plants.

The estimated total annual forage production is 2,400 pounds per acre during favorable years, 1,400 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (18).

This soil is in capability subclass VIe (18), nonirrigated.

195—Walong-Arujo sandy loams, 15 to 30 percent slopes. These soils are deep and moderately deep, well drained, and hilly. They are on mountainous uplands. Areas are irregular in shape and range from 50 to 700 acres in size. The vegetation is mainly annual and perennial grasses and hardwoods. Elevation dominantly is between 3,000 and 5,000 feet. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 150 to 225 days. The Walong soil makes up about 50 percent of the unit, the Arujo soil about 30 percent.

Included in this unit are small areas of Friant and Tunis soils. Also included is a soil similar to the Arujo soil, but in which the depth to weathered rock is less than 40 inches. Included areas make up about 20 percent of the unit.

The Walong soil is moderately deep and well drained. It formed in residual material weathered from granite.

Typically, the surface layer of the Walong soil is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is yellowish brown, strongly weathered granite. In some areas the surface layer is coarse sandy loam or gravelly sandy loam.

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

The Arujo soil is deep and well drained. It formed in residual material weathered from metamorphic and igneous rocks.

Typically, the surface layer of the Arujo soil is grayish brown and dark grayish brown sandy loam and loam about 23 inches thick. The upper 22 inches of the subsoil is dark brown and brown clay loam. The lower 10 inches is yellowish brown loam. Below this is weathered gneiss. In some places the surface layer is clay loam or sandy clay loam.

Permeability of this soil is moderately slow, and available water capacity is moderate to very high. Surface runoff is medium, and the hazard of erosion is

moderate. The effective rooting depth ranges from 40 to 60 inches.

These soils are used for rangeland, watershed, and wildlife habitat.

These soils are suited for rangeland. The hazard of erosion is the main limitation. Livestock grazing should be managed to protect the soil from excessive erosion. This soil supports an open stand of blue oak. There is an abundant understory of soft chess, bluegrass, and filaree.

The estimated total annual forage production on the Walong soil is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Arujo soil is 2,400 pounds per acre during favorable years, 1,900 pounds during normal years, and 1,400 pounds during unfavorable years. The range site for the Walong soil is Coarse Loamy (18) and for the Arujo soil is Coarse Loamy (18).

This unit is in capability unit IVe-1 (18), nonirrigated.

196—Walong-Arujo sandy loams, 30 to 50 percent slopes. These soils are deep and moderately deep, well drained, and steep. They are on mountainous uplands. Areas are irregular in shape and range from 400 to 700 acres in size. The vegetation is mainly annual and perennial grasses and hardwoods. Elevation is dominantly between 3,000 and 5,800 feet. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 150 to 225 days. The Walong soil makes up about 45 percent of the unit, the Arujo soil about 30 percent.

Included in this unit are small areas of Anaverde and Rescue Variant soils. Also included are small areas of soils similar to the Arujo soil but in which the depth to soft weathered rock ranges from 24 to 40 inches and soil colors are redder. A few areas of the complex have slopes that are less than 30 percent. Included areas make up about 25 percent of the unit.

The Walong soil is moderately deep and well drained. It formed in residual material weathered from granite.

Typically, the surface layer of the Walong soil is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is a yellowish brown, strongly weathered granite. In some areas the surface layer is coarse sandy loam or gravelly sandy loam.

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

The Arujo soil is deep and well drained. It formed in residual material weathered from metamorphic and igneous rock.

Typically, the surface layer of the Arujo soil is grayish brown and dark grayish brown sandy loam and loam about 23 inches thick. The upper 22 inches of the subsoil is dark brown and brown clay loam. The lower 10 inches is yellowish brown loam. Below this is weathered gneiss. In some places the surface layer is clay loam or sandy clay loam.

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

These soils are used for rangeland, watershed, and wildlife habitat.

These soils are suited for rangeland. The major limitation is steep slopes. In some places, dense growths of woody plants are also a problem. Where woody plants are managed to create open areas, the soils will produce a good cover of desirable grasses and forbs. Steep slopes limit livestock access, which results in overgrazing on flatter areas. Livestock trails may be needed on the steeper slopes to encourage livestock distribution. Soft chess, wild oats, filaree, and bluegrass are the main forage plants. Blue oak and interior live oak are predominant on these soils.

The estimated total annual forage production on the Walong soil is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Arujo soil is 2,400 pounds per acre during favorable years, 1,900 pounds during normal years, and 1,400 pounds during unfavorable years. The range site for the Walong soil is Coarse Loamy (18) and for the Arujo soil is Coarse Loamy (18).

This unit is in capability subclass VIe (18), nonirrigated.

197—Walong-Arujo sandy loams, 50 to 75 percent slopes. These soils are deep and moderately deep, well drained, and very steep. Areas are irregular in shape and range from 100 to 700 acres in size. They are on mountainous uplands. The vegetation is mainly annual and perennial grasses and hardwoods. Elevation is dominantly between 3,000 and 5,800 feet. The mean annual precipitation ranges from 12 to 18 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 150 to 225 days. The Walong soil makes up about 50 percent of the unit, the Arujo soil about 35 percent.

Included in this unit are small areas of Anaverde and Rescue Variant soils. Also included are a few areas of rock outcrop and a soil similar to Arujo except that the depth to the weathered rock is between 24 inches and 40 inches and colors are redder. Included areas make up 15 percent of the unit.

The Walong soil is moderately deep and well drained. It formed in residual material weathered from granite. It is on hillsides and the less stable toe slopes.

Typically, the surface layer of the Walong soil is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is yellowish brown, strongly weathered granite. In some areas the surface layer is coarse sandy loam or gravelly sandy loam.

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

The Arujo soil is deep and well drained. It formed in residual material weathered from metamorphic and igneous rocks. It is on ridgetops and stable toe slopes.

Typically, the surface layer of the Arujo soil is grayish brown and dark grayish brown sandy loam and loam about 23 inches thick. The upper 22 inches of the subsoil is dark brown and brown clay loam. The lower 10 inches is yellowish brown loam. Below this is weathered gneiss. In some places the surface layer is clay loam or sandy clay loam.

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

These soils are used for rangeland, recreation, watershed, and wildlife habitat.

These soils are suited for rangeland. They are limited mainly by very steep slopes. In some places dense growths of woody plants are also a problem. Where woody plants are managed to create open areas, these soils will produce a good cover of desirable grasses and forbs. The very steep slopes limit livestock access, which results in overgrazing on flatter areas. Livestock trails may be needed on the steeper slopes to encourage livestock distribution. Soft chess, wild oats, filaree, and ripgut brome are the main forage plants. Blue oak, black oak, and interior live oak are predominant on these soils.

The estimated total annual forage production on the Walong soil is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 1,000 pounds during unfavorable years. The estimated total on the Arujo soil is 2,400 pounds per acre during favorable years, 1,900 pounds during normal years, and 1,400 pounds during unfavorable years. The range site for the Walong soil is Coarse Loamy (18) and for the Arujo soil is Coarse Loamy (18).

This unit is in capability subclass VIIe (18), nonirrigated.

198—Walong-Rock outcrop complex, 30 to 75 percent slopes. This moderately deep, well drained, steep or very steep soil and miscellaneous area is on mountainous uplands. Areas are irregular in shape and range from 400 to 1,200 acres in size. The vegetation is mainly annual grasses, scattered perennial grasses, and hardwoods. Elevation is dominantly between 3,000 and 5,800 feet. The mean annual precipitation ranges from 12 to 18 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 150 to 225 days. The Walong soil makes up about 45 percent of the unit, the Rock outcrop about 25 percent.

Included in this unit are small areas of Anaverde, Rescue Variant, and Arujo soils. Included areas make up about 30 percent of the unit.

The Walong soil is moderately deep and well drained. It formed in residual material weathered from granite.

Typically, the surface layer of the Walong soil is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is yellowish brown, strongly weathered granite. In some areas the surface layer is coarse sandy loam or gravelly sandy loam.

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

Rock outcrop consists of hard granitic rock exposures. These outcrops are from 2 to 40 feet across. They are impermeable, and the vegetation is limited to fractures in the rock structure. Surface runoff is very rapid, and there is no hazard of erosion.

Areas of this unit are used for rangeland, watershed, and wildlife habitat.

This unit is poorly suited for rangeland. It is limited mainly by steep and very steep slopes, rock outcrops, and low available water capacity. Woody plants are a problem on some areas. Where the woody plants are managed to create open areas, this soil will produce adequate cover of desirable grasses and forbs. Escarpments and very steep slopes limit livestock distribution. Livestock trails and water development may help to prevent overgrazing on less steep areas. Livestock grazing should be managed to protect the soil from excessive erosion. Blue oak is the dominant tree. Soft chess, bluegrass, and filaree are the main forage plants.

The estimated total annual forage production on the Walong soil is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Walong soil is Coarse Loamy (18).

This unit is in capability subclass VIIe (18), nonirrigated.

199—Walong-Edmundston association, steep. These are deep and moderately deep, well drained soils. They are on mountainous uplands. Slope ranges from 30 to 50 percent. Areas are irregular in shape and range from 200 to 1,000 acres in size. The vegetation is mainly annual grasses, shrubs, hardwoods, and conifers. Elevation ranges from 3,500 to 5,800 feet. The mean annual precipitation ranges from 12 to 18 inches, and the mean annual air temperature is about 57 degrees F. The average frost-free season ranges from 150 to 225 days. The Walong soil makes up about 45 percent of this unit, the Edmundston soil about 40 percent.

Included in this unit are areas of Arujo soils, areas of Tunis soils, and a few small areas of rock outcrops. All

these included areas make up about 15 percent of the unit.

The Walong soil is moderately deep and well drained. It formed in residual material weathered from granitic rocks. It is on south-facing slopes and supports annual grasses and hardwoods.

Typically, the surface layer of the Walong soil is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is yellowish brown, strongly weathered granitic rock.

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

The Edmundston soil is deep and well drained. It formed in residual material weathered mainly from granitic rock. It is on north-facing slopes and supports a dense tree canopy of conifers and hardwoods.

Typically, the surface layer of the Edmundston soil is brown and grayish brown sandy loam about 17 inches thick. The subsoil is grayish brown sandy loam about 17 inches thick. The substratum is brown gravelly coarse sandy loam about 16 inches thick. Below this is weathered granodiorite. In some places the surface texture is loam.

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

These soils are used for rangeland, woodland, recreation, watershed, and wildlife habitat.

These soils are suited for rangeland. They are limited mainly by steep slopes, hazard of erosion, and low available water capacity. Lack of water for livestock also limits these areas for grazing. Steep slopes limit livestock distribution. Trails and walkways can be constructed in places to encourage livestock grazing where access is limited. Livestock grazing should be managed to protect the soil from excessive erosion.

The Edmundston soil is suited to the production of singleleaf pinyon pine. It can produce 8.5 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The main concerns in producing and harvesting timber are equipment limitations, slope, and hazard of erosion. Conventional methods of harvesting trees can be used in the more gently sloping areas but are difficult to use in steeper areas. Management that minimizes the risk of erosion is essential in harvesting timber.

The estimated total annual forage production on the Walong soil is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Walong soil is Coarse Loamy (18).

The Walong soil is in capability subclass VIe (18), and the Edmundston soil is in VIe (22), nonirrigated.

200—Walong-Edmundston association, very steep. These soils are deep, moderately deep, and well drained. They are on mountainous uplands. Slope ranges from 50 to 75 percent. Areas are irregular in shape and range from 300 to 1,200 acres in size. The vegetation is mainly annual grasses, hardwoods, and conifers. Elevation ranges from 2,000 to 5,800 feet. The mean annual precipitation ranges from 12 to 18 inches, and the mean annual air temperature is about 57 degrees F. The average frost-free season ranges from 175 to 225 days. The Walong soil makes up about 45 percent of this unit, the Edmundston soil about 40 percent.

Included in this unit are small areas of Tunis soil, Arujo soils, and some rock outcrops. These included areas make up about 15 percent of this unit.

The Walong soil is moderately deep and well drained. It formed in residual material weathered from granitic rocks. It is on south-facing slopes with a vegetation of annual grasses and hardwoods.

Typically, the surface layer of the Walong soil is dark grayish brown and brown sandy loam about 14 inches thick. The subsoil is brown sandy loam about 13 inches thick. Below this is a yellowish brown, strongly weathered granitic rock.

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

The Edmundston soil is deep and well drained. It formed in residual material weathered mainly from granitic rock. It is on north-facing slopes that support a dense canopy of conifers and hardwoods.

Typically, the surface layer is brown and grayish brown sandy loam about 17 inches thick. The subsoil is grayish brown sandy loam about 17 inches thick. The substratum is brown gravelly coarse sandy loam about 16 inches thick. Below this is weathered granodiorite. In some places the surface texture is loam.

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

These soils are used for rangeland, recreation, watershed, and wildlife habitat.

These soils are poorly suited for rangeland. It is limited mainly by the very steep slopes, hazard of erosion, and low available water capacity. Lack of livestock water also limits these soils for grazing use. Very steep slopes limit livestock distribution. Trails and walkways can be constructed in places to encourage livestock grazing where access is limited. Livestock grazing should be managed to protect the soil from excessive erosion.

The Edmundston soil is suited to the production of singleleaf pinyon pine. It can produce 8.5 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The main concerns in producing and harvesting timber are equipment limitations, slope, and

hazard of erosion. Conventional methods of harvesting trees can be used in the more gently sloping areas but are difficult to use in the steeper areas. Management that minimizes the risk of erosion is essential in harvesting timber.

The estimated total annual forage production on the Walong soil is 2,000 pounds per acre during favorable years, 1,200 pounds during normal years, and 1,000 pounds during unfavorable years. The range site for the Walong soil is Coarse Loamy (18).

The Walong soil is in capability subclass VIIe (18), and the Edmundston soil is in VIIe (22), nonirrigated.

201—Wasioja sandy loam, 2 to 9 percent slopes. This very deep, well drained, gently or moderately sloping soil is on stream terraces. It formed in alluvial material derived from mixed sources. Areas are irregular in shape and range from 50 to 1,000 acres in size. The vegetation is mainly annual grasses. Elevation ranges from 800 to 1,500 feet. The mean annual precipitation ranges from 8 to 9 inches, and the average annual air temperature is about 63 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is light brownish gray sandy loam about 34 inches thick. The subsoil is brownish yellow and yellowish brown loam about 15 inches thick. The substratum to a depth of 62 inches is light yellowish brown sandy loam. In some places the surface layer is fine sandy loam.

Included with this soil in mapping are areas of Arvin, Chanac, and Hesperia soils that make up about 10 percent of the unit. Also included are areas of Wasioja soil with slopes ranging from 9 to 15 percent. These areas make up 9 to 15 percent of the unit.

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

Most areas of this soil are used for irrigated crops such as sugar beets, tomatoes, onions, potatoes, and grapes. Other areas are used for rangeland.

This soil is suited to row crops. The hazard of erosion and the sandy loam surface texture are the main limitations. A cropping system that includes crop rotation or cover crops, crop residue utilization, and proper tillage helps to prevent water erosion and soil blowing and improves soil tilth, structure, fertility, and water infiltration. This soil is suited for furrow, sprinkler, and drip irrigation. Irrigation water should be applied at a rate sufficient for maximum production but in amounts small enough to avoid excessive runoff, deep percolation, and erosion.

This soil is suited for rangeland. It has few limitations. Range seeding and fertilization are two practices that can help increase forage production. The desirable forage plants include desert needlegrass, purple needlegrass, and filaree.

The estimated total annual forage production is 2,000 pounds per acre during favorable years, 1,500 pounds during normal years, and 1,200 pounds during unfavorable years. The range site is Coarse Loamy (17).

This soil is in capability unit IVe-1 (17), nonirrigated, and IIe-1(17), irrigated.

202—Wasioja sandy loam, cool, 5 to 9 percent slopes. This very deep, well drained, moderately sloping soil is on stream terraces. It formed in alluvial material derived from mixed sources. Areas are irregular in shape and range from 200 to 400 acres in size. The vegetation is a mixture of perennial and annual grasses, and shrubs. Elevation ranges from 4,000 to 4,500 feet. The mean annual precipitation ranges from 8 to 10 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is light brownish gray sandy loam about 34 inches thick. The subsoil is brownish yellow and yellowish brown loam about 15 inches thick. The substratum to a depth of 62 inches is light yellowish brown sandy loam. In some places the surface layer is fine sandy loam.

Included with this soil in mapping are areas of Cajon, Neuralia, and Pajuela soils that make up about 5 percent of the unit. Also included are small areas of Tehachapi soils at the edge of the xeric moisture regime. The included areas of the Tehachapi soil make up about 2 percent of the unit.

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

Most areas of this soil are used for rangeland, recreation, and wildlife habitat.

This soil is suited for rangeland. It is limited mainly by the hazard of erosion. Proper livestock use, stock water development, and rest rotation grazing systems will help to increase the main forage plants. Vegetation consists of perennial and annual grasses with scattered goldenbush. The main forage plants are desert needlegrass, purple needlegrass, and filaree. Herbicides can be used to efficiently control goldenbush.

The estimated total forage production is 2,400 pounds per acre during favorable years, 1,500 pounds during normal years, and 1,000 pounds during unfavorable years. The range site is Coarse Loamy (29).

This soil is in capability subclass VIe (29), nonirrigated.

203—Whitewolf loamy sand, 2 to 5 percent slopes. This very deep, somewhat excessively drained, gently sloping soil is on flood plains and alluvial fans along the edge of the San Joaquin Valley. It formed in alluvial material derived mainly from granitic rock. Only one area of this soil is mapped. It is approximately 3,947 acres in size. The vegetation is mainly annual grasses and scattered shrubs. Elevation ranges from 500 to 1,500

feet. The average annual precipitation ranges from 6 to 9 inches, and the average annual air temperature is about 65 degrees F. The average frost-free season ranges from 250 to 300 days.

Typically, the surface layer is grayish brown loamy sand about 32 inches thick. The underlying material to a depth of 70 inches is pale brown loamy coarse sand.

Included with this soil in mapping are a few small nearly level areas of Whitewolf soils. Also included are small areas of Hesperia soils and narrow bodies of Psamments-Xerolls, mainly on old drainageways and stream bottoms.

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

Most areas of this soil are used for irrigated crops. Grapes, onions, potatoes, and tomatoes are the main crops.

This soil is suited to irrigated row crops. Soil blowing and low available water capacity are the main limitations. A cropping system that maintains a cover of crops or crop residue reduces the risk of soil blowing. Use of manure and commercial fertilizer helps to improve tilth and increase fertility. Sprinkler irrigation is recommended on this soil because of the high intake rate and gentle slopes. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because this soil is droughty, light and frequent applications of irrigation water are needed.

This soil is in capability unit IIIs-4(17), irrigated, and VIe(17), nonirrigated.

204—Whitewolf loamy sand, cool, 2 to 5 percent slopes. This soil is very deep, somewhat excessively drained, and gently sloping. It is on alluvial fans and stream flood plains in a transitional area between the Tehachapi Mountains and the Mojave Desert. It formed in alluvial material derived mainly from granitic rock. Only one area of this soil was mapped. It is approximately 1,435 acres in size. The vegetation is mainly annual grasses and scattered shrubs. Elevation ranges from 2,800 to 4,500 feet. The mean annual precipitation ranges from 6 to 9 inches, and the average annual air temperature is about 60 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is grayish brown loamy sand about 32 inches thick. The underlying material to a depth of 70 inches is pale brown sand.

Included with this soil in mapping are small areas where gravel content ranges from 15 to 20 percent. These gravelly areas make up about 5 percent of the unit.

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

Most areas of this soil are used for rangeland and wildlife habitat.

This soil is suited for rangeland. It is limited mainly by low available water capacity and rapid permeability. The most favorable time for grazing is early spring or late fall. Forage production is low and is mainly allscale and white bursage. No more than half of the annual growth should be used for browse.

The estimated total annual forage production is 800 pounds per acre during favorable years, 500 pounds during normal years, and 400 pounds during unfavorable years. The range site is Sandy (29).

This soil is in capability subclass VIIs(29), nonirrigated.

205—Xererts-Xerolls complex, steep. These soils are moderately deep and well drained. They are on mountainous uplands. Slope ranges from 15 to 85 percent. Areas are irregular in shape and range from 140 to 1,100 acres in size. The vegetation is mainly hardwoods with an undercover of annual grasses. Elevation ranges from 1,500 to 6,000 feet. The mean annual precipitation is about 9 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 150 to 250 days. The Xererts soils make up about 60 percent of this unit, the Xerolls 30 percent.

Included in this unit are rock outcrops that make up about 10 percent of the unit.

Xererts are clay soils that have deep cracks when dry.

Permeability of the Xererts is slow, and the available water capacity is low to moderate. Surface runoff is initially medium but becomes very rapid after the soil is wet and the cracks have closed. Depending on the steepness of slope, the hazard of water erosion is moderate to very high. The effective rooting depth ranges from 20 to 40 inches. The shrink-swell potential is very high.

Xerolls are clay loam throughout. Content of coarse fragments ranges from 0 to 35 percent. The fragments typically have dark surfaces.

Permeability of the Xerolls is moderately slow, and the available water capacity is low to moderate. Surface runoff is medium, and the hazard of erosion is moderate to very high. The effective rooting depth ranges from 20 to 40 inches.

This unit is used mainly for woodland, recreation, and wildlife habitat.

This unit is suited to the production of singleleaf pinyon pine. It can produce 5.5 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The main concerns in producing and harvesting timber are equipment limitations, slope, and the hazard of erosion. The clayey texture of the surface layer limits the use of equipment. Conventional methods of harvesting trees can be used in the more gently sloping areas but are difficult to use in the steeper areas.

Management that minimizes the risk of erosion is essential in harvesting.

This unit is in capability subclass VIIe (18), nonirrigated.

206—Xeric Torriorthents, very steep. These soils are on mountainous uplands between deeply entrenched drainageways. Slope ranges from 50 to 85 percent. Areas are irregular in shape and range from 100 to 2,600 acres in size. The vegetation is mainly annual grasses, shrubs, and scattered conifers. Elevation ranges from 3,000 to 5,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 175 to 225 days.

Included in this unit are many small areas of rock outcrops.

The Xeric Torriorthents are shallow and well to somewhat excessively drained. They formed in residual material weathered from metamorphic or igneous rocks. They have moderately coarse to moderately fine textures and in places are gravelly. Content of coarse fragments ranges from 0 to 20 percent.

Permeability of these soils is moderately rapid to moderately slow, and available water capacity is very low or low. Surface runoff is very rapid, and the hazard of erosion is very high. The effective rooting depth is less than 20 inches.

These soils are used mainly for watershed and limited range for wildlife habitat.

These soils are poorly suited for rangeland. Major limitations are steep slopes and the hazard of erosion. Lack of livestock water and low annual precipitation are also problems. Vegetation is sparse and consists of cheatgrass, buckwheat, rabbitbrush, juniper, and Joshua-trees. The rugged terrain limits livestock distribution. Grazing should be limited on this soil.

These soils are in capability subclass VIIIe (29), nonirrigated.

207—Xerolls, very steep. These soils are on mountainous uplands in the ridges between deeply entrenched drainageways. Slope ranges from 30 to 85 percent. Areas are irregular in shape and range from 350 to 2,700 acres in size. The vegetation is mainly annual grasses, shrubs, and scattered conifers. Elevation ranges from 4,000 to 6,000 feet. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 55 degrees F. The average frost-free season ranges from 150 to 225 days.

Included in this unit are small areas of rock outcrop.

The Xerolls are shallow and well drained. They formed in residual material weathered from mixed rock sources, but they are mainly from sedimentary or volcanic rocks.

Typically, these soils are less than 20 inches deep over weathered bedrock. They have moderately coarse or medium textures and in places are gravelly. Content of coarse fragments ranges from 0 to 20 percent.

Permeability of these soils is moderately rapid. Permeability is very slow in the weathered bedrock. Available water capacity is very low. Surface runoff is rapid to very rapid, and the hazard of erosion is high or very high. The hazard of soil blowing is low or moderate. The effective rooting depth is less than 20 inches.

These soils are used mainly for watershed and limited range for wildlife habitat.

These soils are poorly suited for rangeland. Major limitations are very steep slopes and the hazard of erosion. Vegetation is sparse and limited to some perennial grasses, rabbitbrush, and widely scattered juniper. The high relief limits livestock grazing and distribution.

These soils are in capability subclass VIIIe (18), nonirrigated.

208—Xerolls-Rock outcrop complex, very steep. These shallow, well drained soils and miscellaneous areas are on mountainous uplands. Slope ranges from 30 to 75 percent. Areas are irregular in shape and range from 300 to 2,500 acres in size. The vegetation is mainly perennial grasses, shrubs, and scattered conifers. Elevation dominantly ranges from 4,500 to 6,000 feet. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 54 degrees F. The average frost-free season ranges from 150 to 250 days. The Xerolls soils make up about 70 percent of this unit, the Rock outcrop makes up about 30 percent.

Included in this unit are areas of Rock outcrop with slopes of 85 to 100 percent.

The Xerolls are shallow and well drained. They formed in residual material weathered mainly from granitic rock.

Typically, these soils are less than 20 inches thick over hard rock. They have coarse to medium textures. Cobble and stone content ranges from 3 to 35 percent, but the gravel content ranges from 8 to 50 percent.

Permeability of these soils is moderate or rapid, and available water capacity is very low. Surface runoff is rapid or very rapid, and the hazard of erosion is very high. The hazard of soil blowing is low or moderate. The effective rooting depth is 20 inches or less.

Rock outcrop consists mainly of hard granitic rock exposures. Some areas are schist or granite gneiss. Vegetation is limited to fractures in rock structure. Surface runoff is very rapid, and there is no hazard of erosion.

Areas of this unit are used mainly for watershed, recreation, and limited range.

The soils in this complex are poorly suited for rangeland. Major limitations are shallow depth, low available water capacity, and extremely steep rock outcrops. There is sparse vegetation, consisting of a few perennial grasses, sagebrush, and scattered pinyon pines. The high relief limits livestock distribution. Careful grazing management practices must be applied to prevent severe erosion.

This unit is in capability subclass VIIIe (18), nonirrigated.

209—Xerorthents, very steep. These soils are on mountainous uplands. Slope ranges from 30 to 85 percent. Areas are irregular in shape and range from 100 to 1,100 acres in size. The vegetation is mainly annual grasses, forbs, and scattered hardwoods. Elevation dominantly ranges from 2,000 to 5,000 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 61 degrees F. The average frost-free season ranges from 150 to 250 days.

Included in this unit are small areas of rock outcrops.

The Xerorthents are shallow and well drained. They formed in residual material weathered mainly from sedimentary and volcanic rocks. They have moderately coarse textures and in places are gravelly. Content of coarse fragments ranges from 0 to 20 percent.

Permeability of these soils is moderately rapid; it is very slow in the weathered rock. The available water capacity is very low. Surface runoff is very rapid, and the hazard of erosion is very high. The hazard of soil blowing is moderate. The effective rooting depth is 20 inches or less.

These units are used mainly for watershed and limited range for wildlife.

These soils are poorly suited for rangeland. They are limited mainly by steep slopes, shallow soil depth, and the hazard of erosion. Vegetation consists of a sparse stand of oak, red brome, soft chess, redstem filaree, and other forbs. Livestock grazing should be limited to prevent further erosion. Livestock trails generally are not feasible on this unit.

These soils are in capability subclass VIIIe (18), nonirrigated.

210—Xerorthents, loamy, very steep. These soils are on terrace escarpments. Slope ranges from 30 to 85 percent. Areas are irregular in shape and range from 50 to 800 acres in size. The vegetation is mainly annual grasses, forbs, and scattered hardwoods and conifers. Elevation dominantly ranges from 4,000 to 5,000 feet. The mean annual precipitation ranges from 12 to 18 inches, and the mean annual air temperature is about 60 degrees F. The average frost-free season ranges from 150 to 250 days.

Included in this unit are some areas of entrenched drainageways.

The Xerorthents are shallow and well drained. They formed in alluvial material derived mainly from granitic rock.

Typically, the surface layer has moderately coarse to moderately fine textures about 20 inches thick. The underlying material to a depth of 60 inches is compact, coarse, and gravelly. Content of coarse fragments ranges from 5 to 90 percent in the surface layer and from 35 to 95 percent in the underlying material.

Permeability of these soils ranges from moderately slow to very rapid, and the available water capacity is very low. Surface runoff is very rapid, and the hazard of erosion is very high. The hazard of soil blowing is low or moderate. The effective rooting depth is 20 inches or less.

This unit is used for watershed and limited range for wildlife.

These soils are poorly suited for rangeland. They are limited mainly by steepness, shallow depth, erosion hazard, and very low water capacity. The vegetation consists of annual grasses and redstem filaree. Blue oak and scattered junipers are present on the north-facing slopes. The steep slopes and lack of desirable forage plants make livestock grazing impractical.

These soils are in capability subclass VIIIe (18), nonirrigated.

211—Xerorthents-Rock outcrop complex, very steep. These shallow, well drained soils and miscellaneous areas are on mountainous uplands. Slope ranges from 30 to 75 percent. Areas are irregular in shape and range from 40 to 4,000 acres in size. The vegetation is mainly annual grasses and scattered shrubs and hardwood trees. Elevation dominantly ranges from 1,500 to 5,000 feet. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 150 to 250 days. The Xerorthents soils make up about 70 percent of this unit, the Rock outcrop about 30 percent.

The Xerorthents are shallow and well drained. They formed in residual material weathered mainly from granitic rock.

Typically, Xerorthents are less than 20 inches thick over hard rock. They have very coarse to medium textures and in places are gravelly, cobbly, or stony. These soils may be 3 to 35 percent cobbles and stones and 8 to 50 percent gravel.

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

Rock outcrop consists of hard granite, schist, or basalt exposures. Vegetation is limited to fractures in the rock structure (fig. 8). Surface runoff is very rapid, and there is no hazard of erosion.

This unit is used for watershed and limited range for wildlife.

This unit is poorly suited for rangeland. It is limited mainly by very steep slopes and rock outcrops. Woody plants and lack of available livestock water are also problems. Walkways and water development may help on the more gentle slopes. A protective cover of grass and forbs should be maintained as a suitable range management practice or soil erosion may be excessive. Cheatgrass, red brome, filaree, and buckbrush are the main forage and browse plants.

This unit is in capability subclass VIIIe (18), nonirrigated.

Figure 8.—Vegetation is limited in areas of Rock outcrop

use and management of the soils

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

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

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

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

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

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

crops and pasture

Prepared by Bryan D Furman, soil conservationist, and Clarence U Finch, conservation agronomist, Soil Conservation Service.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The major concerns when farming the soils are maintaining or improving the production capacities and preventing erosion. Needed management practices include, but are not limited to, the following: conservation cropping system, crop residue utilization, proper tillage, irrigation water management, cover crops, erosion control, field windbreaks, pasture management, chiseling or subsoiling, and summer fallow.

A *conservation cropping system* consists of growing crops in combination with needed cultural and management measures. If soil-improving crops and practices more than offset the soil-depleting crops and practices, and excessive erosion is controlled, then a conservation cropping system exists. Conservation cropping systems are necessary on all tilled soils in the survey area.

Soil-improving practices include the use of crop rotations that contain grasses and legumes and the returning of crop residues to the soil. Others include the use of green-manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

There are many diverse cropping systems in the survey area, and several combinations of crops are grown. A typical example is alfalfa grown for 5 to 7 years followed by sudangrass and barley for a year. Crop residues of sudangrass and barley should be returned to the soil and tillage reduced to no more than necessary.

Crop residue utilization is the returning of crop residue to the soil. Residue returned to the soil helps to maintain soil tilth, organic matter, and fertility. It also helps to control erosion. On sloping soils, residue should be left on or near the surface during periods when the erosion hazard is high.

Proper tillage is limiting the number of operations to the minimum necessary to control weeds, incorporate crop residues, obtain favorable air and water movement in the soil, and prepare an adequate seedbed. Excessive tillage breaks down soil structure and reduces soil organic matter, and the heavy tillage implements tend to create plowpans. These conditions increase the hazards of erosion, limit permeability, and restrict root

penetration. Varying the tillage depth will slow the development of a plowpan, and infrequent shallow chiseling will help break up the pan. Combining tillage operations to reduce the number of trips over a field and delaying operations while soils are wet are also important.

Irrigation water management is controlling the rate, amount, and timing of irrigation water applied to soil for crop needs. Irrigation water should be applied at a rate sufficient for crop needs but in amounts small enough to prevent excessive runoff or deep percolation. If done in a planned and efficient manner, soil erosion and plant nutrient loss are minimized, undesirable water loss is controlled, and water quality is protected.

Furrow, border, sprinkler, and drip irrigation methods are used in the survey area. Furrow and border irrigation should be limited to slopes of 3 percent or less. Sprinkler irrigation is adapted to all tillable soils in the area (fig. 9). Drip irrigation is suited to orchards and vineyards and is the most efficient system on many soils. It reduces water requirements and decreases the erosion hazard on many soils that are otherwise difficult to manage.

Cover crops are necessary in orchards and vineyards and on soils left fallow during the rainy season. Cover crops provide protection from erosion and maintain or improve water penetration, soil tilth, and fertility. Cover crops are usually volunteer native plants. When a seeded cover is needed or desired, grasses such as barley, cereal rye, Blando brome, or Wimmera 62 ryegrass can be seeded alone. Crimson or rose clover, Lana vetch, or birdsfoot trefoil can be seeded alone for a legume cover.

Erosion control is generally needed on sloping soils. The steeper or longer the slope, the greater the erosion hazard. Erosion can be recognized by rills and gullies on the slope or by the accumulation of sediment at the base of the slope, in drainageways, or against fence lines.

Many practices are used to control erosion. On irrigated soils, land leveling or smoothing, using the most suitable method of irrigation, and controlling irrigation water can help prevent erosion. Other effective practices include cover crops, crop residue utilization, the use of vegetative cover in rotation, proper tillage, and cross-slope farming.

Structural measures may also be needed. These could include diversions, grass waterways, grade stabilization structures, windbreaks, water retention structures, or streambank stabilization.

Many coarse soils in the area are very susceptible to wind erosion, or soil blowing. Difficulty may be encountered during land leveling for irrigation, and in preparing for planting, and establishing the crop. In dryfarmed areas, wind erosion often damages young plants by abrasion. Irrigated soil that is susceptible to wind erosion should be planted in crops that provide protection, such as orchards and vineyards or pasture. If possible, cultivation should be done during the months when the possibility of wind damage is the least. Full use should be made of crop residues, cover crops, and minimum tillage. Ordinarily, coarse soils that are subject to wind erosion are too droughty for dryland cultivation. If

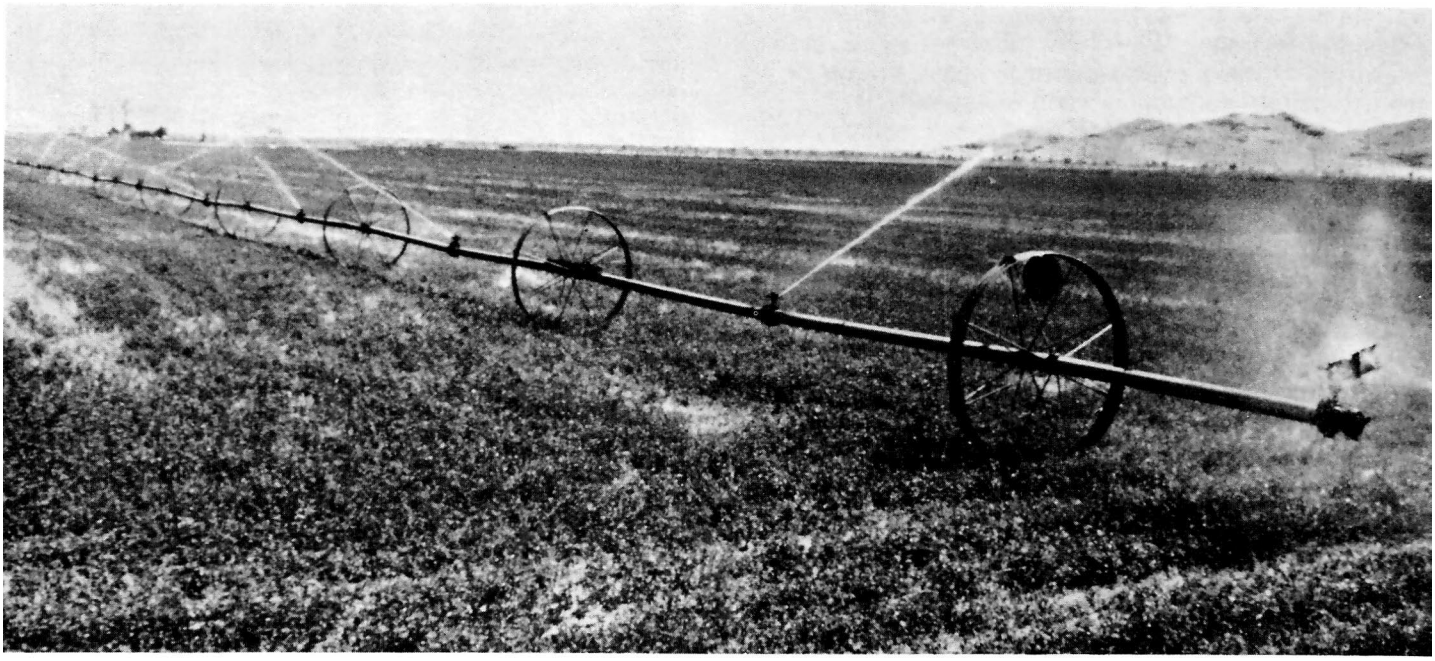

Figure 9.—Sprinklers are an effective way to irrigate alfalfa on Cajon loamy sand, 0 to 5 percent slopes.

they are cultivated, however, wind erosion can be partially controlled by leaving stubble and crop residue on the surface, keeping the surface cloddy, and using subsurface tillage, or cultivating in alternate strips. Stripcropping at right angles to the prevailing wind direction will also reduce wind erosion.

Field windbreaks consist of one or more rows of trees planted on the windward side of a cropped field to decrease wind erosion or crop damage. Windbreaks are suitable to most soils in the survey area. If only a single row is planned, it should be an evergreen species such as Arizona cypress, Aleppo pine, or, in low frost hazard areas, athel. If irrigation for windbreaks is required, the system established for the crop can often be utilized. Where tile drainage systems are installed, some species with aggressive root systems can infiltrate the system and plug it.

Pasture management is needed on irrigated pastures to prevent soil deterioration, provide maximum production, maintain a desirable plant community, and extend the life of the pasture. Practices necessary in a pasture management program include: irrigation water management, rotational grazing using at least three fields, fertilization, harrowing or dragging to scatter droppings, and clipping as necessary to maintain uniform growth. Grazing should begin when plants are 8 to 10 inches high and terminate when 3 to 4 inches of stubble remains.

Selecting an adaptable plant mixture when establishing a pasture is important. Mixtures containing Akaroa orchardgrass or Goars fescue with Birdsfoot trefoil or strawberry clover are well adapted to many soils in the survey area. Under proper pasture management these species will produce an abundance of high quality forage.

Chiseling or subsoiling is a method for increasing the effective rooting depth of soils that have a plowpan or hardpan. Chiseling the plowpan and deep ripping the hardpan will improve permeability and internal drainage, help to prevent a perched water table, and allow deeper root penetration. Chiseling will temporarily benefit soils that have a heavy clay subsoil, but these heavy clay subsoils will eventually return to their original state. The depth of ripping should be based on the depth of the hardpan.

Summer fallow is a means of storing moisture in the soil for later use by crops and controlling weeds, plant diseases, and insects. Fallowed land is kept free of vegetation during one crop season, thus storing moisture for crop production the following season. Under a fallow system of farming, crop production tends to be more stabilized and complete crop failures are less frequent during low rainfall years. One such fallow system consists of small grain planted and harvested one year and summer fallow the next year. The hazard of erosion on sloping soils will be lessened by keeping as much vegetation or residue as possible on the surface. One method to control erosion on sloping soils is to use subsurface tillage implements of sweep or blade types and by delaying the first tillage operation until the spring following harvest.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. In general, the crops in the area are in one of two broad categories: fruit crops or field crops.

Fruit crops suited to the soils include oranges, apples, grapes, pears, and peaches. Oranges and grapes are adapted to the valley soils west of the foothills where air drainage is good. Apples, pears, and peaches are suited to the deep alluvial fans, ripped and leveled terrace soils of the Tehachapi, Cummings, and Brites Valleys.

Field crops suited to the soils where water is available for irrigation include cotton, tomatoes, barley, wheat, and pasture. These crops are grown on the alluvial fans and terraces in the western part of the survey area. Irrigated pasture is grown on moderately coarse and medium textured deep soils throughout the survey area. Akaroa orchardgrass or Goars fescue, with narrowleaf trefoil or strawberry clover, are pasture plant mixtures well suited to soils in the survey area. Alfalfa is the primary crop in the Mojave Desert near Cantil. Dryland wheat is suited to the moderately deep to deep, well drained loam and clay soils in the mountain valleys.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops

that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils for cropland. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIIs-3 or IVe-5. The numbers used to designate units within the subclasses are as follows:

0.—Indicates that a problem or limitation is caused by stony, cobbly, or gravelly material in the substratum.
1.—Indicates that a problem or limitation is caused by slope or by actual or potential erosion hazard.
2.—Indicates that a problem or limitation of wetness is caused by poor drainage or flooding.
3.—Indicates that a problem or limitation of slow or very slow permeability of the subsoil or substratum is caused by a clayey subsoil or a substratum that is semiconsolidated.
4.—Indicates that a problem or limitation is caused by sandy or gravelly soils with a low available water holding capacity.
5.—Indicates that a problem or limitation is caused by a fine-textured or very fine textured surface layer.
6.—Indicates that a problem or limitation is caused by salt or alkali.
7.—Indicates that a problem or limitation is caused by rocks, stones, or cobblestones.
8.—Indicates that a problem or limitation exists in the root zone, which generally is less than 40 inches over massive bedrock and lacks moisture for plants.
9.—Indicates that a problem or limitation is caused by low or very low fertility, acidity, or toxicity that cannot be corrected by adding normal amounts of fertilizer, lime, or other amendments.

No unit designations are shown for class I soils because soil characteristics are similar for all soils in this class. Unit designations are also deleted from classes V through VIII soils because these soils are normally not intensively managed for cropland.

The capability classification is given for each map unit in the section "Detailed soil map units."

Major land resource areas are designated for the soils in the southeastern part of Kern County to further refine the capability classification. A land resource area is a nationally recognized broad geographic area that has a distinct combination of climate, topography, vegetation, land use, and general type of farming. Parts of five of these areas are in the survey area. These resource areas and their numbers are: San Joaquin Valley (17); Sierra Nevada Foothills and Tehachapi Valley (18); Sierra Nevada and Tehachapi Mountain Range (22); Southern Nevada Range (29); and Mojave Desert Range (30). The number of the resource area is added in parenthesis after the class, subclass, or unit designation for complete identification of the capability unit.

A soil in one resource area may be similar to a soil in another resource area and have the same capability

symbol, but the climate, vegetation, suitable crops, and management practices needed may differ. For example, both capability subclass VIe (18) and VIe (22) contain deep, well drained soils. The soils in capability subclass VIe (18) are in the Sierra Nevada Foothills and are not suited to coniferous trees, but the soils in capability subclass VIe (22) are in the Sierra Nevada Range and are suited to forest vegetation.

Land Resource Area 17 is in the far western part of the survey area. It consists of lands dominantly on alluvial fans and terraces in the San Joaquin Valley. Elevation ranges from 500 to 1,500 feet. The average annual precipitation is dominantly 6 to 9 inches but in a few areas it is as high as 12 inches. The average annual air temperature is about 63 degrees F, and the average frost-free season ranges from 250 to 300 days.

Within the survey area, about 95 percent of resource area 17 is used for agriculture, 4 percent for urban and industrial development, and 1 percent for mineral exploration. The cropland is irrigated with water from wells and canals, and the main crops are cotton, grapes, Irish potatoes, and sugar beets.

Land Resource Area 18 is in the central to western part of the survey area and includes the Sierra Nevada Foothills and the Tehachapi Valley. It is dominantly on alluvial fans and dissected terraces in the mountain valleys and on steep upland positions near the base of the mountains. Elevation ranges from 575 to 6,000 feet. The average annual precipitation ranges from 9 to 18 inches. The average annual temperature is about 59 degrees F, and the frost-free season is dominantly from 150 to 250 days.

Within the survey area, most of the land in resource area 18 is used for grazing with the exception of land in the Tehachapi and Cummings Valleys. Alfalfa, apples, and Irish potatoes are the main crops in the valleys. The moderate rainfall and intermittent streamflow provides some water for crops. Water for large urban areas is brought from the Colorado River through the California Aqueduct.

Land Resource Area 22 is in the central to western part of the survey area and includes the high mountainous areas of the Sierra Nevada and Tehachapi Mountains. Elevation ranges from 4,500 to 8,000 feet. The average annual precipitation ranges from 10 to 21 inches. The average annual air temperature is about 54 degrees F, and the average frost-free season ranges from 150 to 200 days.

Within the survey area, most of the land in resource area 22 is used for grazing, recreation, wildlife, and watershed. Some areas are also used for woodland; firewood is the main product. Tehachapi Mountain State Park is in this resource area. There is usually sufficient water for plants in this area from rainfall and snow melt.

Land Resource Area 29 is in the central part of the survey area on the eastern foot slopes of the Sierra Nevada Mountains. It consists of lands dominantly on mountainous uplands. Elevation ranges from 2,800 to 5,000 feet. The average annual precipitation ranges from about 6 inches at the lower elevations to about 12 inches at higher points. The average annual air temperature is about 60 degees F, and the average frost-free season ranges from 150 to 225 days.

Within the survey area, most of the land in resource area 29 is used for grazing, wildlife, and watershed. Besides the minimal amount of water available through rainfall, water can be obtained from natural or developed springs.

Land Resource Area 30 is in the eastern part of the survey area. It covers nearly half of the survey area and consists of lands dominantly on alluvial fans, basins, lakebeds, desert buttes, and low pediments and mountains in the Mojave Desert. Elevation ranges from 2,000 to 4,000 feet. The average annual precipitation ranges from 4 to 6 inches. Average air temperature is about 63 degrees F, and the average frost-free season ranges from 200 to 250 days.

Within the survey area most of the land in resource area 30 is owned by the federal government and used primarily for rangeland, wildlife, or military installations. Grazing is limited to a few weeks in early spring when rainfall is favorable. Ground water is the main source of water for agriculture. Water for urban areas is provided mainly through the California Aqueduct.

rangeland

Prepared by John D Swanson, range conservationist, Soil Conservation Service.

About 80 percent of the land in the survey area is rangeland. Income from ranching is derived mainly from cattle and sheep. The major beef producing area is along the western foothills and mountains of the Sierra Nevada and Tehachapi Mountains. Ranches are generally stocker and commercial cow-calf operations.

In the Tejon hills and on the lower alluvial fans, soils are generally loamy and deep to very deep. Vegetation consists mainly of annual grasses and forbs. These soils provide some of the highest production of range forage in the survey area.

Slightly above this geographical area the vegetation consists of annual grasses with stands of blue oak, white oak, and live oak and a variety of shrubs. As elevation increases, excellent forage is found where black oaks and cheatgrass are dominant. Some areas are dominated by a variety of chaparral species. Soils in this zone are loamy and range from deep to shallow.

At higher elevations are scattered stands of timber consisting of sugar pine, ponderosa pine, Jeffrey pine, white fir, and incense cedar. The understory is a sparse grass, shrub, and forb mixture. Soils are deep to shallow over fractured rock and are sandy loam. Areas of shallow soils are dominated by a variety of chaparral species.

On the eastern side of the Sierras, on arid mountainsides, and on rolling hills the pinyon-juniper

forest type occurs with big sagebrush, rubber rabbitbrush, desert bitterbrush, Mormon-tea, cheatgrass, and desert needlegrass. Soils are shallow over rock, which is exposed in places, and are sandy to loamy.

The Mojave Desert portion of the survey area is characterized by low precipitation, droughty soils, and sparse vegetation consisting of creosotebush, bursage, bunchgrass, and a variety of forbs. Most of this area is administered and managed by the Bureau of Land Management, U. S. Dept. of the Interior. During years with favorable precipitation, annual grasses and forbs provide suitable grazing for sheep. Soils in this area are sandy and range from shallow to deep with a wide variation in soil profile development.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationships between the soils, vegetation, and water. The range site, the total annual production of vegetation, and the mean annual precipitation are given in the detailed descriptions of soils that are used as range or are suited to vegetation.

A *range site* is a grouping of similar soils that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. For those areas where the relationship between the soils and vegetation was established during this survey, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, calcium-magnesium ratios, and a seasonal high water table are also important.

Each range site has a distinctive name that includes the major land resource area in parentheses. An example is Coarse Loamy (18). More information about range sites can be obtained from local offices of the Soil Conservation Service. The major land resource areas are described in the section "Land capability classification."

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the characteristic plant community. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

The chief management concerns for all rangeland in the survey area are briefly described in the following paragraphs. These include proper grazing use, fertilization, range seeding, planned grazing systems, and brush management.

Proper grazing use is grazing at an intensity which will maintain enough cover to protect the soil and maintain or improve the quality and quantity of desirable vegetation. This will allow the adequate reproduction of the main forage plants, increase the accumulation of litter, and help to prevent unnecessary runoff. Proper grazing promotes stable and high-producing forage conditions and also helps maintain the natural beauty of the landscape.

The plant cover needed to protect soils from surface erosion varies with the depth of soil and degree of slope. Normally, a 2-inch stubble on slopes of less than 30 percent and a 3-inch stubble on slopes of more than 30 percent are adequate. At these heights the typical California annual will produce a current year's growth of approximately 700 to 1,000 and 1,000 to 1,200 pounds per acre respectively. No more than an average of 50 percent of the current year's growth should be removed annually from perennial grass ranges.

Other practices that may be needed to obtain proper grazing use and livestock distribution are water development, fencing, salt distribution, stock trails, feed supplements, and herding. Most of the rangeland needs stock water. Water can be stored from such underground sources as springs and perennial or intermittant streams and used during periods of need throughout the year. Water hauling is necessary to make extensive use of the desert areas.

Knowledge of the terrain, the grazing patterns of livestock, and the wildlife are essential in designing efficient grazing units. Fencing, salt distribution, stock trails, distribution of salt and minerals, and feed supplements are used to distribute stock in the western foothill and mountain areas. Natural barriers in this area can be used along with drift fences and suspension fences for livestock control. On the Mojave Desert, a good sheep herding technique is to move sheep to new bed ground every night. Open herding sheep through good forage areas will reduce the incidence of plant poisoning. It will allow sheep to select nutritious forage and eliminate excessive damage to forage plants.

Fertilization is the addition of natural or manufactured plant nutrients containing minerals, usually inorganic, to the soil to aid in the establishment of desirable plants. Range fertilization is also used to improve the existing plant cover for erosion control and forage production. Fertilization will generally increase forage production and make the range suitable for earlier grazing. In areas where the annual rainfall is less than 12 inches, fertilization is not usually recommended.

Range seeding will establish forage plants on rangeland to produce more forage or to convert cropland to rangeland. This practice will improve the natural beauty of grazing land and reduce erosion. It frequently can be used to improve the existing native plant cover.

Planned grazing systems are important to achieve uniform levels of grazing. Grazing systems should be keyed to high production plants that are locally abundant. Proper salting, use of feed supplements, proper grazing use, and deferred grazing will allow maximum utilization of the forage.

Brush management can be used to eliminate or reduce competition from woody plants and help establish or reestablish a satisfactory grass cover to prevent soil and water loss. As a result, forage production can be increased, and runoff can be better controlled. It will also improve the habitat for some species of wildlife, improve recreation sites, and create an aesthetically pleasing landscape. Mechanical, chemical, and biological methods are used to kill or suppress brush.

Technical assistance in planning rangeland management suited to the soil on a particular farm or ranch can be obtained from local representatives from the Soil Conservation Service or the Cooperative Extension Service.

recreation

The southeastern part of Kern County is in three different climatic zones. Recreation is mostly outdoors, and the demand for it will be greater as the population increases and facilities are improved or developed.

There are areas with good potential for hunting, horseback riding, campgrounds, guest ranches, and many other outdoor sports. The survey area also has several city and county parks.

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

In table 6, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 6 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9 and interpretations for dwellings without basements and for local roads and streets in table 8.

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

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

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

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

wildlife habitat

Prepared by Ronald F. Schultze, area biologist, Soil Conservation Service.

Wildlife is important in the survey area primarily for hunting or wildlife study. Other benefits include the control of undesirable rodents and insects by various predators.

Quail, mourning dove, and band-tailed pigeon are common game birds in the area. The habitat is not favorable for pheasants in most of the area. Pheasant are stocked for hunting, however, in some locations. Chukars are common in the eastern, arid portion. Ducks and geese are not common in the area because of the limited habitat, but a few are occasionally found on small reservoirs or on duck club ponds.

Mule deer are the principal big game animal and are found primarily in the Sierra Nevada and Tehachapi Mountains. A few black bear and mountain lions are also

found in these mountains. Small game mammals in the survey area include jackrabbits, brush rabbits, desert cottontail, ground squirrels, coyotes, and bobcats. In addition, many other small animals and nongame species occur throughout the survey area, as well as many kinds of songbirds and other birds.

Fish are somewhat limited in the survey area because of low rainfall and streams that are intermittent. Some small reservoirs may contain warmwater fish such as bluegill, largemouth bass, and channel catfish.

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

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

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

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

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

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

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are filaree, fiddleneck, burclover, mullein, cheatgrass, soft chess, Indian ricegrass, wheatgrass, and mouse barley.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, willow, western sycamore, black walnut, hawthorn, California buckeye, blackberry, and elderberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and pyracantha.

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

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, bitterbrush, manzanita, ephedra, creosotebush, shadscale, and big sagebrush.

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

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include California quail, pheasant, mourning dove, meadowlark, field sparrow, cottontail, jackrabbit, and coyote.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, mountain quail, bandtailed pigeon, thrushes, woodpeckers, gray squirrels, gray fox, raccoon, deer, coyote, and bear.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland in the mountains include California mule deer,

brush rabbit, scrub jay, red shafted flicker, California quail, golden eagle, coyote, and bobcat. Common in the Mojave Desert area are desert cottontail rabbit, whitetail antelope, squirrel, coyote, loggerhead shrike, and chukar.

engineering

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

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

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

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

building site development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

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

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

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They

have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

sanitary facilities

Table 9 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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

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

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 9 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

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

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

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

The ratings in table 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

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

construction materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of these materials. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

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

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

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 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 12.

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

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

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

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

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

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

water management

Table 11 gives information on the soil properties and site features that affect water management. It gives for each soil the restrictive features, if any, that affect pond reservoir areas; embankments, dikes, and levees; drainage; irrigation; terraces and diversions; and grassed waterways.

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

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

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

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

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

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

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

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

soil properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

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

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

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

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

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

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

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

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

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

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

physical and chemical properties

Table 13 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area.

The estimates are based on field observations and on test data for these and similar soils.

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

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

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

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

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

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind or erosion in cultivated areas or areas where the plant cover is disturbed by overgrazing or excessive traffic. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to wind erosion.

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

In table 13, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

soil and water features

Table 14 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

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

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 hardness of bedrock 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.

Cemented pans are hard subsurface layers, within a depth of 5 or 6 feet, that are strongly compacted (indurated). Such pans cause difficulty in excavation. The hardness of pans is similar to that of bedrock. A rippable pan can be excavated, but a hard pan generally requires blasting.

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

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

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

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*11*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 15, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

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

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxerolls (*Hapl*, meaning minimal horizonation, plus *xeroll*, the suborder of the Entisols that have a xeric moisture regime).

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

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy, mixed, thermic, shallow Typic Haploxerolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*10*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*11*). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

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

Alko series

The Alko series consists of well drained soils on old terraces. These soils are shallow over a duripan. They formed in alluvial material derived from granitic rock. Slope ranges from 0 to 9 percent. The mean annual precipitation ranges from 5 to 6 inches, and the mean annual air temperature is about 62 degrees F.

Alko soils are similar to Muroc soils. They are near Cajon and Neuralia soils. Muroc soils have a paralithic contact under the duripan and are on low pediments. Cajon soils are very deep and somewhat excessively drained. Neuralia soils have a sandy clay loam B horizon.

Typical pedon of Alko sandy loam in an area of Alko-Neuralia sandy loam, 0 to 9 percent slopes, in the SE1/4, SW1/4, NE1/4 of sec. 16, T. 32 S., R. 38 E. MDB&M.

A1—0 to 14 inches; pale brown (10YR 6/3) sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular and interstitial pores; violently effervescent with disseminated lime, moderately alkaline (pH 8.0); abrupt smooth boundary.

C1sicam—14 to 23 inches; strong brown (7.5YR 5/6) dry and moist, indurated, lime-silica cemented duripan; coarse platy, extremely hard; strongly effervescent with lime coating faces of plates and as filaments; horizon capped by a thin, dense, hard opalized layer.

C2sicam—23 to 60 inches; many alternating thin laminas of duripan and similar but softer material with lime throughout; alternating bands of sandy loam and gravelly sandy loam.

The thickness of the lime-silica cemented duripan ranges from 5 to 14 inches. The A horizon ranges from 5 to 16 inches in thickness. It has hue of 10YR, value of 6 or 7, and chroma of 2 to 4. Gravel content ranges from 0 to 15 percent. A C1ca horizon is present in some pedons. It has hue of 10YR, value of 6 or 7, and chroma of 1 to 3. It is sandy loam or gravelly sandy loam. Gravel content ranges from 0 to 15 percent. The lime-silica cemented duripan contains few to many, fine to coarse lime filaments. Gravel content ranges from 0 to 15 percent in the C2sicam but most pedons are free of gravel. In some places, the opalized capping is absent.

Anaheim Variant

The Anaheim Variant consists of moderately deep, well drained soils on mountainous uplands. These soils formed in residual material weathered from basalt. Slope ranges from 2 to 30 percent. The mean annual precipitation ranges from 9 to 15 inches, and the mean annual air temperature is about 58 degrees F.

Anaheim Variant soils are similar to Anaverde and Walong soils. They are near Anaverde, Cibo, and Walong soils. Anaverde soils have a mesic soil temperature regime. Walong soils have a coarse-loamy control section and a mollic epipedon less than 20 inches thick. Cibo soils have a fine control section.

Typical pedon of Anaheim Variant very fine sandy loam in an area of Anaheim Variant very fine sandy loam, 2 to 30 percent slopes, 2,100 feet north and 340 feet west of the southeast corner of sec. 8, T. 32 S., R. 34 E. MDB&M.

A11—0 to 2 inches; reddish brown (5YR 4/4) very fine sandy loam, dark reddish brown (5YR 3/2) moist; strong very fine granular structure; loose, very friable, nonsticky and slightly plastic; few very fine and fine roots; moderately alkaline (pH 8.0); abrupt smooth boundary.

A12—2 to 16 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/3) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; very few fine roots; common fine and medium tubular pores; mildly alkaline (pH 7.8); clear wavy boundary.

B2—16 to 29 inches; dark brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/2) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few thin clay films as bridges; few very fine and fine roots; few very fine and fine tubular and interstial pores; mildly alkaline (pH 7.8); diffuse wavy boundary.

Cr—29 inches; weathered basalt; reddish brown (5YR 5/3) soil material filling a few fine fractures.

The solum thickness and depth to the paralithic contact ranges from 24 to 35 inches. The A horizon ranges from 13 to 25 inches in thickness. It has hue of 5YR and 7.5YR, value of 4 or 5, and chroma of 2 to 4. Reaction ranges from neutral to moderately alkaline. The B2 horizon has 7.5YR hue, value of 4 or 5, and chroma of 2 or 4. Texture is loam or clay loam. Gravel content ranges from 0 to 10 percent, but most pedons are free of gravel. Reaction is neutral or mildly alkaline. The soil material in fractures in the Cr horizon has 5YR hue, value of 5, and chroma of 3 or 4. Fractures range from 0.2 to 0.4 inches wide and are 20 to 60 inches apart.

Anaverde series

The Anaverde series consists of very deep, well drained soils on mountainous uplands. These soils formed in residual material weathered from schist. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 54 degrees F.

Anaverde soils are similar to Edmundston and Walong soils. They are near Edmundston, Rescue Variant, and Walong soils. Edmundston and Walong soils formed in material weathered from granite and have a coarse-loamy control section. Rescue Variant soils have a fine-loamy control section and a thermic soil temperature regime.

Typical pedon of Anaverde gravelly loam in an area of Anaverde gravelly loam, 50 to 75 percent slopes, in SE1/4SW1/4NW1/4 sec. 22, T. 9 N., R. 18 W. SBB&M.

A1—0 to 8 inches; dark brown (10YR 4/3) gravelly loam, very dark brown (10YR 2/2) moist; strong medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; 30 percent fine to coarse gravel; neutral (pH 7.0); clear wavy boundary.

B2—8 to 35 inches; dark brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine, medium and coarse roots; many medium and few fine tubular pores; 20 percent fine to coarse gravel and 10 percent cobbles and stones; neutral (pH 7.0); clear wavy boundary.

C1—35 to 62 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine, medium and coarse roots; many medium and few fine tubular pores; 15 percent fine gravel and 15 percent cobbles and stones; neutral (pH 7.0); clear wavy boundary.

C2—62 to 90 inches; pale brown (10YR 6/3) stony sandy loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; very few fine roots; very few fine tubular pores; 20 percent fine gravel and 25 percent cobbles and stones; neutral (pH 7.0); clear wavy boundary.

R—90 inches; fractured metamorphic rock (schist).

Depth to the lithic contact ranges from 60 to 95 inches. The solum ranges from 21 to 39 inches in thickness. It is neutral or slightly acid. The A horizon ranges from 3 to 9 inches in thickness. It has hue of 10YR and 7.5YR, value of 3 to 5, and chroma of 1 to 4. Content of rock fragments ranges from 5 to 35 percent. The B2 horizon has hue of 10YR and 7.5YR, value of 3 to 5, and chroma of 2 or 3. It is loam, or gravelly loam. Content of rock fragments ranges from 5 to 35 percent. The C horizon to a depth of 90 inches has hue of 10YR, 7.5YR, and 2.5Y; value of 4 to 6; and chroma of 2 to 4 and 6. It is loam, clay loam, sandy loam, gravelly sandy loam, or very stony sandy loam. Total content of coarse fragments ranges from 15 to 70 percent.

Arizo series

The Arizo series consists of very deep, excessively drained soils on alluvial fans and plains. These soils formed in alluvial material derived from granitic rocks. Slope ranges from 2 to 9 percent. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 63 degrees F.

Arizo soils are similar to Pajuela soils. They are near Cajon, Cinco, and Garlock soils. Pajuela soils are on old terraces and have xeric moisture regimes. Cajon soils are somewhat excessively drained and are less than 35 percent coarse fragments. Cinco soils are excessively drained but they are on mountainous uplands. Garlock soils have an argillic horizon.

Typical pedon of Arizo gravelly loamy sand in an area of Arizo gravelly loamy sand, 2 to 9 percent slopes, in SW1/4SW1/4SE1/4 sec. 5, T. 32 S., R. 36 E. MDB&M.

A1—0 to 3 inches; very pale brown (10YR 7/3) gravelly loamy sand, yellowish brown (10YR 5/4) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; 18 percent fine gravel; strongly effervescent with disseminated lime; moderately alkaline (pH 8.3); abrupt smooth boundary.

C—3 to 65 inches; very pale brown (10YR 7/3) very gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and medium roots; few very fine and medium tubular pores; 38 percent fine gravel; strongly effervescent with disseminated lime, some gravel fragments have a coating of lime; moderately alkaline (pH 8.3).

Reaction is mildly or moderately alkaline. The A horizon ranges from 2 to 10 inches in thickness. It has hue of 10YR; value of 6 or 7; and chroma of 3. Commonly, the surface is paved with fine gravel fragments and scattered cobbles. The C horizon has value of 6 or 7 and chroma of 3 or 4. It is very gravelly loamy coarse sand and very gravelly sand. Coarse fragment content ranges from 35 to 60 percent. In some pedons, the C horizon is stratified with thin layers of sandy loam material or has gravel in bands.

Arujo series

The Arujo series consists of deep, well drained soils on mountainous uplands. These soils formed in residual material weathered from metamorphic and igneous rocks, mainly granitic rocks. Slope ranges from 9 to 75 percent. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 61 degrees F.

Arujo soils are similar to Rescue Variant, Tehachapi, and Tweedy soils. They are near Anaverde, Tweedy, and Walong soils. Rescue Variant soils have an A horizon that is both massive and hard when dry. Tehachapi soils formed in alluvial material and have dark surface horizons less than 20 inches thick. Tweedy and Anaverde soils have a mesic soil temperature regime. Walong soils have a coarse-loamy control section.

Typical pedon of Arujo sandy loam in an area of Arujo sandy loam, 9 to 15 percent slopes, in SE1/4NE1/4NE1/4 sec. 22 T. 11 N., R. 17 W. SBB&M.

A11—0 to 3 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular and moderate very thin platy structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few very fine tubular and common fine interstitial pores; slightly acid (pH 6.5); gradual wavy boundary.

A12—3 to 23 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; few fine

tubular and common fine interstitial pores; slightly acid (pH 6.5); gradual wavy boundary.

B1t—23 to 35 inches; dark brown (10YR 4/3) light clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine interstitial pores; few thin clay films on faces of peds and lining pores; slightly acid (pH 6.5); clear wavy boundary.

B2t—35 to 45 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium angular blocky structure; hard, friable, sticky and slightly plastic; few fine and medium roots; few moderately thick clay films on faces of peds and lining pores; medium acid (pH 6.0); clear wavy boundary.

B3t—45 to 55 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; few very fine interstitial pores; few thin clay films bridging mineral grains; slightly acid (pH 6.5); gradual wavy boundary.

Cr—55 inches; light yellowish brown (10YR 6/4) highly weathered metamorphosed sedimentary rock, crushing to sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, firm, slightly sticky and slightly plastic; slightly acid (pH 6.5).

The solum thickness and depth to the paralithic contact is 40 to 60 inches. Gravel content ranges from 0 to 10 percent. It is medium acid to mildly alkaline throughout. The A horizon ranges from 16 to 23 inches in thickness. It has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 or 2. A transitional A3 horizon is present in some pedons. The B horizon averages 5 to 11 percent more clay than the A horizon. It is loam, clay loam, or sandy clay loam. It has hue of 10YR and 7.5YR, value of 3 to 5, and chroma of 2 to 4. In some pedons, a C horizon is above the paralithic contact. It has chroma of 4 or 6. It is sandy loam, sandy clay loam, or loam.

Arvin series

The Arvin series consists of very deep, well drained soils on alluvial fans, stream flood plains, and stream terraces. These soils formed in mixed alluvium derived from granitic rock. Slope ranges from 2 to 9 percent. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 63 degrees F.

Arvin soils are similar to Hesperia and Steuber soils. They are near Chanac, DiGiorgio, Hesperia, Rosamond Variant, Tehachapi (warm phase), and Whitewolf soils. Hesperia and DiGiorgio soils have no stratification and have aridic moisture regimes bordering on xeric. Steuber soils are at higher elevations and have slightly cooler soil temperatures. Chanac soils are more than 18 percent clay and have a B2ca horizon. Rosamond Variant soils have no continuous mollic colors in the surface horizons. Tehachapi soils have a sandy clay loam B horizon. Whitewolf soils have a sandy control section and are somewhat excessively drained.

A typical pedon of Arvin sandy loam in an area of Arvin sandy loam, 2 to 5 percent slopes, 1,200 feet west and 600 feet north of the southeast corner of sec. 20, T. 11 N., R. 18 W. SBB&M.

A11—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; few fine interstitial pores; mildly alkaline (pH 7.5); abrupt smooth boundary.

A12—2 to 21 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine tubular and interstitial pores; finely stratified with very thin lenses of very fine sandy loam; mildly alkaline (pH 7.5); clear smooth boundary.

C—21 to 60 inches; yellowish brown (10YR 5/4) sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine tubular and interstitial pores; finely stratified with very thin lenses of very fine sandy loam, silt loam, and sand; mildly alkaline (pH 7.8).

Clay content ranges from 5 to 18 percent in the control section. Organic matter content is 0.9 percent or less. Reaction is slightly acid to mildly alkaline throughout. Content of rock fragments ranges from 0 to 35 percent. The A horizon ranges from 11 to 22 inches in thickness. It has value of 4 or 5 and chroma of 1 to 3. The C horizon has chroma of 3 or 4. It is sandy loam or coarse sandy loam. In some pedons, there are gravelly, cobbly, or stony equivalents.

Cajon series

The Cajon series consists of very deep, somewhat excessively drained soils mainly on alluvial fans and plains. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 0 to 15 percent. The mean annual precipitation ranges from 4 to 6 inches; there is some snow. In the survey area, Cajon soils in map units 114 and 116 receive as much as 12 inches of precipitation annually. This is more than normally received on soils of this series. The mean annual air temperature is about 65 degrees.

Cajon soils are similar to Cinco and Tujunga soils. They are near Arizo, DeStazo, Garlock, Neuralia, and Rosamond soils. Cinco and Tujunga soils have a xeric moisture regime and more rainfall. Arizo soils have sandy profiles and are more than 35 percent coarse fragments. DeStazo soils are 40 percent or more calcium carbonate. Garlock and Neuralia soils have an argillic horizon. Rosamond soils are stratified and have finer textures.

Typical pedon of Cajon loamy sand in an area of Cajon loamy sand, 0 to 5 percent slopes, 200 feet north and 250 feet east of southwest corner sec. 31, T. 12 N., R. 9 W. SBB&M.

A1—0 to 4 inches; pale brown (10YR 6/3) loamy sand, dark yellowish brown (10YR 4/4) moist; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; moderately alkaline (pH 8.0); abrupt smooth boundary.

C1—4 to 11 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; 5 percent fine gravel; moderately alkaline (pH 8.0); clear smooth boundary.

C2—11 to 20 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.

IIC3ca—20 to 31 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; 20 percent fine gravel; violently effervescent with lime disseminated and as threads, filaments, and pendulants under gravel fragments; moderately alkaline (pH 8.0); clear wavy boundary.

IIC4ca—31 to 44 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; 30 percent fine and coarse gravel; violently effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

IIIC5ca—44 to 66 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; 20 percent fine gravel coated with lime; violently effervescent; moderately alkaline (pH 8.2).

In the control section the clay content ranges from 5 to 12 percent. Reaction is mildly or moderately alkaline. Gravel content ranges from 0 to 35 percent. Some pedons have no carbonates. The A horizon ranges from 1 to 15 inches in thickness. It has value of 5 or 6 and chroma of 3, 4, or 6. In many pedons the soil surface is 30 to 50 percent paved by fine gravel. The C horizon has value of 6 or 7 and chroma of 3 or 4. Above a depth of 40 inches, textures are loamy sand or gravelly loamy sand. In some pedons, stratification occurs below a depth of 40 inches and includes gravelly sandy loam.

Chanac series

The Chanac series consists of very deep, well drained soils on old dissected terraces. These soils formed in old weakly consolidated alluvial material of mixed origin which now is highly weathered. Slope ranges from 5 to 50 percent. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 64 degrees F.

Chanac soils are similar to Nacimiento, Pleito, and Rosamond Variant soils. They are near Pleito and Rosamond Variant soils. Nacimiento soils have a mollic epipedon, have no cambic horizon, and are on mountainous uplands. Pleito soils have a mollic epipedon. Rosamond Variant soils are stratified and are on alluvial fans and in basins.

Typical pedon of Chanac sandy clay loam in an area of Chanac-Badland complex, 30 to 50 percent slopes, 3,500 feet north and 450 feet west of southeast corner sec. 10, T. 11 N., R. 18 W. SBB&M.

A11—0 to 2 inches; gray (10YR 5/1) sandy clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium granular structure; very hard, firm, sticky and plastic; many very fine and fine roots; common very fine and fine tubular and interstitial pores; slightly effervescent with disseminated lime; mildly alkaline (pH 7.5); clear smooth boundary.

A12—2 to 10 inches; gray (10YR 5/1) sandy clay loam, very dark gray (10YR 3/1) moist; moderate medium angular blocky structure; very hard, firm, sticky and plastic; many very fine roots; common very fine tubular and interstitial pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); clear wavy boundary.

B2ca—10 to 18 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine interstitial pores; common thin clay films lining pores and on faces of peds; violently effervescent with common fine lime filaments and coatings of lime on faces of peds; few dark krotovinas; moderately alkaline (pH 8.2); clear wavy boundary.

B3ca—18 to 31 inches; very pale brown (10YR 7/4) sandy clay loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine tubular and interstitial pores; few thin clay films bridging mineral grains, lining pores, and on faces of peds; violently effervescent with common fine lime filaments and coatings of lime on faces of peds; moderately alkaline (pH 8.2); clear wavy boundary.

C1ca—31 to 41 inches; brownish yellow (10YR 6/6) coarse sandy loam, yellowish brown (10YR 5/6) moist; massive; hard, friable, nonsticky and nonplastic; few very fine interstitial pores; violently effervescent with common fine lime filaments, medium irregular soft masses of lime, and coatings of lime on mineral grains; few dark krotovinas; moderately alkaline (pH 8.2); gradual wavy boundary.

IIC2ca—41 to 60 inches; very pale brown (10YR 8/4) clay loam, very pale brown (10YR 7/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine interstitial pores; slightly effervescent with disseminated lime; few dark krotovinas; moderately alkaline (pH 8.0).

Depth to the old slightly consolidated alluvial material ranges from 25 to 50 inches. It is mildly or moderately alkaline. The A horizon ranges from 10 to 19 inches in thickness. It has hue of 10YR or 7.5YR and chroma of 1 to 3. Clay content ranges from 18 to 25 percent. The B horizon has hue of 10YR, 7.5YR, and 5Y; value of 5 to 7; and chroma of 2 to 4 or 6. It is sandy clay loam or loam. Clay content ranges from 18 to 25 percent. The C horizon has hue of 10YR or 7.5YR; value of 6 to 8; and chroma of 4, 6, or 8. It is coarse sandy loam, loam, or clay loam. In some pedons, the entire C horizon has disseminated lime only.

Chino Variant

The Chino Variant consists of deep, poorly drained soils in basin valleys. These soils formed in alluvial material derived mainly from granitic rocks. Slope ranges from 0 to 2 percent. The mean annual precipitation ranges from 10 to 12 inches, and the mean annual air temperature is about 58 degrees F.

Chino Variant soils are similar to Havala soils. They are near Steuber and Walong soils. Havala soils are well drained and have an argillic horizon. Walong are residual soils with a coarse-loamy control section.

Typical pedon of Chino Variant clay loam in an area of Chino Variant clay loam, 0 to 2 percent slopes, in SW1/4NW1/4NE1/4 sec. 9, T. 32 S., R. 31 E. MDB&M.

A11—0 to 2 1/2 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; moderate medium angular blocky structure; very hard, firm, very sticky and plastic; many very fine roots; few fine tubular pores; slightly effervescent with disseminated lime; neutral (pH 7.0); abrupt smooth boundary.

A12—2 1/2 to 12 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; moderate medium prismatic structure; very hard, very firm, very sticky and very plastic; common very fine roots; few very fine tubular pores; slightly effervescent with disseminated lime; mildly alkaline (pH 7.5); clear wavy boundary.

A13—12 to 19 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; weak fine and medium angular blocky structure; hard, firm, very sticky and plastic; common very fine roots; few very fine tubular and interstitial pores; strongly effervescent, with disseminated lime; moderately alkaline (pH 8.0); abrupt wavy boundary.

C1g—19 to 29 inches; gray (5Y 6/1) clay loam, olive gray (5Y 4/2) moist; with common coarse distinct black (10YR 2/1) mottles; massive; hard, friable, sticky and plastic; few very fine interstitial pores; common very fine roots; slightly effervescent, with disseminated lime; mildly alkaline (pH 7.5); clear wavy boundary.

IIC2g—29 to 53 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; with few fine distinct pale brown (10YR 6/3) mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine interstitial pores; slightly effervescent, with disseminated lime; mildly alkaline (pH 7.5); abrupt wavy boundary.

IIIC3g—53 to 65 inches; light brownish gray (2.5Y 6/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few very fine interstitial pores; slightly effervescent, with disseminated lime; mildly alkaline (pH 7.5).

The mean annual soil temperature ranges from 55 to 59 degrees F. The A horizon ranges from 19 to 37 inches in thickness. It has value of 3 to 5 and chroma of 1 or 2. In some pedons, there is no A11, A12, or A13 horizon. The C horizon has hue of 5Y and 2.5Y, value of 6, and chroma of 2. In some pedons the C horizon is stratified and faint or distinct black (10YR 2/1) mottles are present. It is clay loam, sandy clay loam, or sandy loam. Depth to a perched high water table ranges from 40 to 55 inches.

Cibo series

The Cibo series consists of moderately deep, well drained soils on mountainous uplands. These soils formed in residual material weathered mainly from basalt. Slope ranges from 2 to 75 percent. The mean annual precipitation ranges from 9 to 12 inches, and the mean annual air temperature is about 59 degrees F.

Cibo soils are similar to Potterville soils. They are near Friant and Potterville soils. Potterville soils have no lithic contact at a depth of less than 40 inches. Friant soils have a loamy control section and a lithic contact at a depth of less than 20 inches.

Typical pedon of Cibo cobbly clay in an area of Cibo cobbly clay, 2 to 30 percent slopes, 2,480 feet south and 740 feet west of northeast corner sec. 17, T. 32 S., R. 34 E. MDB&M.

A11—0 to 2 inches; reddish brown (5YR 4/4) cobbly clay, reddish brown (5YR 4/4) moist; moderate very fine granular structure; soft, friable, slightly sticky and plastic; common very fine roots, moderately alkaline (pH 8.0); abrupt smooth boundary.

A12—2 to 23 inches; reddish brown (5YR 4/4) clay, reddish brown (5YR 4/4) moist; massive; hard, firm, slightly sticky and plastic; cracks 1/4- to 1-inch wide at 4- to 5-inch spacings with common intersecting slickensides; moderately alkaline (pH 8.0); clear wavy boundary.

Cr—23 to 31 inches; yellowish brown (10YR 5/4) highly weathered basalt that crushes to clay loam, dark yellowish brown (10YR 3/4) moist; massive; hard, very firm, nonsticky and nonplastic; slightly effervescent with few seams of lime; moderately alkaline (pH 8.0); abrupt wavy boundary.
R—31 inches; hard basalt.

Depth to the hard basalt ranges from 24 to 36 inches. The A horizon ranges from 22 to 38 inches in thickness. It has hue of 5YR and 7.5YR, value of 4, and chroma of 4. Cobble content on the A11 horizon ranges from 15 to 20 percent. The A12 commonly has no gravel. A few pedons have a C horizon.

Cinco series

The Cinco series consists of very deep, excessively drained soils on mountainous uplands. These soils formed in residual material weathered from granitic rock. Slope ranges from 50 to 75 percent. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 60 degrees F.

Cinco soils are similar to Cajon and Whitewolf soils. They are near Arizo, Cajon, and Pajuela soils. Cajon soils are on alluvial fans and plains, are somewhat excessively drained, and have slopes of less than 15 percent. Whitewolf soils are on alluvial fans, are somewhat excessively drained, and have slopes of less than 5 percent. Arizo soils have an aridic moisture regime and the content of rock fragments ranges from 35 to 60 percent. Pajuela soils are 35 to 80 percent rock fragments.

Typical pedon of Cinco gravelly loamy sand in an area of Cinco gravelly loamy sand, 50 to 75 percent slopes, in NE1/4SW1/4SW1/4 sec. 36, T. 32 S., R. 34 E. MDB&M.

A1—0 to 8 inches; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 4/3) moist; massive; loose, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; approximately 50 percent fine gravel; strongly effervescent with disseminated lime; moderately alkaline (pH 8.0); gradual smooth boundary.
C1—8 to 86 inches; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 4/3) moist; massive; loose, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; approximately 30 percent fine gravel; moderately alkaline (pH 8.0) gradual wavy boundary.
C2r—86 inches; highly weathered granite which can be dug with a spade and slakes in water but retains traces of the original rock structure.

Depth to the paralithic contact is 60 inches or more. Total content of rock fragments ranges from 15 to 35 percent. Total content of fines (silt and clay) ranges from 10 to 25 percent. Reaction is neutral to moderately alkaline. The A horizon ranges from 3 to 10 inches in thickness. It has value of 4 to 6 and chroma of 3 or 4. The C horizon has colors similar to the A horizon.

DeStazo series

The DeStazo series consists of very deep, well drained soils on flood plains and in basins. These soils formed in alluvial material derived mainly from granitic rocks (fig. 10). Slope ranges from 0 to 9 percent. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 66 degrees F.

DeStazo soils are similar to Alko soils. They are near Cajon, Garlock, and Rosamond soils. Alko soils are shallow over a duripan. Cajon soils are deep and somewhat excessively drained. Garlock soils are well drained soils that have an argillic horizon. Rosamond soils are well drained, but they are stratified.

Typical pedon of DeStazo sandy loam in an area of DeStazo sandy loam, 0 to 2 percent slopes, in SW1/4SE1/4SW1/4 sec. 2, T. 11 N., R. 11 W. SBB&M.

A11—0 to 2 inches; pale brown (10YR 6/3) sandy loam, yellowish brown (10YR 5/4) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; violently effervescent with disseminated lime; moderately alkaline (pH 8.0); abrupt smooth boundary.
A12—2 to 11 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few fine tubular and common very fine interstitial pores; violently effervescent with disseminated lime; moderately alkaline (pH 8.2) gradual smooth boundary.
C1ca—11 to 21 inches; very pale brown (10YR 7/3) very gravelly clay loam, pale brown (10YR 6/3) moist; and white (10YR 8/2) lime nodules; massive; slightly hard, friable, slightly sticky and plastic; few very fine and fine roots; few very fine and medium tubular pores; violently effervescent with disseminated and segregated lime; approximately 50 percent irregularly shaped, extremely hard lime nodules, 0.4 to 0.8 inch in diameter; moderately alkaline (pH 8.4) clear wavy boundary.
C2ca—21 to 32 inches; very pale brown (10YR 7/3) very gravelly clay loam, pale brown (10YR 6/3) moist; and white (10YR 8/2) lime nodules; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; violently effervescent with disseminated and segregated lime; approximately 60 percent irregularly shaped, extremely hard lime nodules, 0.4 to 0.8 inch in diameter; moderately alkaline (pH 8.4); clear wavy boundary.

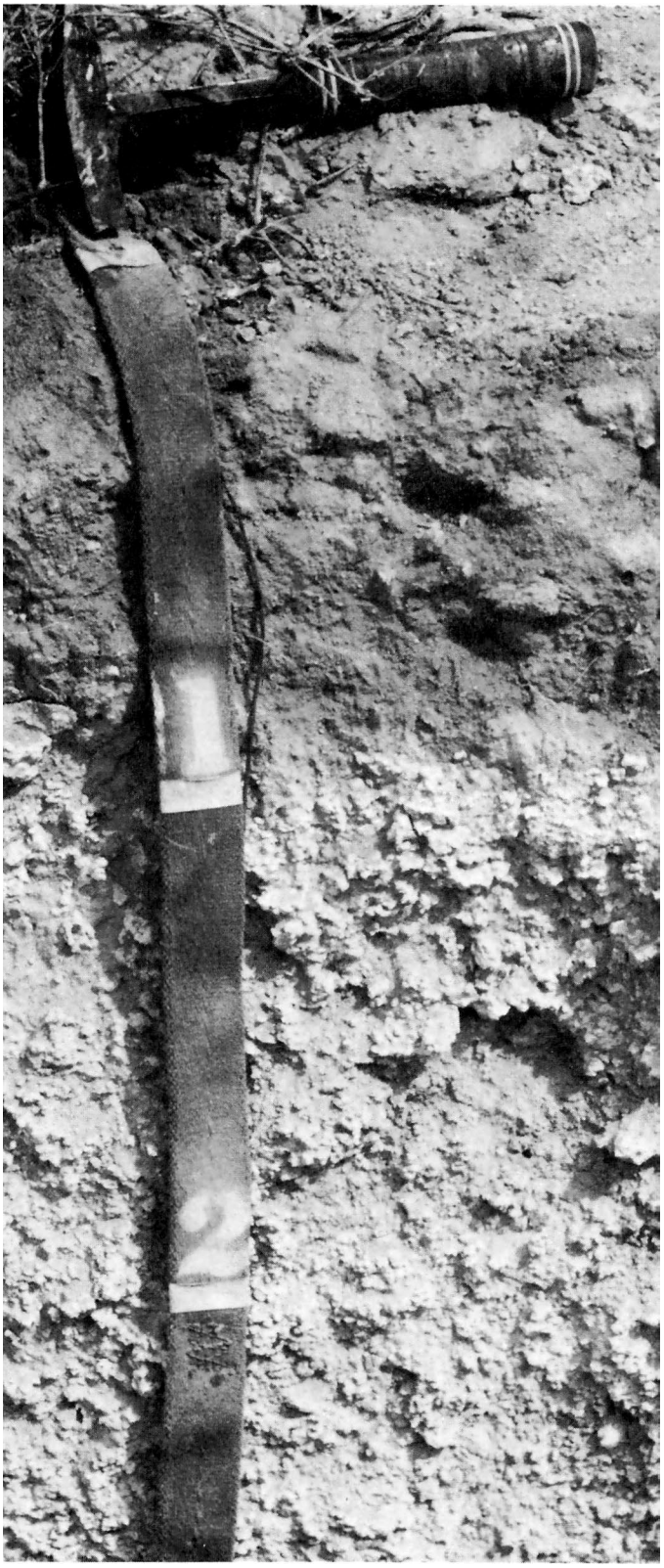

Figure 10.—Profile of DeStazo sandy loam, 0 to 2 percent slopes. Many lime nodules are below a depth of about 11 inches.

C3ca—32 to 52 inches; very pale brown (10YR 7/3) extremely gravelly clay loam, pale brown (10YR 6/3) moist, and white (10YR 8/2) lime nodules; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; few medium tubular pores; violently effervescent with disseminated and segregated lime; approximately 70 percent of horizon consists of irregularly shaped, extremely hard lime nodules, 0.8 to 2 inches in diameter; moderately alkaline (pH 8.4); clear wavy boundary.

C4—52 to 65 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; massive; hard, firm, sticky and plastic; few fine and medium roots; few fine tubular pores; violently effervescent with lime in filaments and threads; moderately alkaline (pH 8.4).

The A horizon ranges from 1 to 19 inches in thickness. It has value of 5 or 6 and chroma of 3 or 4. Coarse fragments in the form of lime nodules make up 0 to 5 percent of this horizon. The C horizon has hue of 10YR or 2.5Y, value of 6 to 8, and chroma of 2 to 4. It is clay loam sandy clay loam and sandy loam. Coarse fragments in the form of extremely hard lime nodules make up 35 to 80 percent of the 10- to 40-inch control section. The total content of carbonates is 65 percent or more, and calcium carbonate is 40 percent or more. Below the control section, content of coarse fragments ranges from 0 to 10 percent.

DiGiorgio series

The DiGiorgio series consists of very deep, well drained soils on stream flood plains and basins. These soils formed in alluvial material derived mainly from granitic rocks. Slope ranges from 0 to 2 percent. The mean annual precipitation ranges from 6 to 8 inches, and the mean annual air temperature is about 64 degrees F.

DiGiorgio soils are similar to Arvin, Hesperia, and Whitewolf soils. They are near Arvin, Hesperia, Rosamond Variant, and Whitewolf soils. Arvin and Hesperia soils have a coarse-loamy control section. Rosamond Variant soils are stratified and have an irregular decrease in organic matter with depth. Whitewolf soils are somewhat excessively drained and have textures coarser than loamy very fine sand in the control section.

Typical pedon of DiGiorgio sandy clay loam in an area of DiGiorgio sandy clay loam, 0 to 2 percent slopes, 1,900 feet east and 125 feet north of center sec. 11, T. 32 S., R. 29 E. MDB&M.

Ap—0 to 7 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure and moderate very fine and fine granular; very hard, friable, slightly sticky and plastic; common

very fine roots; common very fine and fine tubular pores; mildly alkaline (pH 7.8); abrupt smooth boundary.

A12—7 to 18 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse angular blocky structure; very hard, friable, slightly sticky and plastic; common very fine roots; few very fine and fine tubular pores; mildly alkaline (pH 7.8); clear wavy boundary.

C1—18 to 60 inches; yellowish brown (10YR 5/4) sandy clay loam, dark grayish brown (10YR 4/2) moist; massive; very hard, friable, slightly sticky and plastic; few very fine roots; common very fine and fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline (pH 8.2); abrupt wavy boundary.

IIC2—60 to 78 inches; pale brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and plastic; common very fine and fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline (pH 8.2).

Reaction is mildly or moderately alkaline throughout. The A horizon ranges from 12 to 40 inches in thickness. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The C horizon has hue of 10YR, value of 4 to 7, and chroma of 2 to 4. It is sandy loam, fine sandy loam, loam, clay loam, and sandy clay loam. Lime may occur as filaments and threads.

Edmundston series

The Edmundston series consists of deep, well drained soils on mountainous uplands. These soils formed in residual material weathered mainly from granitic rock. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 10 to 21 inches, and the mean annual air temperature is about 54 degrees F.

Edmundston soils are similar to Anaverde, Steuber, and Walong soils. They are near Anaverde, Godde, Tollhouse, and Walong soils. Anaverde soils have a fine-loamy control section. Steuber soils are on alluvial fans and flood plains and have an irregular decrease in organic matter with depth. Walong, Godde, and Tollhouse soils are shallow and have a lithic or paralithic contact.

Typical pedon of Edmundston sandy loam in an area of Walong-Edmundston association, very steep, in SE1/4NE1/4SW1/4 sec. 26, T. 11 N., R. 16 W. SBB&M.

A11—0 to 2 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium platy structure; hard, friable, nonsticky and nonplastic; common very fine roots; few very fine tubular and common very fine interstitial pores; medium acid (pH 6.0); abrupt wavy boundary.

A12—2 to 17 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common medium and fine roots; common very fine interstitial and few fine tubular pores; slightly acid (pH 6.5); gradual wavy boundary.

B2—17 to 34 inches; grayish brown (10YR 5/2) sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common medium and fine roots; few very fine tubular and common very fine interstitial pores; few thin clay films bridging mineral grains; slightly acid (pH 6.5); clear wavy boundary.

C1—34 to 50 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark brown (10YR 3/3) moist; massive; hard, friable, nonsticky and nonplastic; few medium and coarse roots; few very fine tubular and interstitial pores; few colloidal stains; 20 percent soft pieces of granodiorite, 0.1 to 2.5 inches in diameter; slightly acid (pH 6.5); clear wavy boundary.

Cr—50 inches; weathered granodiorite.

Depth to the weathered granitic rock or granite-gneiss ranges from 40 to 60 inches. The solum ranges from 30 to 45 inches thickness. Base saturation ranges from 75 to 95 percent throughout. Reaction is neutral to medium acid throughout. The A horizon ranges from 14 to 23 inches in thickness. It has value of 4 or 5 and chroma of 1 to 3. Content of rock fragments ranges from 0 to 25 percent by volume. The B2 horizon has value of 4 or 5 and chroma of 1 to 4. It is sandy loam, gravelly sandy loam, light loam, or gravelly light loam. Content of rock fragments ranges from 5 to 30 percent by volume. The C horizon has value of 4 or 5 and chroma of 3 or 4. It is gravelly sandy loam, sandy loam, loam, or gravelly loam. Content of rock fragments ranges from 5 to 30 percent.

Friant series

The Friant series consists of shallow, well drained soils on mountainous uplands. These soils formed in residual material weathered mainly from hard mica schist. Slope ranges from 9 to 75 percent. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 60 degrees F.

Friant soils are similar to Godde, Tollhouse, and Tunis soils. They are near Arujo, Tunis, and Walong soils. Godde and Tollhouse soils have mesic moisture regimes. Arujo soils are deep and formed in material weathered from granitic rock. Tunis soils have a paralithic contact at a shallow depth and are somewhat excessively drained. Walong soils are moderately deep and have a coarse-loamy control section.

Typical pedon of Friant sandy loam in an area of Arujo-Friant-Tunis complex, 15 to 20 percent slopes, in SW1/4SE1/4SW1/4 sec. 4, T. 32 S., R. 33 E. MDB&M.

A11—0 to 1 1/2 inches; grayish brown (10YR 5/2) sandy loam, very dark brown (10YR 3/2) moist;

weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine roots; common fine tubular pores; neutral (pH 7.3); abrupt smooth boundary.

A12—1 1/2 to 10 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; common fine tubular pores; 10 percent medium and fine gravel; neutral (pH 7.3); clear wavy boundary.

A13—10 to 18 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; few very fine roots; common fine tubular pores; neutral (pH 7.3); clear broken boundary.

R—18 inches; hard mica schist, 1/2 inch wide cracks at 6- to 12-inch intervals. Little or no displacement of the mass because of the cracks. Some cracks filled with soil material and roots.

Depth to the hard mica schist ranges from 6 to 20 inches. Content of coarse fragments ranges from 0 to 25 percent by volume. Reaction is slightly acid or neutral. The A horizon ranges from 6 to 20 inches in thickness. It has value of 4 or 5 and chroma of 2 to 4. Organic matter ranges from 1 to 3 percent. Some pedons have a C horizon.

Garlock series

The Garlock series consists of very deep, well drained soils on alluvial fans and old stream terraces. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 2 to 9 percent. The mean annual precipitation ranges from 5 to 7 inches, and the mean annual air temperature is about 63 degrees F.

Garlock soils are similar to Neuralia soils. They are near Cajon, Neuralia, and Hi Vista soils. Neuralia soils have lime in the B2t horizon. Cajon soils have a control section that is coarser than loamy very fine sand and is somewhat excessively drained. Hi Vista soils are shallow residual soils.

Typical pedon of Garlock loamy sand in an area of Garlock loamy sand, 2 to 9 percent slopes, in NW1/4NE1/4SW1/4 sec. 1, T. 11 N., R. 12 W. SBB&M.

A1—0 to 3 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; about 2 percent fine gravel; moderately alkaline (pH 8.0); clear smooth boundary.

A3—3 to 9 inches; brown (7.5YR 5/4) sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; few thin clay films bridging mineral grains; about 2 percent fine gravel; moderately alkaline (pH 8.0); abrupt wavy boundary.

B1t—9 to 12 inches; strong brown (7.5YR 5/6) sandy loam, dark brown (7.5YR 4/4) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; few very fine roots; common medium and fine tubular and very fine interstitial pores; few thin clay films bridging mineral grains and on faces of peds; moderately alkaline (pH 8.0); clear wavy boundary.

B2t—12 to 24 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; strong coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; common thin clay films bridging mineral grains and many moderately thick clay films on faces of peds; 5 percent fine gravel; moderately alkaline (pH 8.0); abrupt wavy boundary.

B3t—24 to 33 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; massive; hard, friable, nonsticky and slightly plastic; few fine roots; common thin clay films bridging mineral grains; 5 percent fine gravel; mildly alkaline (pH 7.5); abrupt wavy boundary.

C1—33 to 42 inches; brown (7.5YR 5/4) gravelly loamy sand, dark brown (7.5YR 4/4) moist; massive; hard, friable, nonsticky and nonplastic; few thin clay films bridging mineral grains; 20 percent fine gravel; moderately alkaline (pH 8.0); clear wavy boundary.

C2—42 to 51 inches; yellowish brown (10YR 5/6) gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; many fine interstitial pores; few very thin clay films bridging mineral grains; 35 percent fine, medium and coarse gravel; mildly alkaline (pH 7.5); abrupt smooth boundary.

IIC3ca—51 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; strongly effervescent with lime coating pebbles; 55 percent fine, medium, and coarse gravel; moderately alkaline (pH 8.0).

Reaction ranges from neutral to moderately alkaline. The soil is calcareous below a depth of about 40 inches. The A horizon ranges from 6 to 24 inches in thickness. It has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. Pebble content ranges from 5 to 10 percent. A few pedons have no A3 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 to 8. It is sandy clay loam or gravelly sandy clay loam. Clay content ranges from 22 to 35 percent. A few pedons have thin horizons with clay content ranging

from 35 to 50 percent. Gravel content ranges from 5 to 20 percent. A few pedons have no transitional B1t or B3t horizon. The C horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 3, 4, 6, or 8. It is loamy sand or coarse sand with gravelly or very gravelly equivalents. Gravel content ranges from 10 to 55 percent. Some pedons have a silty substratum below a depth of 40 inches.

Godde series

The Godde series consists of shallow, somewhat excessively drained soils on mountainous uplands. These soils formed in residual material weathered from granitic rock. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 12 to 21 inches, and the mean annual air temperature is about 54 degrees F.

Godde soils are similar to Friant, Tollhouse, and Tunis soils. They are near Edmundston and Tollhouse soils. Friant soils are well drained and are warmer. Tollhouse and Tunis soils have paralithic contacts with the granitic rock. Edmundston soils are deep and well drained.

Typical pedon of Godde gravelly sandy loam in an area of Edmundston-Godde-Tollhouse complex, 50 to 75 percent slopes, 50 feet north of SW corner of NW1/4NE1/4SW1/4 sec. 29, T. 11 N., R. 15 W. SBB&M.

O1—2 inches to 0; oak leaves, oak leaf mold, pine needles; abrupt wavy boundary.
A1—0 to 10 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular and interstitial pores; approximately 15 percent fine gravel with 5 percent of the top surface covered with fine and coarse gravel; neutral (pH 6.7); clear wavy boundary.
C—10 to 12 inches; brown (10YR 5/3) gravelly sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; common fine and medium roots; friable; approximately 25 percent fine gravel; neutral (pH 6.7); abrupt wavy boundary.
R—12 inches; fractured granitic rock.

Depth to the fractured granitic rock ranges from 10 to 20 inches. The A horizon ranges from 10 to 20 inches in thickness. It has value of 3 to 5 and chroma of 2 or 3. Reaction is slightly acid or neutral. The C horizon has value of 5 or 6 and chroma of 2 to 4. It is sandy loam or gravelly sandy loam. Reaction ranges from medium acid to neutral.

Havala series

The Havala series consists of very deep, well drained soils on alluvial fans and old stream terraces. These soils formed in alluvial material derived mainly from granitic rocks. Slope ranges from 0 to 15 percent. The mean annual precipitation ranges from 9 to 12 inches, and the mean annual air temperature is about 59 degrees F.

Havala soils are similar to Tehachapi soils. They are near Steuber and Tehachapi soils. Tehachapi soils have a thinner A horizon. Steuber soils are stratified and have a coarse-loamy control section.

Typical pedon of Havala sandy loam, 9 to 15 percent slopes, about 2,400 feet west and 500 feet north of southwest corner sec. 12, T. 11 N., R. 17 W. SBB&M (nonsectionalized).

A1—0 to 10 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; few very fine tubular and fine interstitial pores; 12 percent fine and medium gravel; neutral (pH 7.0); clear wavy boundary.
A3—10 to 24 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few fine and medium tubular and interstitial pores; neutral (pH 7.0); clear wavy boundary.
B1t—24 to 31 inches; dark brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine interstitial and tubular pores; mildly alkaline (pH 7.5); clear wavy boundary.
B2t—31 to 48 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine interstitial pores; few thin clay films on faces of peds and bridging mineral grains; moderately alkaline (pH 8.0); clear wavy boundary.
C—48 to 65 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; moderately alkaline (pH 8.0).

Solum thickness ranges from 30 to 60 inches. Organic matter content is more than 1.2 percent to a depth of 10 inches but decreases regularly to less than 1 percent at a depth of about 12 to 18 inches. Coarse fragment content ranges from 0 to 15 percent; occasional stones and boulders are on the surface. Reaction is neutral to moderately alkaline. The A horizon ranges from 20 to 30 inches in thickness. It has value of 4 or 5 and chroma of 1 to 3. A few pedons have no A3 horizon. Some pedons have no B1t horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. It is loam, sandy clay loam, or clay loam. In some pedons, a B3 horizon is present. The C horizon has value of 4 or 5

and chroma of 2 to 4. It is sandy loam or fine sandy loam.

Hesperia series

The Hesperia series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvial material derived from granitic rock. Slope ranges from 0 to 9 percent. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F.

Hesperia soils are similar to Arvin, DiGiorgio, Rosamond Variant, and Whitewolf soils. They are near Arvin, DiGiorgio, Wasioja, and Whitewolf soils. Arvin soils are stratified. DiGiorgio and Rosamond Variant soils have fine-loamy control sections. Wasioja soils have a fine-loamy control section and an argillic horizon. Whitewolf soils have a profile of loamy sand or coarser material throughout.

Typical pedon of Hesperia sandy loam in an area of Hesperia sandy loam, 0 to 2 percent slopes, NW corner of sec. 19 T. 11 N., R. 18 W. SBB&M.

Ap—0 to 4 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; common fine interstitial pores; mildly alkaline (pH 7.8); clear smooth boundary.

C1—4 to 18 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and nonplastic; common fine interstitial pores; mildly alkaline (pH 7.8); clear smooth boundary.

C2—18 to 34 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky and nonplastic; common fine interstitial pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); clear smooth boundary.

C3—34 to 57 inches; light yellowish brown (10YR 6/4) sandy loam mixed with lenses of pale brown (10YR 6/3) fine sandy loam and silt loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky and nonplastic; common fine interstitial pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); gradual smooth boundary.

C4—57 to 70 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, nonsticky and nonplastic; common fine interstitial pores; 5 to 10 percent fine gravel; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0).

Reaction is mildly or moderately alkaline. Organic matter content is less than 1.0 percent. The A horizon ranges from 30 to 47 inches in thickness. It has hue of 10YR or 7.5YR and chroma of 2 or 3. Clay content ranges from 12 to 18 percent. Gravel content ranges from 0 to 5 percent. The C horizon has value of 5 or 6 chroma of 3 or 4. It is fine sandy loam, sandy loam, or coarse sandy loam. In some pedons, there is weak stratification of similar textures in the C horizon. Gravel content ranges from 5 to 10 percent.

Hi Vista series

The Hi Vista series consists of moderately deep, well drained soils on low pediments. These soils formed in residual material weathered from granitic rock. Slope ranges from 2 to 9 percent. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 63 degrees F.

Hi Vista soils are similar to Garlock and Neuralia soils. They are near Alko and Cajon soils. Garlock soils are very deep and Neuralia soils are deep over bedrock. Alko soils are shallow over a silica-lime cemented duripan. Cajon soils are very deep and have no argillic horizon.

Typical pedon of Hi Vista sandy loam in an area of Hi Vista sandy loam, 2 to 9 percent slopes, in NE1/4 SE1/4 NE1/4 sec. 8, T. 9 N., R. 12 W. SBB&M.

A1—0 to 4 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine interstitial pores; approximately 10 percent fine gravel fragments; moderately alkaline (pH 8.0); abrupt wavy boundary.

B1t—4 to 12 inches; brown (7.5YR 5/4) gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate, coarse subangular blocky structure; hard, firm, slightly sticky and plastic; common very fine roots; few fine tubular and interstitial pores; few thin clay films bridging mineral grains; approximately 25 percent fine gravel fragments; moderately alkaline (pH 8.0); clear wavy boundary.

B2t—12 to 18 inches; dark yellowish brown (10YR 4/4) gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate, coarse angular blocky structure; very hard, very firm, slightly sticky and plastic; few very fine roots; few very fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; 25 percent fine gravel fragments; moderately alkaline (pH 8.0); clear wavy boundary.

B3t—18 to 30 inches; light yellowish brown (10YR 6/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak, medium angular blocky structure; very hard, firm, slightly sticky and plastic; few moderately thick clay films on faces of peds; approximately 30 percent fine gravel; moderately alkaline (pH 8.0); abrupt wavy boundary.

R—30 inches; hard, slightly fractured granite. Has cracks .1- to 1-inch wide, spaced 12 to 24 inches apart

both horizontally and vertically, little or no displacement.

Depth to the granitic rock ranges from 20 to 40 inches. Organic matter content is less than 1 percent in the surface layer. The A horizon ranges from 4 to 9 inches in thickness. It has value of 5 or 6 and chroma of 3 or 4. Gravel content ranges from 5 to 10 percent. In some places, 50 to 70 percent of the surface is covered by fine gravel fragments. The B2t horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 to 6; and chroma of 4 or 6. It is gravelly sandy clay loam. Gravel content ranges from 15 to 35 percent by volume. A B1t and a B3t are present in some places.

Jawbone series

The Jawbone series consists of shallow, excessively drained soils on mountainous uplands. These soils formed in residual material weathered from granitic rocks. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F.

Jawbone soils are similar to Cinco, Cajon, and Randsburg soils. They are near Arizo, Cajon, Cinco, and Hi Vista soils. Cinco soils are deep and have a xeric moisture regime. Cajon soils are very deep. Randsburg soils have a loamy control section and are calcareous. They are on low pediments. Arizo soils are on alluvial fans and they are sandy-skeletal. Hi Vista soils are moderately deep and have a fine-loamy control section.

Typical pedon of Jawbone gravelly loamy sand in an area of Jawbone gravelly loamy sand, 15 to 75 percent slopes, in NE1/4NE1/4NW1/4 sec. 19, T. 31 S., R. 36 E. MDB&M.

A11—0 to 1 inch; light yellowish brown (10YR 6/4) gravelly loamy sand, yellowish brown (10YR 5.4) moist; weak medium platy structure; soft, very friable; common very fine and few medium roots; few medium tubular pores; 20 percent pebbles; surface paved with fine pebles; moderately alkaline (pH 8.0); abrupt wavy boundary.

A12—1 to 10 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable; common very fine and few medium roots; few medium tubular pores; 20 percent fine gravel; moderately alkaline (pH 8.0); abrupt irregular boundary.

IICr—10 inches; highly weathered granite, contains original rock structure with minerals in position of original crystalline structure; material will disperse to individual mineral grains when shook in water; slightly hard, friable, very few very fine roots in fractures; some thin (1/2 to 1 inch) seams of very pale brown (10YR 7/3) sandy loam extend nearly vertically into the mineral.

Depth to the paralithic contact is 4 to 12 inches. Gravel content ranges from 15 to 25 percent. The surface is commonly paved with fine gravel. The A horizon ranges from 4 to 12 inches in thickness. It has hue of 10YR, value of 5 to 7, and chroma of 3 or 4.

Los Osos Variant

The Los Osos Variant consists of moderately deep, well drained soils on mountainous uplands. These soils formed in residual material weathered from quartzite or marble. Slope ranges from 30 to 50 percent. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 57 degrees F.

Los Osos Variant soils are similar to Arujo, Sween Variant, and Tweedy soils. They are near Anaverde, Godde, Tweedy, and Tollhouse soils. Arujo soils are deep and weathered mainly from granitic rocks. Sween Variant has a thinner A horizon and a mesic soil temperature regime. Tweedy and Anaverde soils have a fine-loamy control section. Godde and Tollhouse are shallow and somewhat excessively drained.

Typical pedon of Los Osos Variant in an area of Los Osos Variant clay loam, 30 to 50 percent slopes, in NE1/4SW1/4SW1/4 sec. 10, T. 31 S., R. 32 E. MDB&M.

A1—0 to 13 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; moderate very fine and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); clear smooth boundary.

A3—13 to 22 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few medium tubular pores; strongly effervescent with lime as a few threads and filaments; moderately alkaline (pH 8.2); clear smooth boundary.

B2tca—22 to 32 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; moderate fine and medium angular blocky structure; hard, friable, sticky and plastic; few fine roots; few medium tubular pores; few moderately thick clay films on faces of peds; violently effervescent with common lime filaments and threads; moderately alkaline (pH 8.2); abrupt broken boundary.

R—32 inches; hard, slightly fractured quartzite with thin veins of marble. Cracks are about .05 to .1 inch wide and about 30 inches apart, randomly spaced.

Depth to the lithic contact ranges from 25 to 40 inches. Reaction is mildly or moderately alkaline. The A horizon ranges from 20 to 28 inches in thickness. It is dark grayish brown and grayish brown (10YR 4/2, 5/2). An A3 or a B1 horizon are commonly present. They have

hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Texture is sandy clay loam or clay loam with 25 to 35 percent clay. The B2tca horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. Clay content ranges from 40 to 50 percent. Calcium carbonate content is 15 percent or less.

Muroc series

The Muroc series consists of well drained soils on low pediments. They are shallow over a duripan. These soils formed in residual material weathered from granite. Slope ranges from 2 to 9 percent. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 66 degrees F.

Muroc soils are similar to Alko and Randsburg soils. They are near Cajon, Neuralia, and Randsburg soils. Randsburg soils have a paralithic contact at a depth of less than 20 inches and do not have a duripan. Alko soils formed in alluvial material on old terraces. Cajon soils are very deep and somewhat excessively drained. Neuralia soils are very deep and have an argillic horizon.

Typical pedon of Muroc sandy loam in an area of Muroc sandy loam, 2 to 9 percent slopes, in the SE1/4SE1/4NW1/4 sec. 33, T. 10 N., R. 12 W. SBB&M.

A11—0 to 3 inches; yellowish brown (10YR 5/4) sandy loam, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; many very fine roots; few very fine interstitial pores; 5 percent fine gravel; moderately alkaline (pH 8.0); slightly effervescent; abrupt smooth boundary.

A12—3 to 11 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and coarse roots; few fine and coarse tubular pores; 5 percent fine and medium gravel; moderately alkaline (pH 8.0); strongly effervescent with disseminated lime; clear wavy boundary.

A13—11 to 15 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine and coarse tubular pores; 5 percent fine and medium gravel; moderately alkaline (pH 8.0); strongly effervescent with disseminated lime; abrupt wavy boundary.

C1sicam—15 to 27 inches; white (10YR 8/2) indurated silica-lime cemented duripan, light gray (10YR 7/2) moist; massive; extremely hard surface of duripan consists of a thin laminar layer or opalized band with fine roots matted on the surface of the layer; abrupt smooth boundary.

C2rca—27 to 54 inches; white (10YR 8/2) highly weathered granite rock crushes to light gray (10YR 7/2) moist; massive; hard, friable; few fine roots in cracks; slightly effervescent with disseminated lime; moderately alkaline (pH 8.2); horizon has been highly weathered, but has rock structure with minerals of the weathered granite in position of original crystallization, will disperse when shook in water; few vertical and horizontal thin seams of silica cemented material occurring in fractures in the weathered granite.

Depth to duripan and thickness of the A horizon ranges from 8 to 20 inches. Fine gravel content ranges from 0 to 15 percent. The A horizon has value of 5 or 6 and chroma of 3 or 4. The opalized layer ranges from 0.12 to 0.25 inches in thickness. It is oriented horizontally, obliquely, and vertically in the weathered granite. In some places, it is separated by an inch or two of calcareous sandy material. The weathered granite has value of 7 or 8 and chroma of 2 or 3 because of the amount of lime present.

Nacimiento series

The Nacimiento series consists of moderately deep, well drained soils on mountainous uplands. These soils formed in residual material weathered from marble. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 10 to 14 inches, and the mean annual air temperature is about 58 degrees F.

Nacimiento soils are similar to Chanac and Pleito soils. They are near Anaverde, Arujo, Tweedy, and Walong soils. Chanac and Pleito soils are very deep and are on old dissected terraces. Anaverde soils have a thicker mollic epipedon and a mesic soil temperature regime. Arujo soils have a thicker mollic epipedon and they have an argillic horizon. Tweedy soils have an argillic horizon and a mesic soil temperature regime. Walong soils have a coarse-loamy control section.

Typical pedon of Nacimiento in an area of Nacimiento loam, 30 to 50 percent slopes, eroded, about 150 feet southeast of Tehachapi summit benchmark in the SE1/4NW1/4 sec. 23, T. 32 S., R. 33 E. MDB&M.

A11—0 to 2 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots; common very fine interstitial pores, many very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.2); abrupt smooth boundary.

A12—2 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak and moderate fine granular structure; slightly hard, friable, slightly sticky and nonplastic; common very fine roots; few very fine interstitial pores with common very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.2); abrupt wavy boundary.

C1ca—12 to 24 inches; white (2.5Y 8/2) loam, pale yellow (2.5Y 7/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; very few very fine interstitial pores;

strongly effervescent with common fine and medium soft masses of lime; moderately alkaline (pH 8.2); abrupt wavy boundary.

C2r—24 to 30 inches; weathered marble; will slake when soaked in calgon and water; has many .1-inch discontinuous cracks filled with material from above.

Depth to the paralithic contact ranges from 24 to 40 inches. Content of coarse fragments ranges from 5 to 25 percent. The A horizon ranges from 7 to 15 inches in thickness. It has value of 4 or 5 and chroma of 2 or 3. In some pedons, lime is segregated as few filaments or threads in the A12 horizon. The C horizon has value of 7 or 8 and chroma of 2 or 4. It is loam or gravelly loam. Lime occurs as common fine or medium soft masses, threads, and filaments.

Neuralia series

The Neuralia series consists of deep, well drained soils on alluvial fans and plains. They formed in alluvial material derived mainly from granitic rock. Slope ranges from 0 to 9 percent. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 60 degrees F.

Neuralia soils are similar to Garlock and Hi Vista soils. They are near Alko, Cajon, Garlock, and Norob soils. Garlock soils do not have lime in the B2t horizon. Hi Vista soils formed from weathered granite. Alko soils have a silica cemented duripan. Cajon soils are somewhat excessively drained and have a sandy profile. Norob soils have a natric horizon.

Typical pedon of Neuralia sandy loam in an area of Neuralia sandy loam, 2 to 5 percent slopes, 2,000 feet east and 1,000 feet south of the northwest corner sec. 7, T. 32 S., R. 39 E. MDB&M.

A11—0 to 3 inches; yellowish brown (10YR 5/4) sandy loam, brown (10YR 4/3) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular and interstitial pores; moderately alkaline (pH 8.0); abrupt smooth boundary.

A12—3 to 7 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few fine tubular and common very fine interstitial pores; moderately alkaline (pH 8.0); clear smooth boundary.

A3—7 to 11 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular and common very fine interstitial pores; common thin clay films as bridges and lining pores; moderately alkaline (pH 8.0); clear wavy boundary.

B21t—11 to 18 inches; brown (7.5YR 5/4) sandy clay loam, mixed dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular and common very fine interstitial pores; common moderately thick clay films on faces of peds and lining pores; moderately alkaline (pH 8.0); abrupt wavy boundary.

B22tca—18 to 22 inches; yellowish brown (10YR 5/4) sandy clay loam, yellowish brown (10YR 5/6) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular and very fine interstitial pores; common moderately thick clay films on faces of peds and lining pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); clear wavy boundary.

B3tca—22 to 31 inches; brown (7.5YR 5/4) light sandy clay loam, dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) moist; moderate medium and coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine tubular and very fine interstitial pores; violently effervescent with lime in seams and filaments; moderately alkaline (pH 8.0); clear wavy boundary.

C1ca—31 to 37 inches; light brown (7.5YR 6/4) gravelly heavy sandy loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine interstitial pores; violently effervescent with lime in seams and filaments; 25 percent fine gravel; moderately alkaline (pH 8.0); clear wavy boundary.

C2ca—37 to 55 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine interstitial pores; violently effervescent with lime in soft masses and filaments; moderately alkaline (pH 8.0); clear wavy boundary.

C3ca—55 to 60 inches; consolidated mixed alluvium.

Depth to the consolidated mixed alluvium ranges from 40 to 60 inches. The solum ranges from 12 to 50 inches deep. It is neutral to moderately alkaline. Lime is disseminated or segregated in the lower part of the B horizon and C horizon. The A horizon ranges from 4 to 17 inches in thickness. It has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 6. Fine gravel content ranges from 0 to 10 percent. Most pedons have an A3 or a B1 horizon. The B horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 3 or 4. It is sandy clay loam or clay loam. Content of coarse fragments ranges from 0 to 15 percent. In some pedons, there is no B3 horizon. The C horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 to 6. It is sandy loam, loamy sand, or sandy clay loam with gravelly equivalents of each texture. Content of coarse fragments commonly is 15 to 30 percent.

Norob series

The Norob series consists of very deep, well drained soils on alluvial plains. These soils formed in alluvial material from mixed origin. Slope ranges from 0 to 5 percent. The mean annual precipitation is about 5 inches, and the mean annual air temperature is about 64 degrees F.

Norob soils are similar to Garlock, Hi Vista, and Neuralia soils. They are near Cajon, DeStazo, Garlock, Neuralia, and Rosamond soils. Garlock soils do not have lime in the B2t horizon. Hi Vista soils formed from weathered granite. Neuralia soils have no natric horizon. Cajon soils are somewhat excessively drained and have a sandy profile. DeStazo soils are more than 40 percent calcium carbonate. Rosamond soils have stratified profiles.

Typical pedon of Norob in an area of Norob-Neuralia complex, 0 to 5 percent slopes, 2,600 feet east and 600 feet north of center of sec. 31, T. 11 N., R. 8 W. SDB&M.

A1—0 to 6 inches; light yellowish brown (10YR 6/4) sand, brown (7.5YR 4/4) moist; single grained; loose; few very fine roots; moderately alkaline (pH 8.0); abrupt smooth boundary.

IIB21t—6 to 13 inches; dark brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate coarse columnar structure; capped by a 1/16-inch thick light gray (10YR 7/1) A2 horizon; very hard, very firm, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and lining pores; strongly alkaline (pH 8.6); clear smooth boundary.

IIB22tca—13 to 22 inches; dark brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure; very hard, very firm, sticky and plastic; few very fine roots on the sides of prisms; few very fine tubular pores; many moderately thick clay films on faces of peds and bridging mineral grains; strongly effervescent with lime in seams, and as few fine irregular soft masses; strongly alkaline (pH 8.8); clear smooth boundary.

IIB23t—22 to 40 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak very coarse prismatic structure; very hard, firm, slightly sticky and slightly plastic; few very fine tubular and interstitial pores; few thin clay films bridging mineral grains; slightly effervescent with lime disseminated and as a few fine seams and threads; moderately alkaline (pH 8.4); gradual smooth boundary.

IIICca—40 to 60 inches; yellowish brown (10YR 5/6) gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, nonsticky and slightly plastic; many fine and medium interstitial pores; estimated 16 percent by volume fine rounded pebbles; strongly effervescent with lime as few fine and medium irregular soft masses and in seams; moderately alkaline (pH 8.2).

The A horizon ranges from 4 to 19 inches in thickness. It has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 6. It is mildly or moderately alkaline. Electrical conductivity is 2mmhos/2cm or less. Some pedons have an A2 horizon. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is sandy clay loam or clay loam with 20 to 35 percent clay. Reaction is moderately or strongly alkaline. Lime is disseminated or segregated. The electrical conductivity ranges from 4 to 16mmhos/2cm. The sodium absorption ratio (SAR) ranges from 70 to 200. The C horizon is gravelly sandy loam, sandy loam, or sandy clay loam. Fine gravel content ranges from 5 to 30 percent. Reaction is mildly or moderately alkaline.

Pajuela series

The Pajuela series consists of very deep, somewhat excessively drained soils on old stream terraces. These soils formed in alluvial material derived from granitic rock. Slope ranges from 30 to 50 percent. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 65 degrees F.

Pajuela soils are similar to Arizo and Cinco soils. They are near Cajon, Cinco, Jawbone, and Wasioja soils. Arizo soils are excessively drained and are on alluvial fans and plains. Cinco soils are excessively drained and are on mountainous uplands. Cajon soils are somewhat excessively drained and are less than 35 percent coarse fragments. Jawbone soils are shallow, excessively drained soils on mountainous uplands. Wasioja soils have a fine-loamy control section.

Typical pedon of Pajuela gravelly sandy loam in an area of Pajuela-Whitewolf association, steep, in NE1/4NW1/4NW1/4 sec. 13, T. 11 N., R. 14 W. SBB&M.

A11—0 to 12 inches; yellowish brown (10YR 5/4) gravelly sandy loam, brown (10YR 4/3) moist; weak fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; 20 percent fine gravel; moderately alkaline (pH 8.0); clear smooth boundary.

A12—12 to 22 inches; yellowish brown (10YR 5/6) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine and fine tubular and interstitial pores; 30 percent fine to coarse gravel; moderately alkaline (pH 8.0); clear wavy boundary.

C—22 to 60 inches; very pale brown (10YR 7/4) extremely gravelly loamy sand, yellowish brown

(10YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few very fine, fine, and medium tubular pores; 75 percent coarse gravel; neutral (pH 7.0).

The control section (10 to 40 inches) averages more than 35 percent coarse fragments. Reaction is neutral to moderately alkaline. The A horizon ranges from 11 to 24 inches in thickness. Organic matter content is less than 1 percent. The A horizon has value of 5 or 6 and chroma of 3 or 4 and 6. The C horizon has value of 6 or 7 and chroma of 3 or 4 and 6. It is extremely gravelly loamy sand and very gravelly loam coarse sand.

Pleito series

The Pleito series consists of very deep, well drained soils on alluvial fans and old dissected terraces. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 2 to 50 percent. The mean annual precipitation ranges from 10 to 14 inches, and the mean annual air temperature is about 60 degrees F.

Pleito soils are similar to Chanac and Nacimiento soils. They are near Arvin, Chanac, Friant, Tehachapi, and Walong soils. Chanac soils have a mollic epipedon less than 20 inches in thickness. Nacimiento soils are moderately deep and are on mountainous uplands. Arvin soils have a coarse-loamy control section. Friant soils are shallow over weathered mica schist. Tehachapi soils have an argillic horizon.

Typical pedon of Pleito sandy clay loam in an area of Pleito sandy clay loam, 9 to 50 percent slopes, about 3,800 feet due south of southeast corner sec. 35 T. 32 S., R. 30 E. MDB&M (nonsectionalized).

A11—0 to 6 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark brown (10YR 2/2) moist; moderate medium and coarse granular structure; very hard, very firm, sticky and plastic; common very fine roots; few very fine tubular pores; moderately alkaline (pH 8.0); abrupt wavy boundary.

A12—6 to 16 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure; very hard, very firm, sticky and plastic; common very fine roots; few very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); clear smooth boundary.

B2ca—16 to 23 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse angular blocky structure; very hard, very firm, sticky and plastic; few very fine roots; few very fine tubular pores; 5 percent fine gravel; strongly effervescent with common filaments of lime; moderately alkaline (pH 8.0); clear smooth boundary.

Cca—23 to 60 inches; very pale brown (10YR 7/3) gravelly sandy clay loam, pale brown (10YR 6/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; 20 percent fine gravel and 5 percent 3- to 10-inch cobbles; strongly effervescent with common irregular soft masses of lime; moderately alkaline (pH 8.0).

Solum thickness ranges from 20 to 35 inches. Organic matter content is between 1 and 2 percent above a depth of 20 inches. It decreases regularly to less than 1 percent at a depth of 26 to 32 inches. Total content of coarse fragments ranges from 0 to 25 percent. Reaction is neutral to moderately alkaline. The A horizon ranges from 14 to 25 inches in thickness. It has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 1 to 3. Most pedons have a B2 horizon. It has hue of 10YR and 7.5YR, value of 4 or 5, and chromas of 2 to 4. It is sandy clay loam, clay loam, or loam. Lime occurs as filaments or soft masses. The C horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 1 to 4. It is gravelly sandy clay loam, sandy clay loam, clay loam, or loam. Content of gravel and cobbles ranges from 5 to 35 percent.

Porterville series

The Porterville series consists of very deep, well drained soils on alluvial fans. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 5 to 9 percent. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 57 degrees F. In the survey area, Porterville soils in map unit 164 on the Mojave Desert receive as little as 6 inches of precipitation annually. This is less than normally received on soils of this series.

Porterville soils are similar to Cibo soils. They are near Cibo and Steuber soils. Cibo soils are on mountainous uplands and formed in residual material weathered from basic igneous rock. Steuber soils have a coarse-loamy control section.

Typical pedon of Porterville clay in an area of Porterville clay, 5 to 9 percent slopes, in NW1/4SW1/4NW1/4 sec. 7, T. 32 S., R. 34 E. MDB&M.

A11—0 to 2 inches; brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; strong fine granular structure; hard, firm, sticky and plastic; common very fine tubular pores; moderately alkaline (pH 8.0); clear smooth boundary.

A12—2 to 36 inches; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/2) moist; weak coarse prismatic structure; hard, firm, sticky and plastic; common very fine roots; common distinct slickensides on the sides of peds; very deep wide cracks; moderately alkaline (pH 8.0), abrupt wavy boundary.

Cca—36 to 60 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; massive;

slightly hard, friable, slightly sticky and plastic; strongly effervescent with common coarse vertical seams of lime 2 to 3 feet long, with random cross seams; moderately alkaline (pH 8.0).

Depth to carbonates ranges from 18 to 40 inches. There are cracks ranging from 0.5 to 2 inches in width and up to 4 feet in depth. Content of rock fragments ranges from 0 to 25 percent. Reaction is mildly or moderately alkaline. The A horizon ranges from 18 to 42 inches in thickness. Clay content ranges from 40 to 60 percent. The C horizon has value of 6 or 7 and chroma of 3 or 4. Clay content ranges from 30 to 40 percent. Lime occurs in thin or thick long seams, bands, or soft masses.

Randsburg series

The Randsburg series consists of shallow, well drained soils on low pediments. These soils formed in residual material weathered from granitic rock (fig. 11). Slope ranges from 2 to 15 percent. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 66 degrees F.

Randsburg soils are similar to Hi Vista, Jawbone, and Muroc soils. They are near Cajon, Hi Vista, and Muroc soils. Hi Vista soils are moderately deep and have a fine-loamy control section. Jawbone soils are hilly or very steep and have no lime. Muroc soils have a duripan above the paralithic contact. Cajon soils are very deep and somewhat excessively drained.

Typical pedon of Randsburg sandy loam in an area of Randsburg sandy loam, 2 to 15 percent slopes, in NW1/4SW1/4NW1/4 sec. 7, T. 31 S., R. 39 E. MDB&M.

A11—0 to 2 inches; yellowish brown (10YR 5/4) sandy loam, brown (10YR 4/3) moist; weak very fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine interstitial pores; about 2 percent gravel; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); clear smooth boundary.

A12—2 to 5 inches; yellowish brown (10YR 5/4) sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine interstitial pores; about 2 percent gravel; slightly effervescent with disseminated lime; moderately alkaline (pH 8.0); abrupt smooth boundary.

C1—5 to 12 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; hard, friable, nonsticky and nonplastic; few very fine roots; common very fine and few fine tubular and interstitial pores; few thin clay films bridging mineral grains; few small fragments of rock; slightly effervescent with disseminated lime; mildly alkaline (pH 8.0); abrupt wavy boundary.

C2rca—12 to 33 inches; weathered granitic rock with strong brown (7.5YR 5/6) coatings on mineral grains; lime in filaments, soft masses, and threads; weathered rock will disperse into individual minerals when soaked in water; abrupt wavy boundary.

C3rcasi—33 to 48 inches; weathered gray (10YR 6/1) granitic rock; lime occurs in seams and cracks that slant into the weathered rock; few pockets of discontinuous silica cemented pan are in the lower part of this horizon; weathered rock will disperse into individual minerals after soaking and shaking in water.

Figure 11.—Profile of Randsburg sandy loam showing a paralithic contact to weathered granitic rock at a depth of about 16 inches. Depth to the paralithic contact ranges from 8 to 20 inches.

Depth to the paralithic contact ranges from 8 to 20 inches (fig. 11). The A horizon ranges from 4 to 11 inches in thickness. It has chroma of 3 or 4. Fine gravel content ranges from 0 to 15 percent. The C horizon has hue of 10YR, value of 6, and chroma of 3 or 4. In some pedons, lime has accumulated in the weathered granitic rock to form a thin or very thin white horizon.

Rescue Variant

The Rescue Variant consists of deep, well drained soils on mountainous uplands. These soils formed in residual material weathered from basalt. Slope ranges from 15 to 50 percent. The mean annual precipitation is about 13 inches, and the mean annual air temperature is about 58 degrees F.

Rescue Variant soils are similar to Cibo soils. They are near Anaverde and Walong soils. Cibo soils have a fine control section and a lithic contact with hard basalt. Anaverde soils have a mollic epipedon more than 20 inches thick and a mesic temperature regime. Walong soils have a coarse-loamy control section.

Typical pedon of Rescue Variant in an area of Rescue Variant loam, 15 to 30 percent slopes 100 feet west of power line, 1.6 mile west and 4,200 feet north of southeast corner sec. 36, T. 9 N., R. 18 W. SBB&M (nonsectionalized).

A1—0 to 16 inches; dark brown (10YR 4/4) loam, dark brown (7.5YR 3/2) moist; massive; very hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; approximately 7 percent rock fragments, many of the fragments are basalt; slightly acid (pH 6.5); gradual wavy boundary.

B1t—16 to 27 inches; dark reddish brown (5YR 3/4) clay loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; very hard, friable, sticky and slightly plastic; common very fine roots; few very fine tubular pores; common thin clay films lining tubular pores; approximately 7 percent rock fragments; slightly acid (pH 6.5); clear wavy boundary.

B21t—27 to 46 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; strong medium and coarse angular blocky structure; very hard, firm, slightly sticky and plastic; few very fine and fine roots along ped faces; common very fine tubular pores; many moderately thick clay films on ped faces and lining tubular pores; approximately 5 percent rock fragments; slightly acid (pH 6.5); clear wavy boundary.

B22t—46 to 68 inches; reddish yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) when moist; strong medium and coarse angular blocky structure; very hard, firm, slightly sticky and plastic; few fine roots; very few very fine tubular pores; slightly acid (pH 6.5); clear wavy boundary.

C—68 to 129 inches; very pale brown (10YR 7/4) loam, yellowish brown (10YR 5/4) moist; massive; friable, slightly sticky and slightly plastic. An auger was used to observe material below 75 inches; colors get paler with depth; material from lower part of C horizon to bedrock is very pale brown (10YR 8/4), yellow (10YR 7/6) moist, gradual smooth boundary.

Cr—129 inches; weathered basalt.

Depth to the paralithic contact ranges from 40 to 129 inches or more. Solum thickness ranges from 42 to 78 inches. Gravel content ranges from 0 to 15 percent. The A horizon ranges from 12 to 18 inches in thickness. It has hue of 10YR, value of 4 or 5, and chroma of 3. Reaction is slightly acid or neutral. The B horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. The C horizon is loam or clay loam.

Rosamond series

The Rosamond series consists of very deep, well drained soils on alluvial plains. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 0 to 2 percent. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 64 degrees F.

Rosamond soils are similar to Cajon and DeStazo soils. They are near Cajon, DeStazo, and Garlock soils. Cajon soils have a sandy profile and are somewhat excessively drained. DeStazo soils are 40 percent or more calcium carbonate. Garlock soils have an argillic horizon.

Typical pedon of Rosamond clay loam in an area of Rosamond clay loam, in the center of sec, 4, T. 9 N., R. 13 W. SBB&M.

A1—0 to 2 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) when moist; moderate fine platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; slightly effervescent; moderately alkaline (pH 8.3); abrupt smooth boundary.

C1—2 to 12 inches; pale brown (10YR 6/3) clay loam, yellowish brown (10YR 5/4) when moist; weak very fine and fine subangular blocky structure; slighty hard, friable, sticky and plastic; few very fine roots; very few very fine tubular pores; strongly effervescent; moderately alkaline (pH 8.3); clear smooth boundary.

C2—12 to 60 inches; pale brown (10YR 6/3) loam, light olive brown (2.5Y 5/4) when moist, mixed with lenses of pale brown (10YR 6/3) fine sandy loam and silt loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; strongly effervescent; moderately alkaline (pH 8.3).

Reaction commonly ranges from mildly alkaline to moderately alkaline; it may range to strongly alkaline in the saline-alkali phase. The A horizon consists of one or more stratified layers. It ranges from 2 to 12 inches in thickness. It has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. The C horizon has similar colors as the A horizon. It is also stratified, and textures range from fine sandy loam to clay loam. Gravel content ranges from 0 to 5 percent, and the pebbles are commonly coated with lime.

Rosamond Variant

The Rosamond Variant consists of very deep, well drained soils on alluvial fans. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 5 to 15 percent. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 59 degrees F.

Rosamond Variant soils are similar to Arvin and DiGiorgio soils. They are near Arvin, Chanac, and Pleito soils. Arvin soils have coarse loamy control sections. DiGiorgio soils have aridic moisture regimes bordering on xeric. Chanac soils are on terraces and have a B2ca horizon. Pleito soils have a thick mollic epipedon.

Typical pedon of Rosamond Variant in an area of Rosamond Variant sandy loam, 5 to 15 percent slopes, in SE1/4 NE1/4 NW1/4 sec. 14, T. 11 N., R. 18 W. SBB&M.

A11—0 to 1 inch; mixed grayish brown and brown (10YR 5/2, 5/3) sandy loam, mixed very dark grayish brown and dark brown (10YR 3/2, 3/3) moist; weak very fine granular structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine and fine tubular and interstitial pores; 2 to 5 percent fine gravel, scattered on surface; slightly acid (pH 6.5); abrupt smooth boundary.

A12—1 to 4 inches; light yellowish brown (10YR 6/4) coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; few very fine tubular and interstitial pores; neutral (pH 7.0); abrupt smooth boundary.

A13—4 to 7 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine and fine tubular and interstitial pores; slightly effervescent, moderately alkaline (pH 8.2); clear smooth boundary.

C1—7 to 30 inches; light brownish gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very interstitial and coarse tubular pores; slightly effervescent, moderately alkaline (pH 8.2); clear wavy boundary.

C2ca—30 to 60 inches; yellowish brown (10YR 6/4) sandy clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and slightly plastic; few very fine interstitial pores; strongly effervescent with segregated lime in filaments; moderately alkaline (pH 8.2).

Organic carbon decreases irregularly with depth, or it remains greater than 0.2 percent at a depth of 49 inches. The A horizon ranges from 5 to 18 inches in thickness. It has color stratification with value of 5 or 6 and chroma of 2 to 4. Clay content ranges from 10 to 18 percent. It ranges from slightly acid to moderately alkaline. Gravel content ranges from 0 to 10 percent. The C horizon has hue of 10YR and 2.5Y, value of 6, and chroma of 2 or 3. Clay content ranges from 20 to 27 percent. Reaction is mildly or moderately alkaline; segregated lime occurs as filaments or seams. Gravel content ranges from 0 to 10 percent.

Steuber series

The Steuber series consists of very deep, well drained soils on alluvial fans and stream flood plains. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 0 to 9 percent. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 61 degrees F.

Steuber soils are similar to Arvin, Edmundston, Rosamond Variant, and Walong soils. They are near Havala, Tehachapi, Tujunga, and Walong soils. Arvin soils are in the San Joaquin Valley and have a higher mean annual soil temperature. Edmundston and Walong soils are on mountainous uplands. Rosamond Variant has a stratified fine-loamy control section. Havala and Tehachapi soils have a B horizon of clay loam and sandy clay loam, Tujunga soils have a sandy profile.

Typical pedon of Steuber sandy loam in an area of Steuber sandy loam, 0 to 2 percent slopes, center of the NW1/4NE1/4 of sec. 36, T. 32 S., R. 31 E. MDB&M.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; few very fine and fine tubular pores; neutral (pH 7.0); abrupt smooth boundary.

A12—6 to 12 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine and fine tubular pores; neutral (pH 7.0); abrupt smooth boundary.

C1—12 to 42 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; neutral (pH 7.0); clear smooth boundary.

C2—42 to 60 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine tubular pores; moderately alkaline (pH 8.0)

Organic carbon content is less than 1 percent throughout and decreases irregularly with depth. Base

saturation is 75 percent or more. Gravel content ranges from 0 to 25 percent. Some pedons may be as much as 20 percent cobbles or stones on the surface or throughout the profile. Reaction is neutral to moderately alkaline. The A horizon ranges from 4 to 15 inches in thickness. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The C horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is sandy loam or gravelly sandy loam.

Sween Variant

The Sween Variant consists of moderately deep, well drained soils on mountainous uplands. These soils formed from residual material weathered from basalt of andesitic rocks. Slope ranges from 5 to 30 percent. The mean annual precipitation ranges from 13 to 15 inches, and the mean annual air temperature is about 55 degrees F.

Sween Variant soils are similar to Arujo, Tweedy, and Tehachapi soils. They are near Anaverde, Tweedy, and Walong soils. Arujo soils have a fine-loamy control section and a mollic epipedon more than 20 inches thick. Tweedy and Tehachapi soils have a fine-loamy control section. Anaverde soils are very deep and have a fine-loamy control section. Walong soils have a coarse-loamy control section.

Typical pedon of Sween Variant in an area of Sween Variant-Rock outcrop complex, 5 to 30 percent slopes, in SW1/4SE1/4NE1/4 sec. 29, T. 31 S., R. 35 E. MDB&M.

A11—0 to 6 inches; brown (7.5YR 4/2) stony sandy clay loam, dark brown (7.5YR 3/2) when moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few fine and medium tubular pores; approximately 15 percent stones; neutral (pH 7.0); clear wavy boundary.

A12—6 to 12 inches; brown (7.5YR 5/2) stony sandy clay loam, dark brown (7.5YR 3/2) when moist; week medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few medium tubular pores; aproximately 15 percent stones and cobbles; neutral (pH 7.0); clear wavy boundary.

B2t—12 to 38 inches; light reddish brown (5YR 6/3) stony clay, dark reddish brown (5YR 3/3) when moist; strong coarse angular blocky structure; hard, firm, sticky and very plastic; few fine roots; approximately 20 percent stones; slightly acid (pH 6.5).

R—38 inches; hard basalt.

Depth to the lithic contact and solum thickness ranges from 24 to 40 inches. Content of stones in the profile ranges from 15 to 35 percent, and the gravel content ranges from 0 to 10 percent. The A horizon ranges 10 to 24 inches in thickness. It has hue of 7.5YR and 5YR, value of 4 or 5, and chroma of 2. Clay content ranges from 25 to 35 percent. The B horizon has hue of 5YR, value of 5 or 6, and chroma of 3. The clay content ranges from 40 to 45 percent.

Tehachapi series

The Tehachapi series consists of very deep, well drained soils on old alluvial fans and terraces. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 2 to 30 percent. The mean annual precipitation ranges from 9 to 15 inches, and the mean annual air temperature is about 61 degrees F.

Tehachapi soils are similar to Arujo, Garlock, Havala, Neuralia, and Tweedy soils. They are near Arvin, Chanac, Havala, Pleito, and Walong soils. Arujo and Tweedy soils are on mountainous uplands. Garlock and Neuralia soils are in the Mojave Desert with aridic moisture regimes. Havala soils have a thicker A horizon. Arvin and Walong soils have coarse-loamy control sections. Chanac and Pleito soils have secondary lime in the profile, and they are on terraces near the San Joaquin Valley.

Typical pedon of Tehachapi sandy loam in an area of Tehachapi sandy loam, 2 to 15 percent slopes, in NW1/4NE1/4SW1/4 sec. 24, T. 32 S., R. 32 E. MDB&M.

A11—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; strong medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common fine tubular pores; neutral (pH 7.0); clear smooth boundary.

A12—2 to 11 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common fine tubular pores; neutral (pH 7.0); clear smooth boundary.

B1t—11 to 19 inches; dark grayish brown (10YR 4/2), with equal amounts of dark reddish gray (5YR 4/2) sandy clay loam, dark grayish brown (10YR 3/2) and dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and plastic; few medium roots; few fine and medium tubular pores; many moderate thick clay films on faces of peds and as bridges between mineral grains; neutral (pH 7.0); gradual smooth boundary.

B2t—19 to 32 inches; yellowish red (5YR 4/6) clay loam, reddish brown (5YR 4/3) moist; strong coarse angular blocky structure; very hard, firm, slightly sticky and plastic; few medium and coarse roots; few fine and medium tubular pores; common thick clay films on faces of peds and as bridges between

mineral grains; slightly acid (pH 6.5); abrupt wavy boundary.

B31t—32 to 38 inches; yellowish red (5YR 5/6) sandy clay loam, reddish brown (5YR 4/4) moist; massive; very hard, friable, slightly sticky and slightly plastic; some pieces exhibit thick clay films when broken; approximately 15 percent by volume mixed gravel, .1 to 1 inch; neutral (pH 7.0); clear wavy boundary.

B32t—38 to 44 inches; brown (7.5YR 4/4) sandy clay loam, reddish brown (5YR 4/4) moist; massive; very hard, very firm, sticky and plastic; few very fine roots; many moderately thick clay films coating mineral grains and as colloidal stains; approximately 10 percent by volume mixed gravel, .1 to 1.0 inch; moderately alkaline (pH 7.8); clear smooth boundary.

Cca—44 to 60 inches; reddish yellow (5YR 6/6) sandy loam, reddish brown (5YR 4/4) moist; massive; very hard, few thin lime silica cemented lamellae; some lamellae have thin clay films bridging mineral grains; moderately alkaline (pH 8.0).

Solum thickness ranges from 38 to 89 inches. Content of rock fragments ranges from 0 to 35 percent. In some places, 20 to 50 percent of the fragments below 40 inches are cobbles and stones. Clay content ranges from 18 to 35 percent. Reaction ranges from slightly acid to moderately alkaline. The A horizon ranges from 11 to 20 inches in thickness. It has hue of 10YR, 7.5YR, or 5YR; value of 3 to 5; and chroma of 1 to 4. The B horizon has hue of 7.5YR or 5YR; value of 4 to 6; and chroma or 2, 4, or 6. It is sandy clay loam, clay loam, gravelly sandy clay loam, or cobbly sandy clay loam. The C horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 to 7; and chroma of 2, 4, or 6. It is stratified with texture ranging from loamy sand to sandy clay loam and their gravelly or cobbly equivalents. In some pedons, weakly cemented thin lamellae of lime-silica material occurs below 40 inches.

Tehachapi Variant

The Tehachapi Variant consists of very deep, well drained soils on alluvial fans and old stream terraces. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 15 to 50 percent. The mean annual precipitation ranges from 10 to 15 inches, and the mean annual air temperature is about 59 degrees F.

Tehachapi Variant soils are similar to Arujo, Havala, Tweedy, and Wasioja soils. They are near Arujo, Steuber, Tehachapi, and Walong soils. Arujo and Tweedy soils are on mountainous uplands. Havala soils have a clay loam B horizon. Wasioja soils have a calcareous B horizon. Steuber soils are stratified and have a coarse-loamy control section. Tehachapi soils have a thinner mollic epipedon.

Typical pedon of Tehachapi Variant in an area of Tehachapi Variant sandy clay loam, 15 to 50 percent slopes, in NW1/4SE1/4NW1/4 sec. 17, T. 32 S., R. 33 E. MDB&M.

A1—0 to 17 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine and fine tubular pores and few medium tubular pores; moderately alkaline (pH 8.0); clear smooth boundary.

B1t—17 to 31 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common fine and few medium tubular pores; common thin clay films bridging mineral grains and on faces of peds; mildly alkaline (pH 7.5); clear smooth boundary.

B21t—31 to 42 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and very plastic; few fine roots; few fine tubular pores; many moderately thick clay films bridging mineral grains and on faces of peds; neutral (pH 7.0); clear smooth boundary.

B22t—42 to 60 inches; brown (10YR 4/3) sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium and coarse subangular blocky structure; few very fine tubular pores; common thick clay films bridging mineral grains and on faces of peds; mildly alkaline (pH 7.5); clear smooth boundary.

Solum thickness ranges from 23 to 67 inches. The mollic epipedon is more than 20 inches thick. Depth to carbonates ranges from 23 to 60 inches. Reaction is neutral to moderately alkaline. Content of coarse fragments ranges from 0 to 15 percent. The A horizon ranges from 10 to 20 inches in thickness. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The clay content ranges from 20 to 25 percent. The B horizon has colors similar to the A horizon, but the clay content of the B horizon ranges from 25 to 35 percent.

Tollhouse series

The Tollhouse series consists of shallow, somewhat excessively drained soils on mountains. These soils formed in residual material weathered mainly from granitic rock. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 55 degrees F.

Tollhouse soils are similar to Friant, Godde, Tunis, and Walong soils. They are near Edmundston, Friant, Godde, Tweedy, and Walong soils. Friant and Godde soils have lithic contacts. Tunis and Walong soils are warmer.

Edmundston soils are deep and well drained. Tweedy soils are moderately deep and well drained.

Typical pedon of Tollhouse gravelly sandy loam in an area of Edmundston-Godde-Tollhouse complex, 50 to 75 percent slopes, in SE1/4SE1/4NW1/4 sec. 29, T. 11 N., R. 15 W. SBB&M.

A1—0 to 5 inches; grayish brown (2.5Y 5/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; few fine and medium tubular and interstitial pores; approximately 15 percent fine gravel; neutral (pH 6.7); clear wavy boundary.

A12—5 to 13 inches; grayish brown (2.5Y 5/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and medium roots; few very fine tubular and interstitial pores; approximately 25 percent fine gravel; neutral (pH 6.7); clear wavy boundary.

Cr—13 inches; highly weathered granite.

Depth to the weathered granitic rock ranges from 5 to 20 inches. The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 and chroma of 1 to 3. Gravel content ranges from 15 to 20 percent. In many pedons there is a C horizon above the weathered granite.

Tujunga series

The Tujunga series consists of very deep, somewhat excessively drained soils on alluvial fans and flood plains. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 2 to 5 percent. The mean annual precipitation ranges from 10 to 14 inches, and the mean annual air temperature is about 58 degrees F.

Tujunga soils are similar to Cajon, Cinco, Jawbone, and Whitewolf soils. They are near Steuber soils. Cajon soils are in the desert and have an aridic moisture regime. Cinco and Jawbone are excessively drained soils on mountainous uplands. Whitewolf soils have a xeric moisture regime bordering on aridic.

Typical pedon of Tujunga loamy sand in an area of Tujunga loamy sand, 2 to 5 percent slopes, in NE1/4SE1/4SE1/4 sec. 34, T. 32 S., R. 33 E. MDB&M.

A1—0 to 40 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; few fine roots; neutral (pH 7.0); gradual wavy boundary.

C1—40 to 60 inches; light yellowish brown (10YR 6/4) loamy sand, brown (10YR 4/4) moist; soft massive; friable, nonsticky and nonplastic; neutral (pH 7.0).

Reaction is neutral or mildly alkaline. There is little or no stratification. The A horizon ranges from 20 to 45 inches in thickness. Some pedons do not have an A horizon.

Tunis series

The Tunis series consists of shallow, somewhat excessively drained soils on mountainous uplands. These soils formed in residual material weathered mainly from granite or gneiss. Slope ranges from 5 to 75 percent. The mean annual precipitation ranges from 12 to 15 inches, and the mean annual air temperature is about 60 degrees F.

Tunis soils are similar to Anaverde, Friant, Godde, Tollhouse, and Walong soils. They are near Anaverde, Friant, and Walong soils. Anaverde, Godde, and Tollhouse soils have a mesic soil temperature regime. Friant soils are well drained and have a lithic contact. Walong soils have a coarse-loamy control section and depth to weathered bedrock is more than 20 inches.

Typical pedon of Tunis loam in an area of Tunis-Walong complex, 50 to 75 percent slopes, 2,000 feet south and 300 feet west of southwest corner sec. 15, T. 10 N., R. 17 W. SBB&M.

A1—0 to 2 inches; brown (10YR 5/3) loam, dark brown (7.5YR 3/3) moist; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; common very fine vesicular and interstitial pores; slightly acid (pH 6.3); abrupt smooth boundary.

B2—2 to 18 inches; brown (10YR 5/3) loam, dark brown (7.5YR 3/3) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine vesicular and interstitial pores; neutral (pH 7.0); abrupt wavy boundary.

Cr—18 inches; weathered metamorphosed igneous rock which slakes in water and calgon after 15 hours of continuous shaking. The weathered rock is almost continuous; there are few seams of cracks. Roots do not extend into this layer.

Depth to the paralithic contact ranges from 10 to 20 inches. Content of coarse fragments ranges from 0 to 15 percent. Reaction is slightly acid to mildly alkaline throughout. The A horizon ranges from 1 to 3 inches in thickness. It has hue of 10YR and 7.5YR, value of 3 to 5, and chroma of 1 to 3. Clay content ranges from 18 to 25 percent. The B horizon has hue of 10YR and 7.5YR, value of 3 to 5, and chroma of 1 to 3. It is loam or sandy loam, but the clay content is 18 percent or less.

Tweedy series

The Tweedy series consists of moderately deep, well drained soils on mountainous uplands. These soils formed in residual material weathered mainly from mica schist. Slope ranges from 30 to 75 percent. The mean

annual precipitation ranges from 10 to 15 inches, and the mean annual air temperature is about 55 degrees F.

Tweedy soils are similar to Arujo, Havala, and Tehachapi soils. They are near Anaverde, Arujo, Godde, Tollhouse, and Walong soils. Arujo and Anaverde soils have a mollic epipedon more than 20 inches thick. Havala soils are deep and formed in material weathered mainly from granitic rock. Tehachapi soils are very deep and have a thermic soil temperature regime. Godde and Tollhouse soils have a lithic or paralithic contact within 20 inches of the surface.

Typical pedon of Tweedy sandy loam in an area of Tweedy-Anaverde complex, 30 to 50 percent slopes, 1/4 mile south of northwest corner sec. 3, T. 32 S., R. 33 E. MDB&M.

A11—0 to 3 inches; brown (7.5YR 4/2) sandy loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; few fine tubular pores; 5 percent fine gravel; moderately alkaline (pH 8.0), abrupt smooth boundary.

A12—3 to 6 inches; brown (7.5YR 4/2) sandy loam, dark brown (7.5YR 3/2) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine tubular pores; 5 percent fine gravel moderately alkaline (pH 8.0); clear smooth boundary.

A3—6 to 10 inches; brown (7.5YR 4/2) sandy loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine and medium tubular pores and common very fine interstitial pores; few thin clay films lining pores; mildly alkaline (pH 7.5); clear smooth boundary.

B21t—10 to 22 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few fine tubular pores; common moderately thick clay films on faces of peds and lining pores; moderately alkaline (pH 7.8); clear smooth boundary.

B22t—22 to 30 inches; reddish brown (5YR 5.4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few fine tubular pores; common thick clay films on faces of peds and lining pores; 10 percent cobbles; moderately alkaline (pH 7.8); clear smooth boundary.

B3t—30 to 38 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; few very fine roots; few fine tubular pores; common thick clay films on faces of peds and lining pores; 10 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

Cr—38 to 52 inches; reddish yellow (7.5YR 7/6) weathered mica schist crushing to clay loam, strong brown (7.5YR 5/6) moist; medium acid (pH 6.0).

Depth to the weathered mica schist is 20 to 40 inches. Coarse fragment content ranges from 0 to 15 percent. Base saturation is 75 percent or more throughout. The A horizon ranges from 7 to 12 inches in thickness. It has hue of 10YR, 7.5YR, and 5YR; value of 4 or 5; and chroma of 2 to 4. Clay content is 12 to 25 percent. Mica content is 5 to 10 percent. Reaction is neutral to moderately alkaline. The B horizon has hue of 7.5YR and 5YR, value of 4 to 6, and chroma of 3 to 6. It is sandy clay loam or clay loam. The clay content ranges from 20 to 35 percent. Mica content is 5 to 15 percent. Reaction is slightly acid to mildly alkaline. Most pedons have a B3 horizon; others have a C1 horizon.

Walong series

The Walong series consists of moderately deep, well drained soils on mountainous uplands. These soils formed in residual material weathered mainly from granitic rocks. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 10 to 18 inches, and the mean annual air temperature is about 57 degrees F.

Walong soils are similar to Anaverde, Edmundston, and Steuber soils. They are near Anaverde, Arujo, Edmundston, Rescue Variant, Steuber, and Tunis soils. Anaverde and Edmundston soils have mesic soil temperature regimes. Steuber soils are very deep, and they are on flood plains and stream terraces. Arujo soils are deep and have a fine-loamy control section. Rescue Variant soils are very deep and formed in material weathered from basalt. Tunis soils are shallow and excessively drained.

Typical pedon of Walong sandy loam in an area of Walong-Edmundston association, steep, in NE1/4NE1/4SE1/4 sec. 11, T. 32 S., R. 32 E. MDB&M.

A11—0 to 2 1/2 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common fine tubular pores; approximately 15 percent fine gravel; mildly alkaline (pH 7.5); gradual smooth boundary.

A12—2 1/2 to 14 inches; brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many medium tubular pores; approximately 15 percent rock fragments; neutral (pH 7.0); gradual smooth boundary.

B2—14 to 27 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky

and slightly plastic; many very fine roots; many medium tubular pores; approximately 15 percent rock fragments; neutral (pH 7.0); clear wavy boundary.

Cr—27 inches; yellowish brown (10YR 5/4) strongly weathered granitic rock, with some weathered minerals still in the position of initial crystalization. This weathered rock will slake when soaked in water and calgon.

Depth to the weathered granitic rock ranges from 20 to 40 inches. Content of rock fragments ranges from 0 to 25 percent. The A horizon ranges from 10 to 28 inches in thickness. It has hue of 10YR and 7.5YR, value of 4 or 5, and chroma of 2 or 3. The B horizon has hue of 10YR and 7.5YR, value of 4 to 6, and chroma of 2 to 4. It is gravelly sandy loam, sandy loam, or coarse sandy loam. Reaction is neutral or mildly alkaline. Some pedons have a C horizon above the paralithic contact.

Wasioja series

The Wasioja series consists of deep, well drained soils on stream terraces. These soils formed in alluvial material derived mainly from mixed sources. Slope ranges from 2 to 9 percent. The mean annual precipitation ranges from 8 to 10 inches, and the mean annual air temperature is about 63 degrees F.

Wasioja soils are similar to Chanac and Tehachapi soils. They are near Arvin, Hesperia, and Rosamond Variant soils. Chanac soils have a dark A horizon and do not have an argillic horizon. Tehachapi soils have a mollic epipedon and a sandy clay loam B horizon. Arvin and Hesperia soils are on alluvial fans or flood plains and have a coarse-loamy control section. Rosamond Variant soils are stratified.

Typical Pedon of Wasioja sandy loam in an area of Wasioja sandy loam, 2 to 9 percent slopes, 4,700 feet west and 400 feet north of southwest corner sec. 31, T. 32 S., R. 18 W. SBB&M.

A11—0 to 17 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial and vesicular pores; mildly alkaline (pH 7.5); gradual wavy boundary.

A12—17 to 34 inches; light brownish gray (10YR 6/2) sandy loam; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; common very fine interstitial and vesicular pores; strongly effervescent with disseminated lime; moderately alkaline (pH 8.0); abrupt irregular boundary.

B2tca—34 to 49 inches; mixed brownish yellow and yellowish brown (10YR 6/6, 5/6) loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine and very fine interstitial and vesicular pores; common thin clay films bridging mineral grains; strongly effervescent with lime in seams and filaments; moderately alkaline (pH 8.2); abrupt irregular boundary.

C—49 to 62 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine interstitial and vesicular pores; approximately 15 percent coarse fragments; violently effervescent with disseminated lime; moderately alkaline (pH 8.2).

Solum thickness ranges from 20 to 60 inches. It is mildly or moderately alkaline throughout. Content of coarse fragments ranges from 0 to 15 percent. The A horizon ranges from 16 to 36 inches in thickness. It has hue of 10YR, value of 6, and chroma of 2 to 4. The B horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It is loam, sandy clay loam, or clay loam with clay content ranging from 18 to 30 percent. Lime is segregated as filaments, threads, or soft masses. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is loam or sandy loam, and the clay content is 18 percent or more.

Whitewolf series

The Whitewolf series consists of very deep, somewhat excessively drained soils on flood plains and alluvial fans. These soils formed in alluvial material derived mainly from granitic rock. Slope ranges from 0 to 5 percent. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F.

Whitewolf soils are similar to Arvin, Hesperia, and Tujunga soils. They are near DiGiorgio, Hesperia, and Pajuela soils. Arvin and Hesperia soils have a coarse-loamy control section. Tujunga soils are moist for longer periods of time and have a lighter colored surface horizon. DiGiorgio soils have an aridic moisture regime bordering on xeric. Pajuela soils have a rock fragment content that ranges from 35 to 85 percent.

Typical pedon of Whitewolf loamy sand in an area of Whitewolf loamy sand, 2 to 5 percent slopes, in NE1/4NE1/4NW1/4 sec. 10, T. 31 S., R. 30 E. MDB&M.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; many very fine roots; many very fine interstitial pores; slightly acid (pH 6.5); clear smooth boundary.

A12—8 to 32 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable; many very fine roots; many very fine interstitial pores; slightly acid (pH 6.5); clear smooth boundary.

C—32 to 70 inches; pale brown (10YR 6/3) loamy coarse sand, dark yellowish brown (10YR 4/4)

moist; massive; slightly hard, very friable; few very fine interstitial pores; neutral (pH 7.0).

Reaction is slightly acid to moderately alkaline. Content of coarse fragments ranges from 0 to 15 percent. The A horizon ranges from 3 to 40 inches in thickness. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is loamy sand, sand, or loamy coarse sand. Some pedons have disseminated lime below a depth of 40 inches.

formation of the soils

Kan Kim Chang, area soil scientist, Soil Conservation Service, helped prepare this section

Soils are formed through the interaction of five major factors: (1) the physical and chemical composition of the *parent material;* (2) the *climate;* (3) the *biological forces* that act upon the soil material; (4) the *relief,* or lay of the land; and (5) the length of *time* the forces of formation have acted on the soil material. Each soil-forming factor includes many variables, and the effect of each factor varies from place to place. Thus, for example, Havala and Steuber soils have the same parent material but their profiles are strikingly different because of differences in relief and time.

parent material

Parent material is the weathered rock or the great variety of unconsolidated organic and mineral material in which soil forms. In the southeastern part of Kern County the soils formed in residual or alluvial material (*7, 8*). The geologic map at the back of this survey shows where the various kinds of underlying rock or alluvium occurs and indicates the kind of rock from which the parent material in each area weathered.

Most of the soils in the Tehachapi and Sierra Nevada Mountains, and on low pediments in the eastern part of the Mojave Desert, formed in residual material. These soils formed in place through weathering of the underlying rocks. Soils that formed in alluvial material are in the San Joaquin Valley, Tehachapi Valley, and the Mojave Desert.

The dominant parent material in the eastern edge of the San Joaquin Valley is unconsolidated granitic alluvium. Coarse soils such as Arvin, Hesperia, and Whitewolf soils formed in recent granitic alluvium. The Chanac and Pleito soils, which formed on terraces in granitic alluvium, have been in place longer and have finer textures.

In the Tehachapi Mountains and a very small part of the Sierra Nevada the parent material weathered from hard, acid igneous rock such as granite, quartz monzonite, and quartz diorite and metasedimentary rocks, mainly schist. Soils formed from these rocks are Anaverde, Edmundston, Godde, Tollhouse, Tweedy, and Walong soils. These soils range in depth from shallow to very deep and have mainly sandy loam and gravelly sandy loam textures.

In the Tehachapi Valley the parent material is mainly unconsolidated granitic alluvium. The Havala, Steuber, and Tehachapi soils formed in this valley. These soils have moderately coarse and moderately fine textures.

In the Mojave Desert the main parent materials are unconsolidated alluvial and residual material weathered from granitic and volcanic rocks. Most of the soils formed in unconsolidated recent and old granitic alluvium. The soils of the recent alluvium are the Arizo, Cajon, DeStazo, and Rosamond soils, which are coarse to medium textured. The Alko, Garlock, Norob, and Neuralia soils formed on terraces in old granitic alluvium. Soils formed in residium on the desert, such as Murock and Randsburg soils, are weathered from hard, acid igneous rock.

climate

Climate has a strong influence on soil formation. The amount of heat and moisture influences the kind and amount of vegetation, the rate of organic matter decomposition and other biological activities, the rate that minerals weather, and the removal or accumulation of material in different soil horizons.

The climate in the survey area varies from aridic to subhumid, mesothermal. In the Mojave Desert summers are hot and dry and winters are mild and somewhat moist. In the Tehachapi Valley, in the mountains, and on the alluvial fans edging the San Joaquin Valley summers are warm and dry and winters are cool and moist.

Sharp differences in snowfall, rainfall, and temperatures are caused, in part, by the great topographic change from the San Joaquin Valley across the mountains to the desert. Mean annual precipitation ranges from more than 30 inches in the Tehachapi Mountains to 3 inches in the Mojave Desert. Mean annual air temperature ranges from 40 degrees F in the mountains to about 80 degrees F in the desert.

The effects of higher precipitation and lower temperatures in the Sierra Nevada and Tehachapi Mountains are evident in the vegetation and the soils. Woody and herbaceous vegetation is more abundant, and the soils contain more organic matter. Edmundston and Walong soils occur in this area.

biological forces

Plants, burrowing animals, insects, and micro-organisms such as bacteria and fungi are important in the formation of soils. They are involved in the formation and destruction of organic matter, the consumption and release of plant nutrients, and changes in soil structure.

Much of the survey area has very low rainfall and sparse vegetation. The vegetation in the Mojave Desert consists of drought-tolerant desert shrubs such as creosotebush and a thin cover of annual grasses and forbs. The soils in these areas typically have a low organic matter content and a light-colored surface layer. Cajon, DeStazo, and Nueralia soils are good examples.

The soils on the southeastern edge of the San Joaquin Valley receive slightly more rainfall than soils in the desert. Because of this, there is more biological activity in the soils. Chanac, Pleito, Arvin, and DiGiorgio soils are representative of the soils in this area.

The higher areas in the Tehachapi Mountains, the Sierra Nevada, and the mountain valleys receive the most rainfall and support the most vegetation in the survey area. Chaparral, oaks, conifers, and understories of grasses and forbs are the dominant types of vegetation at the highest elevations. Dark, mollic surface layers are common, as in the Havala, Tehachapi, Arujo, and Walong soils.

Rodents, earthworms, and micro-organisms mix organic matter into the soil and help break down plant and animal residues. Their action improves the soil's permeability to water and air. Bacteria, fungi, algae, actinomycetes, and other micro-organisms help weather the rocks and mineral portions of the soil and decompose the organic matter to produce humus.

In the Tehachapi Valley and along the edge of the San Joaquin Valley, civilization is changing the character of the soils through land leveling, cultivation and irrigation, and the grazing of livestock. The soil texture is often changed by mixing of soil horizons, and duripans are destroyed by ripping. Irrigation changes the base and carbonate content and the amount of organic matter in the soil. The micro-organism population is affected by fertilizers and irrigation water. Overgrazing exposes the soil to erosion and decreases the amount of organic matter.

relief

The relief in this survey area can be divided into 3 prominent areas, each having one or more physiographic units.

The first area is the San Joaquin Valley, with terraces, plains, and fans of the western drainage of the Tehachapi Mountains (Tejon Creek, Chanac Creek, Comanche Creek). Relief, through its effects on drainage and erosion from the mountains, had an important effect on the formation of the Hesperia soils on the alluvial fans, the Whitewolf soils on the flood plains, and the Arvin soils on the stream terraces.

The second area is made up of two physiographic units: (1) the high mountains and (2) the terraces, plains, and fans in the Tehachapi Valley.

The steep and very steep slopes and the more pronounced northern and southern aspects in the high mountainous areas have influenced the thickness of and the amount of organic matter in the surface layer. Also, because of the steep slopes, the soils are well to somewhat excessively drained. Edmundston and Walong soils are examples of soils formed in this area.

Runoff and erosion from the mountains formed the dissected terraces, alluvial fans, and stream terraces in the Tehachapi Valley. Examples of soils on these land forms are Tehachapi soils on terraces, Havala soils on alluvial fans, and Steuber soils on stream flood plains.

The third area is in the Mojave Desert. It has four main physiographic units: (1) the plains and fans of the eastern drainage of the Sierra Nevada and Tehachapi Mountains, (2) low pediments, (3) terrace deposits, and (4) the basin areas.

The runoff and erosion from the steep eastern slopes of the Sierra Nevada and Tehachapi Mountains formed high alluvial fans and plains. Because of the excessive runoff from mountainous areas with granitic origin, the soil material is coarse and contains gravel-sized particles. The Arizon and Cajon soils are representative of the soils in these areas.

The erosion, drainage, and gently to strongly sloping relief of these low granitic pediments contributes to the formation of shallow, moderately coarse soils. In some places the more pronounced leaching and weathering of the residual material possibly formed the silica-lime cemented hardpans in soils such as the Randsburg and Muroc soils.

The nearly level to moderately sloping Garlock and Neuralia soils are on terraces. These soils are mainly in concave areas where water accumulates and percolates downward through the profile. Because of extra leaching and translocation of clay minerals as a result of the water movement, the B2t horizon is well developed.

In basin areas the soils are nearly level. If adequate outlets are not available, rainfall accumulates and stands on the surface. DeStazo and Norob soils are in these areas. The DeStazo soils have extremely hard lime nodules in the Cca horizon. The Norob soils have a high alkali content and a pronounced B2t horizon.

This survey area has a very complex and interesting geologic history. The Garlock Fault, which divides the area in half, begins at the southwest corner and follows a northeasterly direction. There are many other small fault lines in the mountains and in the Mojave Desert.

time

The length of time that the soil's parent material has been in place and exposed to the active soil-forming processes strongly influences the nature of the soil. In general, the degree of development or differentiation between soil horizons is related to the age of the soil. Thus, most soils with little or no development are young and most soils with strongly expressed horizons are old. The soils in the survey area range from young soils on recent alluvial fans to older soils on high terraces and mountainous uplands.

The older soils may have properties that are unfavorable to crops. Leaching of bases, increases in acidity, and the accumulation of clay to form a B2t horizon are more pronounced in older soils. The B2t horizon may restrict root growth and water permeability. In addition, less phosphorous may be available and cementation of the subsoil into a hardpan is more likely.

Soils in the same locality that have different degrees of profile development are often of different ages. For instance, the Garlock soils have a well developed B horizon and are older than the nearby Cajon soils, which have no B horizon. A duripan in the Muroc and Alko soils indicates that these soils have been in place a long time.

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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.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Andesite. Extrusive masses of igneous rock consisting mainly of plagioclase, pyroxene, and hornblende.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2 5
Low	2 5 to 5
Moderate	5 to 7 5
High	7 5 to 10
Very high	More than 10

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basalt. Dense igneous rock of a lava flow.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breccia (geology). A coarse, *clastic* rock composed of angular rock fragments larger than 2 mm and commonly cemented together in a fine-grained matrix of varying composition and origin. The consolidated equivalent of rubble.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Cement rock. Shaly limestone used in the manufacture of cement.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. Mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. Consolidated rock consisting of rock or pebbles cemented together.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dacite (geology). Extrusive masses of igneous rock consisting mainly of phagioclase, pyroxene, hornblende, and quartz.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock. Bedrock is too near the surface for the specified use.

Dikes (geology). A laminar intrusion of metamorphic or volcanic rocks.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for

significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically 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.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Equigranular (geology). Grains or crystals of approximately the same size.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion hazard. The severity of erosion that can be caused by water when the soil is bare.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other 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 soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

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.

Gneiss. A foliated rock formed by regional metamorphism. It commonly is rich in feldspar and quartz.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. Hydrous calcium sulphate.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by row sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the ridgetops are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration 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.

Interbedded (geology). Between rock layers.

Intrusive (geology). Rock forced between pre-existing rocks.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Drip. —Water is applied directly to the root zone of plants through orifices, emitters, porous tubing, perforated pipe, or other applicators at low pressure. The applicators may be paced on or below the soil surface.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lamallae. Very thin layers of soil deposited by intermittent water flow.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lithic contact. A boundary between soil and coherent underlying material. The material under a lithic contact is harder than the material under a paralithic contact. Hand digging with a spade is impractical, but it can be chipped or scraped with a spade.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil and support little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Monzonite. A light-colored rock mainly of plagioclase and alkali feldspar.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Olivine (geology). A common mineral, magnesium iron silicate, that occurs as olive-green to gray-green masses in basic igneous rock.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Paralithic contact. A boundary between soil and continuous coherent underlying material. The underlying material is normally a partly consolidated sedimentary rock such as sandstone, siltstone, marl, or shale. Its bulk density or consolidation is such that roots cannot enter. The material under a paralithic contact is not as hard as the material under a lithic contact.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pediment. A broad, flat or gently sloping, rock-floored erosion surface or plain of row relief. Pediments are typically developed by subaerial agents in an arid or semiarid region at the base of an abrupt and receding mountain front or plateau escarpment.

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.

Perched water. Water from a local zone of saturation held above the main body of ground water by an impermeable layer, usually clay, and separated from the main body of ground water by an unsaturated zone.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, differences in slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Plugs (geology). A sharp irregular intrusion of metamorphic or volcanic rock.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rhyolite. A fine-grained igneous rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; contains harmful salts and is strongly alkaline; or contains harmful salts and exchangeable sodium and is very strongly alkaline. The salts, exchangeable sodium, and alkaline reaction are in the soil in such location that the growth of most crop plants is less than normal.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil science, saprolite is any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

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 (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Soil layers that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and

granular. Structureless soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, 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 (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unconsolidated (geology). A sediment that is loosely arranged or unstratified, or whose particles are not cemented together.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--AIR TEMPERATURE, GROWING DEGREE DAYS, AND PRECIPITATION AT TEHACHAPI, CALIFORNIA

Month	Air temperature			Growing degree days (Base 40° F)	Precipitation
	Maximum	Minimum	Mean		
	°F	°F	°F		In
January	50.5	28.4	39.5	0	1.75
February	53.0	30.8	41.9	0	1.94
March	56.2	32.5	44.4	0	1.49
April	63.9	37.3	50.6	0	0.96
May	70.4	42.4	56.4	508	0.50
June	79.7	50.2	65.0	750	0.11
July	88.6	56.2	72.4	1,004	0.05
August	86.9	53.2	70.1	932	0.16
September	81.7	46.5	64.1	722	0.27
October	70.7	39.5	55.1	234	0.50
November	60.7	33.4	47.1	0	1.00
December	52.6	30.2	41.4	0	1.60
Total	---	---	---	4,150	10.30

TABLE 2.--AIR TEMPERATURE, GROWING DEGREE DAYS, AND PRECIPITATION AT CANTIL, CALIFORNIA

Month	Air temperature			Growing degree days (Base 40° F)	Precipitation
	Maximum	Minimum	Mean		
	°F	°F	°F		In
January-----	60.0	27.8	43.9	0	0.78
February----	65.3	35.6	50.5	0	0.70
March-------	69.8	40.7	55.3	0	0.32
April-------	80.2	48.1	64.2	126	0.16
May---------	85.7	54.6	70.2	936	0.02
June--------	97.6	62.7	80.2	1,206	0.02
July--------	104.8	68.8	86.8	1,451	0.02
August------	102.6	64.3	83.5	1,305	0.09
September---	97.0	57.8	77.4	1,122	0.12
October-----	85.1	46.0	65.6	794	0.15
November----	70.9	33.7	52.3	0	0.21
December----	61.7	27.3	44.5	0	0.53
Total---	---	---	---	7,540	3.12

TABLE 3.--LENGTH OF GROWING SEASON AND PROBABILITY OF FREEZING TEMPERATURES AFTER GIVEN DATES IN SPRING AND BEFORE GIVEN DATES IN FALL

Station	*	Percentage in spring									Days in growing season	Percentage in fall								
		10	20	30	40	50	60	70	80	90		10	20	30	40	50	60	70	80	90
Tehachapi	32	5/24	5/17	5/12	5/8	5/5	5/1	4/27	4/23	4/17	156	9/23	9/27	10/2	10/5	10/8	10/11	10/14	10/17	10/22
	28	4/29	4/20	4/15	4/10	4/5	3/31	3/26	3/19	3/9	201	9/27	10/8	10/14	10/18	10/23	10/27	11/1	11/5	11/14
Cantil	32	4/14	4/5	3/31	3/26	3/22	3/17	3/12	3/6	2/27	224	10/17	10/22	10/26	10/29	11/1	11/4	11/6	11/10	11/15
	28	4/10	3/29	3/22	3/16	3/9	3/2	2/23	2/16	2/4	248	10/26	11/1	11/5	11/8	11/12	11/13	11/14	11/18	11/23

* Temperature in degrees F at which killing frost is calculated to occur.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
100	Alko-Neuralia sandy loams, 0 to 9 percent slopes	25,271	2.5
101	Anaheim Variant very fine sandy loam, 2 to 30 percent slopes	1,916	0.2
102	Anaverde gravelly loam, 30 to 50 percent slopes	1,355	0.1
103	Anaverde gravelly loam, 50 to 75 percent slopes	19,993	2.0
104	Arizo gravelly loamy sand, 2 to 9 percent slopes	20,319	2.0
105	Arujo sandy loam, 9 to 15 percent slopes	1,818	0.2
106	Arujo-Friant-Tunis complex, 9 to 15 percent slopes	307	*
107	Arujo-Friant-Tunis complex, 15 to 50 percent slopes	5,340	0.5
108	Arujo-Friant-Tunis complex, 50 to 75 percent slopes	7,737	0.8
109	Arvin sandy loam, 2 to 5 percent slopes	3,480	0.3
110	Arvin sandy loam, 5 to 9 percent slopes	960	0.1
111	Arvin stony sandy loam, 5 to 9 percent slopes	7,453	0.7
112	Badland-Orthents complex, 30 to 75 percent slopes	1,047	0.1
113	Cajon sand, 5 to 15 percent slopes	8,475	0.8
114	Cajon loamy sand, 0 to 5 percent slopes	153,132	15.2
115	Cajon loamy sand, saline-alkali, 0 to 2 percent slopes	920	0.1
116	Cajon gravelly loamy sand, 0 to 9 percent slopes	31,585	3.1
117	Cajon-Garlock sands, 2 to 9 percent slopes	4,633	0.5
118	Chanac-Badland complex, 30 to 50 percent slopes	7,225	0.7
119	Chanac-Pleito complex, 9 to 30 percent slopes	1,072	0.1
120	Chanac-Pleito complex, 30 to 50 percent slopes	1,818	0.2
121	Chino Variant clay loam, 0 to 2 percent slopes	588	0.1
122	Cibo cobbly clay, 2 to 30 percent slopes	1,369	0.1
123	Cibo cobbly clay, 30 to 75 percent slopes	2,002	0.2
124	Cinco gravelly loamy sand, 50 to 75 percent slopes	9,022	0.9
125	DeStazo sandy loam, 0 to 2 percent slopes	7,410	0.7
126	DeStazo sandy loam, 5 to 9 percent slopes, eroded	624	0.1
127	DiGiorgio sandy clay loam, 0 to 2 percent slopes	2,982	0.3
128	Dumps, mine	1,199	0.1
129	Edmundston sandy loam, 30 to 50 percent slopes	1,612	0.2
130	Edmundston gravelly sandy loam, 30 to 50 percent slopes	8,134	0.8
131	Edmundston gravelly sandy loam, 50 to 75 percent slopes	4,842	0.5
132	Edmundston gravelly sandy loam, dry, 30 to 50 percent slopes	7,223	0.7
133	Edmundston-Godde-Tollhouse complex, 30 to 50 percent slopes	2,917	0.3
134	Edmundston-Godde-Tollhouse complex, 50 to 75 percent slopes	7,850	0.8
135	Fluvents, ponded	666	0.1
136	Friant sandy loam, 50 to 75 percent slopes	2,687	0.3
137	Garlock loamy sand, 2 to 9 percent slopes	56,312	5.6
138	Godde-Tollhouse gravelly sandy loams, 30 to 75 percent slopes	19,556	1.9
139	Haploxerolls, hilly	3,112	0.3
140	Havala sandy loam, 0 to 2 percent slopes	6,412	0.6
141	Havala sandy loam, 2 to 5 percent slopes	3,220	0.3
142	Havala sandy loam, 5 to 9 percent slopes	3,280	0.3
143	Havala sandy loam, 9 to 15 percent slopes	1,025	0.1
144	Hesperia sandy loam, 0 to 2 percent slopes	19,422	1.9
145	Hesperia sandy loam, 2 to 5 percent slopes	1,197	0.1
146	Hesperia sandy loam, 5 to 9 percent slopes	1,082	0.1
147	Hi Vista sandy loam, 2 to 9 percent slopes	4,581	0.5
148	Jawbone gravelly loamy sand, 15 to 75 percent slopes	12,745	1.3
149	Los Osos Variant clay loam, 30 to 50 percent slopes	1,334	0.1
150	Muroc sandy loam, 2 to 9 percent slopes	8,609	0.9
151	Muroc-Randsburg sandy loams, 5 to 9 percent slopes	23,515	2.3
152	Nacimiento loam, 30 to 50 percent slopes, eroded	1,320	0.1
153	Nacimiento loam, 50 to 75 percent slopes, eroded	1,147	0.1
154	Neuralia sandy loam, 2 to 5 percent slopes	43,081	4.3
155	Norob-Neuralia complex, 0 to 5 percent slopes	5,587	0.6
156	Pajuela-Whitewolf association, steep	7,598	0.8
157	Pits	865	0.1
158	Playas	1,056	0.1
159	Pleito sandy clay loam, 2 to 5 percent slopes	855	0.1
160	Pleito sandy clay loam, 9 to 50 percent slopes	835	0.1
161	Pleito-Chanac sandy clay loams, 5 to 9 percent slopes	1,922	0.2
162	Pleito-Chanac sandy clay loams, 15 to 30 percent slopes	4,144	0.4
163	Porterville clay, 5 to 9 percent slopes	299	*
164	Porterville cobbly clay, 5 to 9 percent slopes	717	0.1
165	Psamments-Xerolls complex, nearly level	4,889	0.5
166	Quarries	1,120	0.1
167	Randsburg sandy loam, 2 to 15 percent slopes	22,191	2.2
168	Rescue Variant loam, 15 to 30 percent slopes	475	*
169	Rescue Variant loam, 30 to 50 percent slopes	724	0.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
170	Rock outcrop	10,545	1.0
171	Rosamond clay loam	11,292	1.1
172	Rosamond clay loam, saline-alkali	5,455	0.5
173	Rosamond Variant sandy loam, 5 to 15 percent slopes	1,198	0.1
174	Steuber sandy loam, 0 to 2 percent slopes	3,513	0.4
175	Steuber sandy loam, 2 to 5 percent slopes	9,207	0.9
176	Steuber sandy loam, 5 to 9 percent slopes	7,713	0.8
177	Steuber stony sandy loam, 5 to 9 percent slopes	1,876	0.2
178	Sween Variant-Rock outcrop complex, 5 to 30 percent slopes	2,450	0.2
179	Tehachapi sandy loam, 2 to 15 percent slopes	7,812	0.8
180	Tehachapi loam, 15 to 30 percent slopes, eroded	2,502	0.3
181	Tehachapi cobbly sandy clay loam, 2 to 30 percent slopes	532	0.1
182	Tehachapi cobbly sandy clay loam, warm, 2 to 9 percent slopes	5,281	0.5
183	Tehachapi Variant sandy clay loam, 15 to 50 percent slopes	940	0.1
184	Torrifluvents-Cajon complex, nearly level	2,700	0.3
185	Torriorthents-Rock outcrop complex, very steep	41,239	4.1
186	Tujunga loamy sand, 2 to 5 percent slopes	1,018	0.1
187	Tunis sandy loam, 5 to 30 percent slopes	1,433	0.1
188	Tunis-Walong complex, 50 to 75 percent slopes	18,802	1.9
189	Tweedy sandy loam, 30 to 50 percent slopes	3,007	0.3
190	Tweedy sandy loam, 50 to 75 percent slopes	12,247	1.2
191	Tweedy-Anaverde complex, 30 to 50 percent slopes	3,962	0.4
192	Tweedy-Anaverde complex, 50 to 75 percent slopes	1,802	0.2
193	Walong sandy loam, 15 to 30 percent slopes	20,665	2.1
194	Walong sandy loam, 30 to 50 percent slopes	34,270	3.4
195	Walong-Arujo sandy loams, 15 to 30 percent slopes	4,276	0.4
196	Walong-Arujo sandy loams, 30 to 50 percent slopes	8,302	0.8
197	Walong-Arujo sandy loams, 50 to 75 percent slopes	5,781	0.6
198	Walong-Rock outcrop complex, 30 to 75 percent slopes	12,304	1.2
199	Walong-Edmundston association, steep	11,153	1.1
200	Walong-Edmundston association, very steep	26,678	2.6
201	Wasioja sandy loam, 2 to 9 percent slopes	2,477	0.2
202	Wasioja sandy loam, cool, 5 to 9 percent slopes	619	0.1
203	Whitewolf loamy sand, 2 to 5 percent slopes	3,947	0.4
204	Whitewolf loamy sand, cool, 2 to 5 percent slopes	1,435	0.1
205	Xererts-Xerolls complex, steep	2,178	0.2
206	Xeric Torriorthents, very steep	12,677	1.3
207	Xerolls, very steep	6,394	0.6
208	Xerolls-Rock outcrop complex, very steep	31,906	3.2
209	Xerorthents, very steep	7,270	0.7
210	Xerorthents, loamy, very steep	1,788	0.2
211	Xerorthents-Rock outcrop complex, very steep	25,781	2.6
	Water	163	*
	Total	1,007,800	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Alfalfa hay	Apples	Cotton lint	Wine grapes	Irish potatoes	Sugar beets	Tomatoes
	Ton	Box	Lb	Ton	Cwt	Ton	Ton
105---------- Arujo	---	---	---	4	---	---	---
109---------- Arvin	---	---	1,000	10	---	35	30
114---------- Cajon	6	---	---	---	---	---	---
125*---------- DeStazo	6	---	---	---	350	17	---
127---------- DiGiorgio	10	---	1,250	---	---	35	30
137---------- Garlock	5	---	---	---	---	---	---
140---------- Havala	---	144	---	---	365	---	---
141---------- Havala	---	144	---	---	365	---	---
144---------- Hesperia	---	---	1,000	10	400	35	30
145---------- Hesperia	---	---	1,000	10	350	30	30
146---------- Hesperia	---	---	800	8	300	25	25
159---------- Pleito	---	---	---	---	250	---	---
161---------- Pleito	---	---	---	---	250	---	---
174*---------- Steuber	6	---	---	---	---	---	---
179---------- Tehachapi	---	180	---	---	---	---	---
201---------- Wasioja	---	---	---	10	400	35	30
203, 204---------- Whitewolf	---	---	---	7	300	---	25

* Yields are for areas protected from flooding.

TABLE 6.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
100*:				
Alko	Moderate: soil blowing.	Moderate: soil blowing.	Severe: cemented pan.	Moderate: soil blowing.
Neuralia	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Moderate: soil blowing.
101, Anaheim Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
102, 103, Anaverde	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
104, Arizo	Severe: floods.	Moderate: floods, small stones.	Severe: floods, small stones.	Severe: too sandy.
105, Arujo	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
106*:				
Arujo	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Friant	Moderate: slope.	Moderate: slope.	Severe: slope, depth to rock.	Slight.
Tunis	Moderate: slope.	Moderate: slope.	Severe: slope, depth to rock.	Slight.
107*, 108*:				
Arujo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Friant	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Tunis	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
109, Arvin	Severe: floods.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Moderate: soil blowing.
110, Arvin	Moderate: soil blowing.	Moderate: soil blowing.	Severe: slope.	Moderate: soil blowing.
111, Arvin	Severe: large stones.	Moderate: large stones.	Severe: large stones, slope.	Severe: large stones.
112*:				
Badland.				
Orthents.				

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
113--- Cajon	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
114--- Cajon	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, small stones.	Moderate: too sandy, soil blowing.
115--- Cajon	Severe: floods.	Moderate: too sandy.	Moderate: too sandy, floods.	Moderate: too sandy.
116--- Cajon	Moderate: small stones, too sandy, soil blowing.	Moderate: small stones, too sandy, soil blowing.	Severe: small stones, slope.	Moderate: too sandy, small stones, soil blowing.
117*: Cajon---	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
Garlock---	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
118*: Chanac---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Badland.				
119*: Chanac---	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Pleito---	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
120*: Chanac---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pleito---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
121--- Chino Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, too clayey.
122--- Cibo	Severe: slope, large stones.	Severe: slope.	Severe: slope, too clayey.	Severe: large stones.
123--- Cibo	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.
124--- Cinco	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
125--- DeStazo	Slight---	Slight---	Slight---	Slight.
126--- DeStazo	Severe: floods.	Slight---	Severe: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
127---------- DiGiorgio	Slight----------	Slight----------	Moderate: too clayey.	Slight.
128*. Dumps				
129---------- Edmundston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
130, 131, 132---------- Edmundston	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
133*, 134*: Edmundston----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Godde----------	Severe: slope.	Severe: slope.	Severe: slope, small stones, depth to rock.	Severe: slope.
Tollhouse----------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
135*. Fluvents				
136---------- Friant	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
137---------- Garlock	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy, soil blowing.	Moderate: too sandy, soil blowing.
138*: Godde----------	Severe: slope.	Severe: slope.	Severe: slope, small stones, depth to rock.	Severe: slope.
Tollhouse----------	Severe: slope.	Severe: slope.	Severe: slope, small stones, depth to rock.	Severe: slope.
139*. Haploxerolls				
140---------- Havala	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: small stones, soil blowing.	Moderate: soil blowing.
141---------- Havala	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, small stones, soil blowing.	Moderate: soil blowing.
142---------- Havala	Moderate: soil blowing.	Moderate: soil blowing.	Severe: slope.	Moderate: soil blowing.
143---------- Havala	Moderate: slope, soil blowing.	Moderate: slope, soil blowing.	Severe: slope.	Moderate: soil blowing.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
144--Hesperia	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: soil blowing.
145--Hesperia	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Moderate: soil blowing.
146--Hesperia	Moderate: soil blowing.	Moderate: soil blowing.	Severe: slope.	Moderate: soil blowing.
147--Hi Vista	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, depth to rock, soil blowing.	Moderate: soil blowing.
148--Jawbone	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
149--Los Osos Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
150--Muroc	Moderate: soil blowing.	Moderate: soil blowing.	Severe: cemented pan.	Moderate: soil blowing.
151*: Muroc	Moderate: soil blowing.	Moderate: soil blowing.	Severe: slope, cemented pan.	Moderate: soil blowing.
Randsburg	Moderate: soil blowing.	Moderate: soil blowing.	Severe: depth to rock.	Moderate: soil blowing.
152*, 153*--Nacimiento	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
154--Neuralia	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Moderate: soil blowing.
155*: Norob	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.
Neuralia	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope, soil blowing.	Moderate: soil blowing.
156*: Pajuela	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Whitewolf	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy, soil blowing.	Moderate: too sandy, soil blowing.
157*. Pits				
158*. Playas				
159--Pleito	Slight	Slight	Moderate: slope, too clayey.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
160--Pleito	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
161*: Pleito	Slight	Slight	Severe: slope.	Slight.
161*: Chanac	Slight	Slight	Severe: slope.	Slight.
162*: Pleito	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Chanac	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
163--Porterville	Moderate: too clayey.	Moderate: too clayey.	Severe: slope, too clayey.	Moderate: too clayey.
164--Porterville	Severe: large stones.	Moderate: large stones, too clayey.	Severe: large stones, slope, too clayey.	Severe: large stones.
165*: Psamments.				
Xerolls.				
166*. Quarries				
167--Randsburg	Moderate: slope, soil blowing.	Moderate: slope, soil blowing.	Severe: slope, depth to rock.	Moderate: soil blowing.
168--Rescue Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
169--Rescue Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
170*. Rock outcrop				
171--Rosamond	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: soil blowing.
172--Rosamond	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: soil blowing.
173--Rosamond Variant	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
174--Steuber	Slight	Slight	Slight	Slight.
175--Steuber	Severe: floods.	Slight	Moderate: slope.	Slight.
176--Steuber	Severe: floods.	Slight	Severe: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
177--Steuber	Severe: floods.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
178*: Sween Variant	Severe: slope, large stones.	Severe: slope.	Severe: large stones, slope.	Severe: large stones.
Rock outcrop.				
179--Tehachapi	Severe: floods.	Moderate: slope.	Severe: slope.	Slight.
180--Tehachapi	Severe: floods, slope.	Severe: slope.	Severe: slope.	Moderate: slope.
181--Tehachapi	Severe: floods, slope, large stones.	Severe: slope.	Severe: slope, large stones.	Severe. large stones.
182--Tehachapi	Severe: floods, large stones.	Moderate: large stones.	Severe: large stones.	Severe: large stones.
183--Tehachapi Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
184*: Torrifluvents.				
Cajon	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: small stones, too sandy, soil blowing.	Moderate: too sandy, soil blowing.
185*: Torriorthents.				
Rock outcrop.				
186--Tujunga	Moderate: too sandy.	Moderate: too sandy.	Severe: too sandy.	Moderate: too sandy.
187--Tunis	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
188*: Tunis	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Walong	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
189, 190--Tweedy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
191*, 192*: Tweedy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Anaverde	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
193--Walong	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
194--Walong	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
195*:				
Walong	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Arujo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
196*, 197*:				
Walong	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Arujo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
198*:				
Walong	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
199*, 200*:				
Walong	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Edmundston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
201--Wasioja	Moderate: soil blowing.	Moderate: soil blowing.	Moderate: slope.	Moderate: soil blowing.
202--Wasioja	Moderate: soil blowing.	Moderate: soil blowing.	Severe: slope.	Moderate: soil blowing.
203--Whitewolf	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy, soil blowing.	Moderate: too sandy, soil blowing.
204--Whitewolf	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
205*:				
Xererts.				
Xerolls.				
206*.				
Xeric Torriorthents				
207*.				
Xerolls				
208*:				
Xerolls.				
Rock outcrop.				

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
209*, 210*. Xerorthents				
211*: Xerorthents.				
Rock outcrop.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
100*:									
Alko	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
Neuralia	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
101--Anaheim Variant	Fair	Good	Good	---	---	Good	Good	---	Good.
102--Anaverde	Poor	Fair	Good	Good	---	Good	Fair	Good	Good.
103--Anaverde	Very poor	Very poor	Good	Good	---	Good	Poor	Fair	Good.
104--Arizo	Very poor	Very poor	Very poor	---	---	Very poor	Very poor	---	Very poor.
105--Arujo	Fair	Good	Good	Good	---	Good	Good	Good	Good.
106*:									
Arujo	Fair	Good	Good	Good	---	Good	Good	Good	Good.
Friant	Poor	Fair	Fair	---	---	Poor	Poor	---	Fair.
Tunis	Very poor	Very poor	Fair	---	---	Fair	Poor	---	Fair.
107*:									
Arujo	Poor	Fair	Good	Good	---	Good	Fair	Good	Good.
Friant	Poor	Very poor	Fair	---	---	Poor	Poor	---	Poor.
Tunis	Very poor	Very poor	Fair	---	---	Fair	Poor	---	Fair.
108*:									
Arujo	Very poor	Very poor	Good	Good	---	Good	Poor	Fair	Good.
Friant	Poor	Very poor	Fair	---	---	Poor	Poor	---	Poor.
Tunis	Very poor	Very poor	Fair	---	---	Fair	Poor	---	Fair.
109, 110--Arvin	Good	Good	Fair	---	---	Fair	Good	---	Fair.
111--Arvin	Poor	Poor	Fair	---	---	Fair	Fair	---	Fair.
112*:									
Badland.									
Orthents.									
113--Cajon	Very poor	Very poor	Fair	---	---	Fair	Poor	---	Fair.
114--Cajon	Fair	Fair	Fair	---	---	Fair	Fair	---	---
115--Cajon	Very poor	Very poor	Very poor	---	---	Very poor	Very poor	---	Very poor.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
116---------- Cajon	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
117*:									
Cajon----------	Very poor	Very poor	Fair	---	---	Fair	Poor	---	Fair.
Garlock----------	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
118*:									
Chanac----------	Poor	Fair	Good	---	---	Good	Fair	---	Good.
Badland.									
119*:									
Chanac----------	Fair	Fair	Good	---	---	Good	Fair	---	Good.
Pleito----------	Fair	Fair	Good	---	---	Good	Fair	---	Good.
120*:									
Chanac----------	Poor	Fair	Good	---	---	Good	Fair	---	Good.
Pleito----------	Poor	Fair	Good	---	---	Good	Fair	---	Good.
121---------- Chino Variant	Fair	Fair	Good	---	---	Good	Fair	---	Good.
122---------- Cibo	Fair	Good	Good	---	---	Poor	Fair	---	Fair.
123---------- Cibo	Very poor	Very poor	Good	---	---	Poor	Poor	---	Fair.
124---------- Cinco	Very poor	Very poor	Poor	---	---	Fair	Very poor	---	Poor.
125---------- DeStazo	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
126---------- DeStazo	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
127---------- DiGiorgio	Good	Good	Poor	---	---	Poor	Good	---	Poor.
128*. Dumps									
129, 130---------- Edmundston	Poor	Fair	Good	---	---	Good	Fair	---	Good.
131---------- Edmundston	Very poor	Very poor	Good	---	---	Good	Poor	---	Good.
132---------- Edmundston	Poor	Fair	Good	---	---	Good	Fair	---	Good.
133*:									
Edmundston---------	Poor	Fair	Good	---	---	Good	Fair	---	Good.
Godde----------	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
Tollhouse---------	Very poor	Very poor	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
134*:									
Edmundston	Very poor	Very poor	Good	---	---	Good	Poor	---	Good.
Godde	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
Tollhouse	Very poor	Very poor	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor.
135*. Fluvents									
136 Friant	Poor	Very poor	Fair	---	---	Poor	Poor	---	Poor.
137 Garlock	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
138*:									
Godde	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
Tollhouse	Very poor	Very poor	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor.
139*. Haploxerolls									
140, 141 Havala	Good	Good	Good	---	---	Good	Good	---	Good.
142, 143 Havala	Fair	Fair	Good	---	---	Good	Fair	---	Good.
144, 145, 146 Hesperia	Good	Good	Fair	---	---	Fair	Good	---	Fair.
147 Hi Vista	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
148 Jawbone	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
149 Los Osos Variant	Poor	Fair	Good	---	---	Good	Fair	---	Good.
150 Muroc	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
151*:									
Muroc	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
Randsburg	Very poor	Very poor	Poor	---	---	Fair	Very poor	---	Poor.
152* Nacimiento	Poor	Fair	Good	---	---	Good	Fair	---	Good.
153* Nacimiento	Very poor	Very poor	Good	---	---	Good	Poor	---	Good.
154 Neuralia	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
155*:									
Norob	Very poor	Very poor	Very poor	---	---	Poor	Very poor	---	Very poor.
Neuralia	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
156*. Pajuela	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
Whitewolf	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
157*. Pits									
158*. Playas									
159 Pleito	Fair	Fair	Good	---	---	Good	Fair	---	Good.
160 Pleito	Fair	Fair	Good	---	---	Good	Fair	---	Good.
161*:									
Pleito	Fair	Fair	Good	---	---	Good	Fair	---	Good.
Chanac	Good	Good	Good	---	---	Good	Good	---	Good.
162*:									
Pleito	Fair	Fair	Good	---	---	Good	Fair	---	Good.
Chanac	Fair	Fair	Good	---	---	Good	Fair	---	Good.
163 Porterville	Fair	Good	Good	---	---	Poor	Fair	---	Fair.
164 Porterville	Fair	Fair	Good	---	---	Poor	Fair	---	Fair.
165*:									
Psamments.									
Xerolls.									
166*. Quarries									
167 Randsburg	Very poor	Very poor	Poor	---	---	Fair	Very poor	---	Poor.
168 Rescue Variant	Fair	Good	Good	---	---	Good	Good	---	Good.
169 Rescue Variant	Poor	Fair	Good	---	---	Good	Fair	---	Good.
170*. Rock outcrop.									
171 Rosamond	Very poor	Very poor	Very poor	---	---	Poor	Very poor	---	Very poor.
172 Rosamond	Very poor	Very poor	Very poor	---	---	Poor	Very poor	---	Very poor.
173 Rosamond Variant	Poor	Fair	Good	---	---	Fair	Fair	---	Fair.
174, 175, 176 Steuber	Poor	Good	Good	---	---	Good	Fair	---	Good.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
177---------- Steuber	Poor	Poor	Good	---	---	Good	Fair	---	Good.
178*: Sween Variant-----	Poor	Poor	Good	---	---	Good	Fair	---	Good.
Rock outcrop.									
179, 180, 181, 182- Tehachapi	Fair	Good	Good	---	---	Good	Good	---	Good.
183---------- Tehachapi Variant	Poor	Fair	Good	---	---	Good	Fair	---	Good.
184*: Torrifluvents.									
Cajon----------	Very poor	Very poor	Fair	---	---	Fair	Poor	---	Fair.
185*: Torriorthents.									
Rock outcrop.									
186---------- Tujunga	Poor	Fair	Fair	---	---	Fair	Fair	---	Fair.
187---------- Tunis	Very poor	Very poor	Fair	---	---	Fair	Poor	---	Fair.
188*: Tunis----------	Very poor	Very poor	Fair	---	---	Fair	Poor	---	Fair.
Walong----------	Very poor	Very poor	Good	Good	---	Good	Fair	Fair	Good.
189---------- Tweedy	Poor	Fair	Good	---	Good	Good	Fair	Good	Good.
190---------- Tweedy	Very poor	Very poor	Good	---	Good	Good	Poor	Good	Good.
191*: Tweedy----------	Poor	Fair	Good	---	Good	Good	Fair	Good	Good.
Anaverde----------	Poor	Fair	Good	Good	---	Good	Fair	Good	Good.
192*: Tweedy----------	Very poor	Very poor	Good	---	Good	Good	Poor	Good	Good.
Anaverde----------	Very poor	Very poor	Good	Good	---	Good	Poor	Fair	Good.
193---------- Walong	Fair	Good	Good	Good	---	Good	Fair	Good	Good.
194---------- Walong	Poor	Fair	Good	Good	---	Good	Fair	Good	Good.
195*: Walong----------	Fair	Good	Good	Good	---	Good	Fair	Good	Good.
Arujo----------	Fair	Good	Good	Good	---	Good	Good	Good	Good.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
196*:									
Walong	Poor	Fair	Good	Good	---	Good	Fair	Good	Good.
Arujo	Poor	Fair	Good	Good	---	Good	Fair	Good	Good.
197*:									
Walong	Very poor	Very poor	Good	Good	---	Good	Fair	Fair	Good.
Arujo	Very poor	Very poor	Good	Good	---	Good	Poor	Fair	Good.
198*:									
Walong	Very poor	Very poor	Good	Good	---	Good	Fair	Fair	Good.
Rock outcrop.									
199*:									
Walong	Poor	Fair	Good	Good	---	Good	Fair	Good	Good.
Edmundston	Poor	Fair	Good	---	---	Good	Fair	---	Good.
200*:									
Walong	Very poor	Very poor	Good	Good	---	Good	Fair	Fair	Good.
Edmundston	Very poor	Very poor	Good	---	---	Good	Poor	---	Good.
201--Wasioja	Fair	Good	Good	---	---	Good	Good	---	Good.
202--Wasioja	Poor	Fair	Good	---	---	Good	Good	---	Good.
203--Whitewolf	Fair	Fair	Poor	---	---	Poor	Fair	---	Poor.
204--Whitewolf	Very poor	Very poor	Poor	---	---	Poor	Very poor	---	Poor.
205*:									
Xererts.									
Xerolls.									
206*.									
Xeric Torriorthents									
207*.									
Xerolls									
208*:									
Xerolls.									
Rock outcrop.									
209*, 210*.									
Xerorthents									
211*:									
Xerorthents.									
Rock outcrop.									

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--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
100*:					
Alko	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan, slope.	Moderate: cemented pan.
Neuralia	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
101 Anaheim Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
102, 103 Anaverde	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
104 Arizo	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
105 Arujo	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, slope, shrink-swell.
106*:					
Arujo	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, slope, shrink-swell.
Friant	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
Tunis	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.
107*, 108*:					
Arujo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Friant	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Tunis	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
109 Arvin	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
110 Arvin	Slight	Slight	Slight	Moderate: slope.	Slight.
111 Arvin	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones, slope.	Moderate: floods, large stones.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
112*: Badland. Orthents.					
113---------- Cajon	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
114---------- Cajon	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
115---------- Cajon	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
116---------- Cajon	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
117*: Cajon----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
Garlock----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
118*: Chanac----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Badland.					
119*, 120*: Chanac----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pleito----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
121---------- Chino Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.
122, 123---------- Cibo	Severe: depth to rock, too clayey, slope.	Severe: shrink-swell, low strength, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: low strength, slope, shrink-swell.
124---------- Cinco	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
125---------- DeStazo	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
126---------- DeStazo	Moderate: too clayey, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, shrink-swell.
127---------- DiGiorgio	Slight----------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
128*. Dumps					

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
129, 130, 131, 132--Edmundston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
133*, 134*: Edmundston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Godde	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.
Tollhouse	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
135*. Fluvents					
136--Friant	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
137--Garlock	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: slope, shrink-swell.	Moderate: shrink-swell.
138*: Godde	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Tollhouse	Severe: slope, depth to rock.	Severe. slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
139*. Haploxerolls					
140, 141--Havala	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
142--Havala	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
143--Havala	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, slope, shrink-swell.
144, 145--Hesperia	Slight	Slight	Slight	Slight	Slight.
146--Hesperia	Slight	Slight	Slight	Moderate: slope.	Slight.
147--Hi Vista	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Moderate: depth to rock, shrink-swell, low strength.
148--Jawbone	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
149---------- Los Osos Variant	Severe: depth to rock, too clayey, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, shrink-swell, depth to rock.	Severe: shrink-swell, slope, low strength.	Severe: low strength, slope, shrink-swell.
150---------- Muroc	Severe: depth to rock, cemented pan.	Moderate: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Moderate: depth to rock, cemented pan, slope.	Moderate: depth to rock, cemented pan.
151*. Muroc----------	Severe: depth to rock, cemented pan.	Moderate: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Moderate: depth to rock, cemented pan, slope.	Moderate: depth to rock, cemented pan.
Randsburg--------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
152*, 153*-------- Nacimiento	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
154---------- Neuralia	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
155*: Norob----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
Neuralia---------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
156*: Pajuela----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Whitewolf--------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
157*. Pits					
158*. Playas					
159---------- Pleito	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
160---------- Pleito	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
161*: Pleito----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
Chanac----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: shrink-swell, low strength.
162*: Pleito----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chanac----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
163, 164---------- Porterville	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
165*: Psamments.					
Xerolls.					
166*. Quarries					
167---------- Randsburg	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
168, 169---------- Rescue Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
170*. Rock outcrop					
171, 172---------- Rosamond	Slight----------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.
173---------- Rosamond Variant	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: slope, shrink-swell.
174---------- Steuber	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
175, 176, 177----- Steuber	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
178*: Sween Variant----	Severe: depth to rock, too clayey, slope.	Severe: shrink-swell, low strength, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, low strength.	Severe: low strength, slope, shrink-swell.
Rock outcrop.					
179---------- Tehachapi	Moderate: too clayey, floods, slope.	Severe: floods.	Severe: floods.	Severe: floods, slope.	Severe: low strength.
180, 181---------- Tehachapi	Severe: slope.	Severe: floods, slope.	Severe: floods, slope.	Severe: floods, slope.	Severe: low strength, slope.
182---------- Tehachapi	Moderate: too clayey, large stones, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.
183---------- Tehachapi Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
184*: Torrifluvents.					
Cajon----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
185*: Torriorthents.					
Rock outcrop.					
186---------- Tujunga	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
187---------- Tunis	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
188*: Tunis----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Walong----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
189, 190---------- Tweedy	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
191*, 192*: Tweedy----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Anaverde----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
193, 194---------- Walong	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
195*, 196*, 197*: Walong----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Arujo----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
198*: Walong----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
199*, 200*: Walong----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Edmundston-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
201, 202---------- Wasioja	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
203, 204---------- Whitewolf	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
205*: Xererts.					
Xerolls.					

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
206*. Xeric Torriorthents					
207*. Xerolls					
208*: Xerolls.					
Rock outcrop.					
209*, 210*. Xerorthents					
211*: Xerorthents.					
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
100*:					
Alko	Severe: cemented pan.	Severe: seepage, cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, area reclaim.
Neuralia	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Fair: too clayey.
101 Anaheim Variant	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
102, 103 Anaverde	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
104 Arizo	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage, too sandy.	Severe: floods, seepage.	Poor: small stones.
105 Arujo	Severe: percs slowly.	Severe: seepage, slope.	Severe: depth to rock.	Severe: seepage.	Fair: slope, too clayey, area reclaim.
106*:					
Arujo	Severe: percs slowly.	Severe: seepage, slope.	Severe: depth to rock.	Severe: seepage.	Fair: slope, too clayey, area reclaim.
Friant	Severe: depth to rock.	Severe: depth to rock, slope, seepage.	Severe: depth to rock.	Severe: seepage.	Poor: thin layer, area reclaim.
Tunis	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
107*, 108*:					
Arujo	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope.
Friant	Severe: slope, depth to rock.	Severe: depth to rock, slope, seepage.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, area reclaim, thin layer.
Tunis	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer, area reclaim.
109 Arvin	Moderate: floods.	Severe: seepage, floods.	Severe: seepage.	Severe: seepage.	Good.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
110 Arvin	Slight	Severe: seepage, floods, slope.	Severe: seepage.	Severe: seepage.	Good.
111 Arvin	Moderate: large stones.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: large stones.
112*: Badland.					
Orthents.					
113 Cajon	Moderate: slope.	Severe: slope, seepage.	Severe: too sandy.	Slight	Poor: too sandy.
114 Cajon	Slight	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
115 Cajon	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage, too sandy.	Severe: floods, seepage.	Poor: too sandy.
116 Cajon	Slight	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
117*: Cajon	Severe: percs slowly.	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
Garlock	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
118*: Chanac	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Badland.					
119*: Chanac	Severe: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
Pleito	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
120*: Chanac	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Pleito	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
121 Chino Variant	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
122---------- Cibo	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: too clayey, slope, thin layer.
123---------- Cibo	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey, slope.	Severe: slope.	Poor: too clayey, slope, thin layer.
124---------- Cinco	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
125---------- DeStazo	Severe: percs slowly.	Slight----------	Moderate: too clayey.	Slight----------	Poor: small stones.
126---------- DeStazo	Severe: percs slowly.	Severe: floods, slope.	Moderate: floods, too clayey.	Moderate: floods.	Poor: small stones.
127---------- DiGiorgio	Severe: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Fair: too clayey.
128*. Dumps					
129, 130, 131, 132-- Edmundston	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
133*, 134*: Edmundston---------	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
Godde----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, slope, area reclaim.
Tollhouse----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: thin layer, area reclaim, slope.
135*. Fluvents					
136---------- Friant	Severe: slope, depth to rock.	Severe: depth to rock, slope, seepage.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, area reclaim, thin layer.
137---------- Garlock	Slight----------	Severe: seepage.	Slight----------	Slight----------	Poor: seepage.
138*: Godde----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, slope, area reclaim.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
138*: Tollhouse	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: thin layer, area reclaim, slope.
139*. Haploxerolls					
140, 141 Havala	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
142 Havala	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
143 Havala	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope, too clayey.
144, 145 Hesperia	Slight	Severe: seepage.	Slight	Slight	Good.
146 Hesperia	Slight	Severe: seepage, slope.	Slight	Slight	Good.
147 Hi Vista	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
148 Jawbone	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, slope, area reclaim.
149 Los Osos Variant	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: slope, depth to rock, too clayey.	Severe: slope.	Poor: slope, thin layer, area reclaim.
150 Muroc	Severe: depth to rock, cemented pan.	Severe: seepage, cemented pan.	Severe: depth to rock, cemented pan.	Slight	Poor: thin layer, area reclaim.
151*: Muroc	Severe: depth to rock, cemented pan.	Severe: seepage, cemented pan.	Severe: depth to rock, cemented pan.	Slight	Poor: thin layer, area reclaim.
Randsburg	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
152*, 153* Nacimiento	Severe: slope, depth to rock, percs slowly.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: thin layer, area reclaim, slope.
154 Neuralia	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Fair: too clayey.
155*: Norob	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
155*: Neuralia	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Fair: too clayey.
156*: Pajuela	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope, seepage.
Whitewolf	Slight	Severe: seepage.	Severe: too sandy.	Slight	Fair: too sandy.
157*. Pits					
158*. Playas					
159 Pleito	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Fair: too clayey, small stones.
160 Pleito	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
161*: Pleito	Severe: percs slowly.	Severe: slope.	Slight	Slight	Fair: too clayey, small stones.
Chanac	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
162*: Pleito	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Chanac	Severe: percs slowly, slope.	Severe. slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
163, 164 Porterville	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey.
165*: Psamments.					
Xerolls.					
166*. Quarries					
167 Randsburg	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
168 Rescue Variant	Severe: percs slowly, slope.	Severe. slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
169 Rescue Variant	Severe: percs slowly, slope.	Severe slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
170*. Rock outcrop					
171, 172---------- Rosamond	Severe: percs slowly.	Slight----------	Moderate: too clayey.	Slight----------	Fair: too clayey.
173---------- Rosamond Variant	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
174---------- Steuber	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
175---------- Steuber	Moderate: floods.	Severe: seepage, floods.	Severe: seepage.	Severe: seepage.	Good.
176---------- Steuber	Moderate: floods.	Severe: seepage, floods, slope.	Severe: seepage.	Severe: seepage.	Good.
177---------- Steuber	Moderate: floods.	Severe: seepage, floods, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones.
178*: Sween Variant------ Rock outcrop.	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: too clayey, slope, area reclaim.
179---------- Tehachapi	Severe: percs slowly.	Severe: seepage, floods, slope.	Moderate: floods, too clayey.	Moderate: floods, slope.	Fair: too clayey, slope.
180,181---------- Tehachapi	Severe: percs slowly, slope.	Severe: seepage, floods, slope.	Moderate: floods, slope, too clayey.	Severe: slope.	Poor: slope.
182---------- Tehachapi	Severe: percs slowly.	Severe: seepage, floods.	Moderate: floods, too clayey.	Moderate: floods.	Fair: too clayey, large stones.
183---------- Tehachapi Variant	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
184*: Torrifluvents.					
Cajon----------	Slight----------	Severe: seepage.	Severe: too sandy.	Slight----------	Poor: too sandy.
185*: Torriorthents. Rock outcrop.					
186---------- Tujunga	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
187---------- Tunis	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
188*: Tunis----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Walong----------	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, slope, seepage.	Severe: seepage, slope.	Poor: slope, thin layer, area reclaim.
189, 190---------- Tweedy	Severe: depth to rock, percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
191*, 192*: Tweedy----------	Severe: depth to rock, percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Anaverde----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
193---------- Walong	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, slope.	Poor: slope, thin layer, area reclaim.
194---------- Walong	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, slope, seepage.	Severe: seepage, slope.	Poor: slope, thin layer, area reclaim.
195*: Walong----------	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, slope.	Poor: slope, thin layer, area reclaim.
Arujo----------	Severe: depth to rock, percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock.	Severe: seepage, slope.	Poor: slope.
196*, 197*: Walong----------	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, slope, seepage.	Severe: seepage, slope.	Poor: slope, thin layer, area reclaim.
Arujo----------	Severe: depth to rock, percs slowly, slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope.
198*: Walong----------	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, slope, seepage.	Severe: seepage, slope.	Poor: slope, thin layer, area reclaim.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
198*: Rock outcrop.					
199*, 200*: Walong	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, slope, seepage.	Severe: seepage, slope.	Poor: slope, thin layer, area reclaim.
Edmundston	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
201 Wasioja	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
202 Wasioja	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
203, 204 Whitewolf	Slight	Severe: seepage.	Severe: too sandy.	Slight	Fair: too sandy.
205*: Xererts.					
Xerolls.					
206*. Xeric Torriorthents					
207*. Xerolls					
208*: Xerolls.					
Rock outcrop.					
209*, 210*. Xerorthents					
211*: Xerorthents.					
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
100*:				
Alko	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer.	Poor: thin layer, area reclaim.
Neuralia	Fair: low strength, shrink-swell.	Poor: excess fines.	Unsuited: excess fines.	Fair: too clayey.
101 Anaheim Variant	Poor: low strength, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
102, 103 Anaverde	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones, slope.
104 Arizo	Good	Unsuited: small stones.	Good	Poor: small stones, too sandy.
105 Arujo	Fair: low strength, shrink-swell, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
106*:				
Arujo	Fair: low strength, shrink-swell, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
Friant	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer.	Poor: thin layer, area reclaim.
Tunis	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Poor: thin layer, area reclaim.
107*, 108*:				
Arujo	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Friant	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer.	Poor: slope, thin layer, area reclaim.
Tunis	Poor: thin layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Poor: slope, thin layer, area reclaim.
109, 110 Arvin	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: small stones.
111 Arvin	Fair: large stones.	Poor: excess fines, large stones.	Unsuited: excess fines.	Poor: large stones.
112*: Badland.				

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
112*: Orthents.				
113---- Cajon	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
114---- Cajon	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy, small stones.
115---- Cajon	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: excess salt, excess sodium.
116---- Cajon	Good	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
117*: Cajon----	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Garlock----	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too sandy, small stones.
118*: Chanac----	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Badland.				
119*: Chanac----	Fair: slope, low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Pleito----	Moderate: low strength, slope, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
120*: Chanac----	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Pleito----	Severe: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
121---- Chino Variant	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
122---- Cibo	Poor: low strength, shrink-swell, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope, large stones.
123---- Cibo	Poor: low strength, slope, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope.
124---- Cinco	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
125, 126---------- DeStazo	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
127---------- DiGiorgio	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
128*. Dumps				
129---------- Edmundston	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
130, 131, 132--------- Edmundston	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: small stones, slope.
133*, 134*: Edmundston----------	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: small stones, slope.
Godde----------	Poor: thin layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: small stones, thin layer, area reclaim.
Tollhouse----------	Poor: thin layer, slope, area reclaim.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Poor: thin layer, small stones, area reclaim.
135*. Fluvents				
136---------- Friant	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer.	Poor: slope, thin layer, area reclaim.
137---------- Garlock	Good----------	Fair: excess fines.	Fair: excess fines.	Fair: too sandy, small stones.
138*: Godde----------	Poor: thin layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: small stones, thin layer, area reclaim.
Tollhouse----------	Poor: thin layer, slope, area reclaim.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Poor: slope, thin layer, small stones.
139*. Haploxerolls				
140, 141, 142--------- Havala	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
143---------- Havala	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, slope.
144, 145, 146--------- Hesperia	Good----------	Poor: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
147--- Hi Vista	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, thin layer, area reclaim.
148--- Jawbone	Poor: than layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, thin layer, area reclaim.
149--- Los Osos Variant	Poor: thin layer, low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
150--- Muroc	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Fair: thin layer, area reclaim.
151*: Muroc---	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Fair: thin layer, area reclaim.
Randsburg---	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Poor: thin layer, area reclaim.
152*, 153*--- Nacimiento	Poor: thin layer, slope, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
154--- Neuralia	Fair: low strength, shrink-swell.	Poor: excess fines.	Unsuited: excess fines.	Fair: too clayey.
155*: Norob---	Poor: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Neuralia---	Fair: low strength, shrink-swell.	Poor: excess fines.	Unsuited: excess fines.	Fair: too clayey.
156*: Pajuela---	Poor: slope.	Poor: excess fines.	Fair: excess fines.	Poor: small stones, slope.
Whitewolf---	Good---	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy, small stones.
157*. Pits				
158*. Playas				
159--- Pleito	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, small stones.
160--- Pleito	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
161*: Pleito	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, small stones.
Chanac	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
162*: Pleito	Fair: low strength, slope, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Chanac	Fair: slope, low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
163--- Porterville	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
164--- Porterville	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, large stones.
165*: Psamments.				
Xerolls.				
166*. Quarries				
167--- Randsburg	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Poor: thin layer, area reclaim.
168--- Rescue Variant	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
169--- Rescue Variant	Poor: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
170*. Rock outcrop				
171--- Rosamond	Fair: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
172--- Rosamond	Fair: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, excess salt.
173--- Rosamond Variant	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
174, 175, 176--- Steuber	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: small stones.
177--- Steuber	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
178*:				
Sween Variant	Poor: low strength, shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones, slope.
Rock outcrop.				
179--- Tehachapi	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, slope.
180--- Tehachapi	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
181--- Tehachapi	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones, slope.
182--- Tehachapi	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
183--- Tehachapi Variant	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
184*: Torrifluvents.				
Cajon---	Good---	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy, small stones.
185*: Torriorthents.				
Rock outcrop.				
186--- Tujunga	Good---	Fair: excess fines.	Unsuited: excess fines.	Fair: too sandy.
187--- Tunis	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Poor: slope, thin layer, area reclaim.
188*:				
Tunis---	Poor: thin layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Poor: slope, thin layer, area reclaim.
Walong---	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
189, 190--- Tweedy	Poor: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
191*, 192*:				
Tweedy---	Poor: thin layer, low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Anaverde---	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
193--- Walong	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
194--- Walong	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
195*: Walong---	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
Arujo---	Fair: low strength, slope, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
196*, 197*: Walong---	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
Arujo---	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
198*: Walong---	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
Rock outcrop.				
199*, 200*: Walong---	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
Edmundston---	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
201, 202--- Wasioja	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
203, 204--- Whitewolf	Good---	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy, small stones.
205*: Xererts.				
Xerolls.				
206*. Xeric Torriorthents				
207*. Xerolls				
208*: Xerolls.				
Rock outcrop.				

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
209*, 210*. Xerorthents				
211*: Xerorthents.				
Rock outcrop.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
100*:						
Alko	Seepage, cemented pan.	Thin layer, seepage.	---	---	Cemented pan, soil blowing.	Droughty, cemented pan.
Neuralia	Seepage	Seepage	---	---	Soil blowing	Droughty.
101 Anaheim Variant	Depth to rock, slope.	Thin layer	---	---	Slope	Droughty, slope, depth to rock
102, 103 Anaverde	Slope, seepage.	Piping	---	---	Slope	Slope, droughty, erodes easily
104 Arizo	Slope, seepage.	Seepage	---	---	Slope, too sandy, soil blowing.	Droughty.
105 Arujo	Slope, depth to rock.	Thin layer	Slope, depth to rock.	Slope	Slope	Slope.
106*, 107*, 108*:						
Arujo	Slope, depth to rock.	Thin layer	Slope, depth to rock.	Slope	Slope	Slope.
Friant	Depth to rock, slope, seepage.	Thin layer, piping.	---	---	Slope, depth to rock.	Slope, rooting depth
Tunis	Slope, depth to rock.	Thin layer, piping.	---	---	Depth to rock, slope.	Rooting depth, slope, droughty.
109, 110 Arvin	Seepage	Piping	Slope	Slope, droughty, soil blowing.	Soil blowing	Droughty.
111 Arvin	Seepage	Large stones, piping.	Large stones, slope.	Large stones, slope, soil blowing.	Large stones, soil blowing.	Large stones, droughty.
112*:						
Badland.						
Orthents.						
113 Cajon	Slope, seepage.	Seepage, piping.	Slope, cutbanks cave.	Slope, droughty, fast intake.	Too sandy, soil blowing.	Slope, droughty.
114 Cajon	Seepage	Seepage, piping.	Cutbanks cave	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
115 Cajon	Seepage	Excess salt, seepage, piping.	Excess salt	Droughty, excess salt, excess sodium.	Too sandy, soil blowing.	Droughty, excess salt, excess sodium
116 Cajon	Seepage	Seepage, piping.	Favorable	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
17*:						
Cajon	Seepage	Seepage, piping.	Favorable	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
Garlock	Seepage	Piping	Slope	Droughty, soil blowing, slope.	Soil blowing	Droughty.
18*:						
Chanac	Slope	Favorable	Slope	Slope	Slope	Slope.
Badland.						
19*, 120*:						
Chanac	Slope	Favorable	Slope	Slope	Slope	Slope.
Pleito	Slope	Favorable	Percs slowly, slope.	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
21 Chino Variant	Seepage	Wetness	Favorable	Wetness	Wetness	Wetness.
22, 123 Cibo	Depth to rock, slope.	Thin layer	Percs slowly, depth to rock, slope.	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.
24 Cinco	Slope, seepage.	Seepage	---	---	Too sandy, slope.	Droughty, slope.
25 DeStazo	Favorable	Favorable	Favorable	Soil blowing	Soil blowing	Droughty.
26 DeStazo	Slope	Favorable	Slope	Soil blowing, slope.	Soil blowing	Droughty.
27 DiGiorgio	Favorable	Favorable	Favorable	Favorable	Favorable	Favorable.
28*. Dumps						
29, 130, 131, 132 Edmundston	Seepage, slope.	Piping, seepage.	---	---	Slope	Slope, droughty.
33*, 134*:						
Edmundston	Seepage, slope.	Piping, seepage.	---	---	Slope	Slope, droughty.
Godde	Slope, depth to rock.	Thin layer, piping, seepage.	---	---	Slope, depth to rock.	Slope, rooting depth, droughty.
Tollhouse	Slope, seepage, depth to rock.	Thin layer, seepage.	---	---	Slope, depth to rock.	Slope, rooting depth.
35*. Fluvents						
36 Friant	Depth to rock, slope, seepage.	Thin layer, piping.	---	---	Slope, depth to rock.	Slope, rooting depth.
37 Garlock	Seepage	Seepage	Slope	Droughty, soil blowing, slope.	Soil blowing	Droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
138*: Godde	Slope, depth to rock.	Thin layer, piping, seepage.	---	---	Slope, depth to rock.	Slope, rooting depth droughty.
Tollhouse	Slope, seepage, depth to rock.	Thin layer, seepage.	---	---	Slope, depth to rock.	Slope, rooting depth.
139*. Haploxerolls						
140 Havala	Seepage	Favorable	Favorable	Favorable	Favorable	Favorable.
141 Havala	Seepage	Favorable	Slope	Slope	Favorable	Favorable.
142 Havala	Slope, seepage.	Favorable	Slope	Slope	Favorable	Favorable.
143 Havala	Slope, seepage.	Favorable	Slope	Slope	Slope	Slope.
144 Hesperia	Seepage	Piping	Favorable	Fast intake, soil blowing.	Soil blowing	Droughty.
145, 146 Hesperia	Seepage	Piping	Slope	Slope, fast intake, soil blowing.	Soil blowing	Droughty.
147 Hi Vista	Depth to rock	Thin layer	---	---	Soil blowing, depth to rock.	Droughty, rooting depth.
148 Jawbone	Slope, depth to rock.	Thin layer, piping.	---	---	Slope, depth to rock, too sandy.	Slope, rooting depth, droughty.
149 Los Osos Variant	Slope, depth to rock.	Hard to pack, thin layer.	---	---	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.
150 Muroc	Seepage, depth to rock, cemented pan.	Thin layer, seepage.	---	---	Depth to rock, cemented pan, soil blowing.	Droughty, rooting depth.
151*: Muroc	Seepage, depth to rock, cemented pan.	Thin layer, seepage.	---	---	Depth to rock, cemented pan, soil blowing.	Droughty, rooting depth.
Randsburg	Seepage, depth to rock.	Thin layer, seepage.	---	---	Depth to rock, soil blowing.	Droughty, rooting depth.
152*, 153* Nacimiento	Slope, depth to rock.	Thin layer	Depth to rock, slope.	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth.
154 Neuralia	Seepage	Seepage	Favorable	Soil blowing	Soil blowing	Droughty.
155*: Norob	Seepage	Piping, excess salt.	---	---	Percs slowly, soil blowing.	Excess salt, excess sodium, percs slowly.
Neuralia	Seepage	Seepage	Favorable	Soil blowing	Soil blowing	Droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
156*: Pajuela	Slope, seepage.	Seepage	---	---	Too sandy, slope.	Droughty, slope.
Whitewolf	Seepage	Piping	---	---	Too sandy	Droughty.
157*. Pits						
158*. Playas						
159--- Pleito	Favorable	Favorable	Percs slowly, slope.	Percs slowly, slope.	Percs slowly---	Percs slowly.
160--- Pleito	Slope	Favorable	Percs slowly, slope.	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
161*: Pleito	Slope	Favorable	Percs slowly, slope.	Percs slowly, slope.	Percs slowly---	Percs slowly.
Chanac	Slope	Favorable	Slope	Slope	Favorable	Favorable.
162*: Pleito	Slope	Favorable	Percs slowly, slope.	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Chanac	Slope	Favorable	Slope	Slope	Slope	Slope.
163--- Porterville	Slope	Favorable	Percs slowly, slope.	Slope, slow intake, percs slowly.	Percs slowly---	Percs slowly.
164--- Porterville	Slope	Favorable	Percs slowly, slope.	Large stones, percs slowly, slope.	Percs slowly, large stones.	Percs slowly, large stones.
165*: Psamments.						
Xerolls.						
166*. Quarries						
167--- Randsburg	Seepage, depth to rock.	Thin layer, seepage.	---	---	Depth to rock, soil blowing.	Slope, droughty, rooting depth.
168, 169--- Rescue Variant	Slope, seepage.	Favorable	---	---	Slope, erodes easily.	Slope, erodes easily.
170*. Rock outcrop						
171--- Rosamond	Favorable	Favorable	Favorable	Soil blowing---	Favorable	Favorable.
172--- Rosamond	Favorable	Piping	Excess salt, excess sodium.	Excess sodium, excess salt.	Erodes easily	Excess salt, excess sodium.
173--- Rosamond Variant	Seepage	Seepage, piping.	Slope	Slope	Slope	Slope, droughty.
174--- Steuber	Seepage	Seepage	Favorable	Droughty---	Favorable	Droughty.
175--- Steuber	Seepage	Seepage	Slope	Slope, droughty.	Favorable	Droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
176---------- Steuber	Seepage, slope.	Seepage---------	Slope----------	Slope, droughty.	Favorable------	Droughty.
177---------- Steuber	Seepage, slope.	Seepage, piping.	Large stones, slope.	Large stones, slope, droughty.	Large stones---	Large stones, droughty.
178*: Sween Variant----	Depth to rock, slope.	Thin layer, large stones.	---	---	Slope, percs slowly, large stones.	Slope, percs slowly, large stones.
Rock outcrop.						
179---------- Tehachapi	Slope, seepage.	Favorable------	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
180---------- Tehachapi	Slope, seepage.	Favorable------	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
181---------- Tehachapi	Slope, seepage.	Large stones---	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.	Slope, large stones, percs slowly.	Large stones, slope, percs slowly.
182---------- Tehachapi	Seepage---------	Large stones---	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.	Large stones, percs slowly.	Large stones, percs slowly.
183---------- Tehachapi Variant	Slope----------	Favorable------	---	---	Slope----------	Slope.
184*: Torrifluvents.						
Cajon----------	Seepage---------	Seepage, piping.	---	---	Too sandy, soil blowing.	Droughty.
185*: Torriorthents.						
Rock outcrop.						
186---------- Tujunga	Seepage---------	Seepage, piping.	Cutbanks cave	Droughty, fast intake.	Too sandy------	Droughty.
187---------- Tunis	Slope, depth to rock.	Thin layer, piping.	---	---	Depth to rock, slope.	Rooting depth, slope, droughty.
188*: Tunis----------	Slope, depth to rock.	Thin layer, piping.	---	---	Depth to rock, slope.	Rooting depth, slope, droughty.
Walong----------	Slope, depth to rock, seepage.	Thin layer, seepage.	---	---	Slope, depth to rock.	Slope, droughty, rooting depth
189, 190---------- Tweedy	Depth to rock, slope.	Thin layer, piping.	---	---	Slope, depth to rock.	Slope, rooting depth
191*, 192*: Tweedy----------	Depth to rock, slope.	Thin layer, piping.	---	---	Slope, depth to rock.	Slope, rooting depth
Anaverde---------	Slope, seepage.	Piping---------	---	---	Slope----------	Slope, droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
193, 194---------- Walong	Slope, depth to rock, seepage.	Thin layer, seepage.	Depth to rock, slope.	Slope, droughty, rooting depth.	Slope, depth to rock.	Slope, droughty, rooting depth.
195*, 196*, 197*: Walong----------	Slope, depth to rock, seepage.	Thin layer, seepage.	Depth to rock, slope.	Slope, droughty, rooting depth.	Slope, depth to rock.	Slope, droughty, rooting depth.
Arujo----------	Slope, depth to rock.	Thin layer-----	Slope----------	Slope----------	Slope----------	Slope.
198*: Walong----------	Slope, depth to rock, seepage.	Thin layer, seepage.	---	---	Slope, depth to rock.	Slope, droughty, rooting depth.
Rock outcrop.						
199*, 200*: Walong----------	Slope, depth to rock, seepage.	Thin layer, seepage.	---	---	Slope, depth to rock.	Slope, droughty, rooting depth.
Edmundston-------	Seepage, slope.	Piping, seepage.	---	---	Slope----------	Slope, droughty.
201---------- Wasioja	Seepage--------	Piping---------	Slope----------	Slope, soil blowing.	Soil blowing---	Favorable.
202---------- Wasioja	Seepage, slope.	Piping---------	Slope----------	Slope, soil blowing.	Soil blowing---	Favorable.
203---------- Whitewolf	Seepage--------	Piping---------	Slope, cutbanks cave.	Droughty, soil blowing, slope.	Too sandy, soil blowing.	Droughty.
204---------- Whitewolf	Seepage--------	Piping---------	Slope, cutbanks cave.	Droughty, slope.	Too sandy------	Droughty.
205*: Xererts.						
Xerolls.						
206*. Xeric Torriorthents						
207*. Xerolls						
208*: Xerolls.						
Rock outcrop.						
209*, 210*. Xerorthents						
211*: Xerorthents.						
Rock outcrop.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
100*:											
Alko	0-14	Sandy loam	SM	A-2	0	95-100	75-100	50-70	20-35	20-30	NP-5
	14-23	Indurated	---	---	---	---	---	---	---	---	---
	23-60	Gravelly sandy loam, gravelly coarse sandy loam, coarse sandy loam.	SM	A-1, A-2	0	70-95	65-90	35-55	15-30	20-30	NP-5
Neuralia	0-7	Sandy loam	SM-SC, SM	A-2, A-4	0	100	85-100	55-70	30-40	15-25	NP-10
	7-31	Sandy clay loam, clay loam.	SC	A-6	0	100	80-100	65-85	35-50	25-35	10-15
	31-60	Stratified gravelly loamy sand to gravelly sandy clay loam.	SM, SM-SC	A-1, A-2, A-4	0	65-85	55-75	40-65	20-40	20-30	NP-10
101 Anaheim Variant	0-2	Very fine sandy loam.	ML, CL-ML	A-4	0	95-100	90-100	80-95	50-60	15-25	NP-10
	2-29	Clay loam, loam	CL	A-6	0	95-100	85-100	85-100	65-80	25-40	10-20
	29	Weathered bedrock.	---	---	---	---	---	---	---	---	---
102, 103 Anaverde	0-8	Gravelly loam	SM	A-4	0-10	70-85	50-75	50-65	35-50	25-35	NP-10
	8-35	Gravelly loam, loam.	SM, ML, GM	A-4	5-15	60-95	50-90	50-80	35-70	25-35	NP-10
	35-62	Gravelly sandy loam, gravelly loam.	GM, SM	A-4, A-1, A-2	5-25	60-70	60-75	45-65	20-50	20-35	NP-10
	62-90	Very stony sandy loam, stony sandy loam.	GM, SM	A-2	25-50	60-70	50-75	45-55	25-35	15-30	NP-5
	90	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
104 Arizo	0-3	Gravelly loamy sand.	SP-SM, SM	A-1	0-15	60-70	50-60	15-25	5-15	---	NP
	3-65	Stratified very gravelly coarse sand to very gravelly loamy sand.	GP-GM, GP	A-1	0-15	35-55	20-50	10-30	0-10	---	NP
105 Arujo	0-3	Sandy loam	SM	A-2, A-4	0	90-100	85-100	50-70	25-40	15-25	NP-5
	3-23	Loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	60-90	50-70	20-35	5-15
	23-45	Clay loam, sandy clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	35-85	25-40	10-20
	45-55	Loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-95	50-70	20-35	5-15
	55	Weathered bedrock.	---	---	---	---	---	---	---	---	---
106*, 107*, 108*: Arujo	0-3	Sandy loam	SM	A-2, A-4	0	90-100	85-100	50-70	25-40	15-25	NP-5
	3-23	Loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	60-90	50-70	20-35	5-15
	23-45	Clay loam, sandy clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	35-85	25-40	10-20
	45-55	Loam	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-95	50-70	20-35	5-15
	55	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
106*, 107*, 108*:											
Friant	0-10	Sandy loam	SM, SM-SC	A-4	0-10	90-100	85-100	60-70	35-50	20-30	NP-10
	10-18	Gravelly sandy loam, gravelly fine sandy loam, sandy loam.	SM	A-1, A-2, A-4	0-10	80-100	65-100	40-60	20-40	15-25	NP-5
	18	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Tunis	0-2	Loam	CL-ML, ML	A-4	0	80-100	75-100	65-95	50-60	20-30	NP-10
	2-18	Loam, sandy loam	SM, ML	A-4	0	80-100	75-100	60-75	40-55	20-30	NP-5
	18	Weathered bedrock.	---	---	---	---	---	---	---	---	---
109, 110	0-21	Sandy loam	SM, SM-SC	A-2, A-4	0-5	80-100	75-100	45-70	25-50	15-30	NP-10
Arvin	21-60	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0-5	80-100	75-100	40-65	25-40	15-25	NP-5
111	0-21	Stony sandy loam	SM, SM-SC	A-2, A-4	25-45	80-95	75-95	45-70	25-50	15-30	NP-10
Arvin	21-60	Cobbly sandy loam, cobbly coarse sandy loam.	SM	A-1, A-2	25-45	75-95	70-90	35-50	20-35	15-25	NP-5
112*:											
Badland.											
Orthents.											
113	0-4	Sand	SM, SP-SM	A-1, A-2,	0	95-100	75-100	40-60	5-25	---	NP
Cajon	4-60	Stratified sand to loamy fine sand.	SM, SP-SM	A-1, A-2, A-3	0	95-100	75-100	40-60	5-25	---	NP
114	0-20	Loamy sand	SM	A-2 A-2, A-3	0	95-100	75-100	50-80	10-30	10-20	NP-5
	20-60	Gravelly sand, gravelly loamy sand, gravelly sandy loam.	SM, SP-SM	A-1	0	60-85	50-75	25-50	5-20	---	NP
115	0-48	Loamy sand	SM	A-2	0	95-100	75-100	50-80	10-30	15-20	NP-5
Cajon	48-60	Stratified sand to loamy fine sand.	SM, SP-SM	A-1, A-2, A-3	0	95-100	75-100	40-60	5-20	---	NP
116	0-36	Gravelly loamy sand.	SM, GM	A-1	0	55-80	50-75	25-50	10-20	---	NP
Cajon	36-60	Gravelly sand, gravelly fine sand.	SM, SP-SM	A-1, A-2	0	55-80	50-75	25-55	5-25	---	NP
117*:											
Cajon	0-42	Sand	SM, SP-SM	A-1, A-2, A-3	0	100	100	40-60	5-25	---	NP
	42-60	Silt loam	ML	A-4	0	100	100	95-100	90-100	25-40	NP-10

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
117*:											
Garlock	0-18	Sand	SM, SP-SM	A-1, A-2	0	90-100	85-95	45-65	5-25	---	NP
	18-30	Sandy clay loam, gravelly sandy clay loam.	SC	A-6	0	80-100	70-95	55-85	35-50	25-35	10-20
	30-45	Sandy loam, gravelly sandy loam.	SM	A-2, A-4	0	80-100	70-95	40-70	25-40	15-25	NP-5
	45-60	Silt loam, stratified silt loam to gravelly loamy sand.	ML	A-4	0	100	70-90	60-70	35-45	25-35	NP-10
118*:											
Chanac	0-10	Sandy clay loam	SM-SC, SC	A-4, A-6	0	90-100	85-100	65-80	35-50	25-35	5-15
	10-31	Sandy clay loam, clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	90-100	85-100	70-100	40-75	25-40	5-15
	31-41	Coarse sandy loam, sandy loam, loam.	ML, SM	A-2, A-4	0	90-100	85-100	50-75	30-60	20-35	NP-10
	41-60	Stratified clay loam to sandy loam.	SM, SM-SC	A-2, A-4	0	90-100	85-100	55-80	30-50	20-30	NP-10
Badland.											
119*, 120*:											
Chanac	0-10	Sandy clay loam	SM-SC, SC	A-4, A-6	0	90-100	85-100	65-80	35-50	25-35	5-15
	10-31	Sandy clay loam, clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	90-100	85-100	70-100	40-75	25-40	5-15
	31-41	Coarse sandy loam, sandy loam, loam.	ML, SM	A-2, A-4	0	90-100	85-100	50-75	30-60	20-35	NP-10
	41-60	Stratified clay loam to sandy loam.	SM, SM-SC	A-2, A-4	0	90-100	85-100	55-80	30-50	20-30	NP-10
Pleito	0-16	Sandy clay loam	SC	A-6	0-10	80-100	75-100	60-80	35-50	25-35	10-15
	16-23	Sandy clay loam, clay loam, loam	CL-ML, CL, SM-SC, SC	A-4, A-6	0-10	80-100	75-100	70-90	40-60	25-35	5-15
	23-60	Gravelly sandy clay loam, gravelly clay loam, gravelly loam.	SC, GC	A-6	0-15	60-75	60-75	50-65	35-50	25-40	10-20
121	0-29	Clay loam	CL	A-6	0	100	100	85-100	60-85	25-40	10-20
Chino Variant	29-53	Sandy loam	SM, SM-SC	A-2, A-4	0	90-100	85-100	50-70	25-40	15-30	NP-10
	53-60	Sandy clay loam, clay loam.	SC	A-6	0	90-100	85-100	70-85	35-50	25-40	10-20
122, 123	0-2	Cobbly clay	CL, CH	A-7	30-35	95-100	95-100	90-100	70-90	40-65	20-35
Cibo	2-23	Clay loam, clay	CL, CH	A-7	0	95-100	95-100	90-100	70-90	40-65	20-35
	23-31	Weathered bedrock.	---	---	---	---	---	---	---	---	---
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
124---------- Cinco	0-8	Gravelly loamy sand.	SM	A-1	0	85-95	50-75	25-50	10-20	---	NP
	8-86	Gravelly loamy sand.	SM	A-1	0	85-95	50-75	25-50	10-20	---	NP
	86	Weathered bedrock.	---	---	---	---	---	---	---	---	---
125---------- DeStazo	0-11	Sandy loam------	SM	A-2, A-4	0	95-100	90-100	70-95	30-50	15-25	NP-5
	11-52	Very gravelly clay loam, very gravelly sandy clay loam.	GP-GC, GC	A-2	0	15-55	10-50	10-45	5-35	25-40	10-20
	52-65	Clay loam-------	CL	A-6	0	90-100	85-100	65-80	65-75	25-40	10-20
126---------- DeStazo	0-3	Sandy loam------	SM	A-2, A-4	0	95-100	90-100	70-95	30-50	15-25	NP-5
	3-44	Very gravelly clay loam, very gravelly sandy clay loam.	GP-GC, GC	A-2	0	15-55	10-50	10-45	5-35	25-40	10-20
	44-65	Sandy loam, sandy clay loam.	SM-SC, SC	A-4, A-6	0	90-100	85-100	50-70	35-50	20-35	5-15
127---------- DiGiorgio	0-18	Sandy clay loam	SC, CL	A-6	0	100	95-100	80-90	35-55	30-40	10-15
	18-60	Sandy clay loam	SC, CL	A-6	0	100	95-100	85-90	40-55	30-40	15-20
	60-78	Sandy loam, fine sandy loam, loam.	SM, ML	A-2, A-4	0	100	95-100	60-85	30-55	20-25	NP-5
128*. Dumps											
129---------- Edmundston	0-17	Sandy loam------	SM	A-2, A-4	0-10	85-100	75-100	45-70	25-40	15-25	NP-5
	17-50	Sandy loam, gravelly sandy loam, gravelly loam.	SM	A-1, A-2	0-10	75-100	55-95	35-70	20-35	15-25	NP-5
	50	Weathered bedrock.	---	---	---	---	---	---	---	---	---
130, 131---------- Edmundston	0-17	Gravelly sandy loam.	SM	A-2	0-10	70-80	65-75	40-50	25-35	15-25	NP-5
	17-50	Sandy loam, gravelly sandy loam, gravelly loam.	SM	A-1, A-2	0-10	75-100	55-95	35-70	20-35	15-25	NP-5
	50	Weathered bedrock.	---	---	---	---	---	---	---	---	---
132---------- Edmundston	0-17	Gravelly sandy loam.	SM	A-2	0-10	70-80	65-75	40-50	25-35	15-25	NP-5
	17-50	Sandy loam, gravelly sandy loam, gravelly loam.	SM	A-1, A-2	0-10	75-100	55-95	35-70	20-35	15-25	NP-5
	50	Weathered bedrock.	---	---	---	---	---	---	---	---	---
133*, 134*: Edmundston--------	0-17	Gravelly sandy loam.	SM	A-2	0-10	70-80	65-75	40-50	25-35	15-25	NP-5
	17-50	Sandy loam, gravelly sandy loam, gravelly coarse sandy loam.	SM	A-1, A-2	0-10	75-100	55-95	35-70	20-35	15-25	NP-5
	50	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
133*, 134*: Godde	0-10	Gravelly sandy loam.	SM, SM-SC, GM, GM-GC	A-2, A-4, A-1	0-10	55-80	50-75	35-65	20-50	15-25	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tollhouse	0-13	Gravelly sandy loam.	SM	A-1, A-2	0-5	70-90	50-75	30-50	20-35	20-30	NP-5
	13	Weathered bedrock.	---	---	---	---	---	---	---	---	---
135*. Fluvents											
136 Friant	0-10	Sandy loam	SM, SM-SC	A-4	0-10	90-100	85-100	60-70	35-50	20-30	NP-10
	10-18	Sandy loam, gravelly fine sandy loam, gravelly loam.	SM	A-1, A-2, A-4	0-10	80-100	65-100	40-60	20-40	15-25	NP-5
	18	Weathered bedrock.	---	---	---	---	---	---	---	---	---
137 Garlock	0-12	Loamy sand	SM, SP-SM	A-1, A-2	0	90-100	85-95	45-65	5-25	---	NP
	12-24	Sandy clay loam, gravelly sandy clay loam.	SC	A-6	0	80-100	70-95	50-85	35-50	25-35	10-20
	24-33	Sandy loam, gravelly sandy loam.	SM	A-2, A-4	0	80-100	70-95	40-75	25-40	15-25	NP-5
	33-51	Gravelly loamy sand, gravelly sand.	SM, SP-SM	A-1	0	55-90	50-75	25-45	5-20	---	NP
	51-60	Very gravelly loamy sand, very gravelly sand.	SP, SP-SM, SM	A-1	0-25	55-80	30-50	15-30	0-15	---	NP
138*: Godde	0-10	Gravelly sandy loam.	SM, SM-SC, GM, GM-GC	A-2, A-4, A-1	0-10	55-80	50-75	35-65	20-50	15-25	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tollhouse	0-13	Gravelly sandy loam.	SM	A-1, A-2	0-5	70-90	50-75	30-50	20-35	20-30	NP-5
	13	Weathered bedrock.	---	---	---	---	---	---	---	---	---
139*. Haploxerolls											
140, 141 Havala	0-24	Sandy loam	SM	A-2, A-4	0-5	80-100	75-100	55-70	30-40	15-25	NP-5
	24-48	Sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-5	80-100	75-100	65-90	35-55	20-35	5-15
	48-65	Sandy loam, fine sandy loam.	SM	A-2, A-4	0-5	80-100	75-100	50-70	25-40	20-30	NP-5
142 Havala	0-24	Sandy loam	SM	A-2, A-4	0-5	80-100	75-100	55-70	30-40	15-25	NP-5
	24-48	Sandy clay loam, clay loam.	SC, CL	A-6	0-5	80-100	75-100	70-95	35-60	25-40	10-20
	48-65	Sandy loam, fine sandy loam.	SM	A-2, A-4	0-5	80-100	75-100	50-70	25-40	20-30	NP-5

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
143----------	0-24	Sandy loam------	SM	A-2, A-4	0-5	80-100	75-100	55-70	30-40	15-25	NP-5
Havala	24-48	Sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-5	80-100	75-100	65-90	35-55	20-35	5-15
	48-65	Sandy loam, fine sandy loam.	SM	A-2, A-4	0-5	80-100	75-100	50-70	25-40	20-30	NP-5
144----------	0-18	Sandy loam------	SM	A-2, A-4	0	95-100	90-100	60-80	30-50	20-30	NP-5
Hesperia	18-34	Fine sandy loam	SM-SC, SM	A-2, A-4	0	80-100	75-100	55-85	30-50	20-30	NP-10
	34-70	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	45-70	25-40	20-30	NP-5
145----------	0-18	Sandy loam------	SM	A-2, A-4	0	95-100	90-100	60-80	30-50	20-30	NP-5
Hesperia	18-34	Fine sandy loam	SM-SC, SM	A-2, A-4	0	80-100	75-100	55-85	30-50	20-30	NP-10
	34-60	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	45-70	25-40	20-30	NP-5
146----------	0-36	Sandy loam------	SM	A-2, A-4	0	95-100	90-100	60-80	30-50	20-30	NP-5
Hesperia	36-60	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	45-70	25-40	20-30	NP-5
147----------	0-4	Sandy loam------	SM	A-2	0	90-100	85-90	50-65	25-35	15-25	NP-5
Hi Vista	4-30	Gravelly sandy clay loam, gravelly clay loam.	SC	A-2, A-6	0	65-80	50-75	40-70	25-50	25-40	10-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
148----------	0-10	Gravelly loamy sand.	SM	A-1	0	65-80	60-75	30-50	10-25	---	NP
Jawbone	10	Weathered bedrock.	---	---	---	---	---	---	---	---	---
149----------	0-22	Clay loam-------	CL	A-6	0	95-100	90-100	70-100	60-80	30-40	10-20
Los Osos Variant	22-32	Clay------------	CL, CH	A-7	0	95-100	90-100	90-100	70-90	45-60	20-30
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
150----------	0-15	Sandy loam------	SM	A-2, A-4	0	80-100	75-100	50-70	25-40	15-25	NP-5
Muroc	15-27	Indurated-------	---	---	---	---	---	---	---	---	---
	27	Weathered bedrock.	---	---	---	---	---	---	---	---	---
151*:											
Muroc----------	0-15	Sandy loam------	SM	A-2, A-4	0	80-100	75-100	50-70	25-40	15-25	NP-5
	15-27	Indurated-------	---	---	---	---	---	---	---	---	---
	27	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Randsburg---------	0-12	Sandy loam------	SM	A-2, A-4	0	80-100	75-100	50-70	25-45	---	NP
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
152*, 153*---------	0-12	Loam------------	CL, ML	A-6, A-7	0	80-100	75-100	70-95	65-85	35-45	10-20
	12-24	Loam, gravelly loam.	CL, ML	A-6, A-7	0	75-95	60-85	50-75	40-65	35-45	10-20
Nacimiento	24	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
154---------- Neuralia	0-7	Sandy loam------	SM-SC, SM	A-2, A-4	0	100	85-100	55-70	30-40	15-25	NP-10
	7-31	Sandy clay loam, clay loam.	SC	A-6	0	100	80-100	65-85	35-50	25-35	10-15
	31-55	Stratified gravelly loamy sand to gravelly sandy clay loam.	SM, SM-SC	A-1, A-2, A-4	0	65-85	55-75	40-65	20-40	20-30	NP-10
155*:											
Norob----------	0-6	Sand----------	SN-SM, SM	A-2	0	100	95-100	50-75	5-15	---	NP
	6-13	Sandy clay loam	SM-SC	A-4	0	100	95-100	80-90	35-50	25-30	5-10
	13-40	Sandy clay loam, clay loam.	SC, CL	A-6, A-7	0	100	95-100	80-100	40-75	30-45	10-20
	40-60	Gravelly sandy loam, sandy loam, sandy clay loam.	SM-SC, SM	A-1, A-2	0	60-80	55-85	35-55	15-35	20-30	NP-10
Neuralia----------	0-7	Sandy loam------	SM-SC, SM	A-2, A-4	0	100	85-100	55-70	30-40	15-25	NP-10
	7-31	Sandy clay loam, clay loam.	SC	A-6	0	100	80-100	65-85	35-50	25-35	10-15
	31-55	Stratified gravelly loamy sand to gravelly sandy clay loam.	SM, SM-SC	A-1, A-2, A-4	0	65-85	55-75	40-65	20-40	20-30	NP-10
156*:											
Pajuela----------	0-12	Gravelly sandy loam.	GM, SM	A-1, A-2	0-10	55-80	50-75	30-50	15-30	20-30	NP-5
	12-22	Gravelly loamy sand.	GM, SM	A-1	0-25	55-80	50-75	30-50	15-20	---	NP
	22-60	Very gravelly loamy sand, very gravelly loamy coarse sand.	GP, GP-GM	A-1	0-25	25-55	20-50	10-30	0-15	---	NP
Whitewolf----------	0-32	Loamy sand------	SM	A-1, A-2	0	80-100	75-100	40-75	15-30	---	NP
	32-70	Sand, loamy sand loamy coarse sand.	SP-SM, SM	A-1, A-2, A-3	0	80-100	75-100	40-75	5-15	---	NP
157*. Pits											
158*. Playas											
159---------- Pleito	0-23	Sandy clay loam	SC	A-6	0-15	80-100	75-100	60-80	35-50	25-35	10-15
	23-60	Sandy clay loam, clay loam.	CL, SC	A-6	0-15	80-100	75-100	60-90	35-75	25-40	10-20
160---------- Pleito	0-16	Sandy clay loam	SC	A-6	0-10	80-100	75-100	60-80	35-50	25-35	10-15
	16-23	Sandy clay loam clay loam, loam	CL-ML, CL SM-SC, SC	A-4, A-6	0-10	80-100	75-100	70-90	40-60	25-35	5-15
	23-60	Gravelly sandy clay loam, gravelly clay loam, gravelly loam.	SC, GC	A-6	0-15	60-75	60-75	50-65	35-50	25-40	10-20

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
161*, 162*:											
Pleito	0-16	Sandy clay loam	SC	A-6	0-10	80-100	75-100	60-80	35-50	25-35	10-15
	16-23	Sandy clay loam, clay loam, loam	CL-ML, CL, SM-SC, SC	A-4, A-6	0-10	80-100	75-100	70-90	40-60	25-35	5-15
	23-60	Gravelly sandy clay loam, gravelly clay loam, gravelly loam.	SC, GC	A-6	0-15	60-75	60-75	50-65	35-50	25-40	10-20
Chanac	0-10	Sandy clay loam	SM-SC, SC	A-4, A-6	0	90-100	85-100	65-80	35-50	25-35	5-15
	10-31	Sandy clay loam, clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	90-100	85-100	70-100	40-75	25-40	5-15
	31-41	Coarse sandy loam, sandy loam, loam.	ML, SM	A-2, A-4	0	90-100	85-100	50-75	30-60	20-35	NP-10
	41-60	Stratified clay loam to sandy loam.	SM, SM-SC	A-2, A-4	0	90-100	85-100	55-80	30-50	20-30	NP-10
163--- Porterville	0-36	Clay	CH, CL, MH	A-7	0-5	85-100	75-100	70-95	60-90	45-65	20-30
	36-60	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-20
164--- Porterville	0-12	Cobbly clay	CH, CL	A-7	20-40	85-95	75-85	65-75	60-70	45-65	20-30
	12-36	Clay	CH, CL	A-7	0-10	95-100	90-100	80-100	65-95	45-65	20-30
	36-60	Silty clay loam	CL	A-6, A-7	0-10	95-100	90-100	80-100	75-95	35-45	15-20
165*: Psamments.											
Xerolls.											
166*. Quarries											
167--- Randsburg	0-12	Sandy loam	SM	A-2, A-4	0	80-100	75-100	50-70	25-45	---	NP
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
168, 169--- Rescue Variant	0-16	Loam	CL-ML	A-4	0	80-100	75-100	65-95	55-75	20-30	5-10
	16-68	Clay loam	CL	A-6	0	80-100	75-100	70-100	50-75	25-40	10-20
	68-99	Loam, clay loam. Weathered bedrock.	CL-ML ---	A-4 ---	0 ---	80-100 ---	75-100 ---	65-95 ---	55-80 ---	20-30 ---	5-10 ---
170*. Rock outcrop											
171--- Rosamond	0-2	Sandy loam	SM,	A-2, A-4	0	100	100	70-90	30-50	15-20	NP-5
	2-12	Clay loam	CL	A-6	0	80-100	75-100	70-100	50-75	25-40	10-20
	12-60	Stratified loam to silty clay loam.	CL	A-6	0	100	100	95-100	60-85	25-40	10-20
172--- Rosamond	0-2	Sandy loam	SM	A-4	0	100	100	70-85	35-50	25-40	NP-5
	2-10	Clay loam	CL	A-6	0	80-100	75-100	70-100	50-75	25-40	10-20
	10-60	Stratified loam to silty clay loam.	CL	A-6	0	100	95-100	85-100	60-85	25-40	10-20
173--- Rosamond Variant	0-7	Sandy loam	SM	A-2, A-4	0	90-100	85-100	50-65	25-40	20-25	NP-5
	7-60	Sandy clay loam	SC	A-6	0	90-100	85-100	65-80	35-50	30-40	10-15

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
174, 175---------- Steuber	0-60	Sandy loam------	SM	A-2, A-4	0-5	80-100	75-100	45-70	25-40	15-25	NP-5
176---------- Steuber	0-45	Sandy loam------	SM	A-2, A-4	0-5	80-100	75-100	45-70	25-40	15-25	NP-5
	45-60	Gravelly sandy loam.	SM	A-1, A-2	0-5	65-80	60-75	40-45	20-35	15-25	NP-5
177---------- Steuber	0-12	Stony sandy loam	SM	A-1, A-2, A-4	5-25	70-80	65-75	40-60	20-50	15-25	NP-5
	12-44	Cobbly sandy loam, cobbly loam.	SM	A-1, A-2, A-4	5-25	70-80	65-75	40-60	20-50	15-25	NP-5
	44-54	Stony sandy loam, stony loam.	SM	A-1, A-2, A-4	5-25	70-80	65-75	40-60	20-50	15-25	NP-5
	54-60	Gravelly sandy loam, gravelly loam.	SM	A-1, A-2, A-4	5-10	70-85	65-75	40-60	20-50	15-25	NP-5
178*: Sween Variant-----	0-12	Stony sandy clay loam.	SC	A-6	25-50	95-100	90-100	75-90	35-50	30-40	10-20
	12-38	Stony clay------	CL, CH	A-7	25-50	95-100	90-100	85-100	75-90	45-60	20-30
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
179---------- Tehachapi	0-11	Sandy loam------	SM-SC, SM	A-2, A-4	0-5	85-100	75-100	45-70	25-50	20-30	NP-10
	11-19	Sandy clay loam	SC	A-6	0-5	85-100	75-100	65-80	35-50	30-40	10-20
	19-32	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0-5	85-100	75-100	70-80	35-80	30-45	10-20
	32-44	Sandy clay loam, sandy loam.	SM-SC, SC	A-4, A-6	0-5	85-100	75-100	60-80	35-50	25-35	5-15
	44-60	Stratified loamy sand to sandy clay loam.	SM-SC	A-2, A-4	0-15	85-100	75-100	40-75	25-50	20-30	5-10
180---------- Tehachapi	0-5	Loam----------	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	65-70	50-65	20-35	5-15
	5-19	Sandy clay loam	SC	A-6	0-5	85-100	75-100	65-80	35-50	30-40	10-20
	19-32	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0-5	85-100	75-100	70-80	35-80	30-45	10-20
	32-44	Sandy clay loam, sandy loam.	SM-SC, SC	A-4, A-6	0-5	85-100	75-100	60-80	35-50	25-35	5-15
	44-60	Stratified loamy sand to sandy clay loam.	SM-SC	A-2, A-4	0-15	85-100	75-100	40-75	25-50	20-30	5-10
181---------- Tehachapi	0-19	Cobbly sandy clay loam.	SC	A-2, A-6	25-35	80-100	75-90	65-75	30-50	30-40	10-20
	19-44	Cobbly clay loam, cobbly sandy clay loam.	CL, SC	A-6, A-7	25-35	80-100	75-90	70-80	35-75	30-45	10-20
	44-60	Stratified cobbly loamy sand to cobbly sandy clay loam.	SM-SC	A-2, A-4	25-50	80-100	75-90	40-60	25-50	20-30	5-10

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
182---------- Tehachapi	0-19	Cobbly sandy clay loam.	SC	A-2, A-6	25-35	80-100	75-90	65-75	30-50	30-40	10-20
	19-30	Cobbly clay loam, cobbly sandy clay loam.	CL, SC	A-6, A-7	25-35	80-100	75-90	70-80	35-75	30-45	10-20
	30-60	Stratified cobbly loamy sand to cobbly sandy clay loam.	SM-SC	A-2, A-4	25-50	80-100	75-90	40-60	25-50	20-30	5-10
183---------- Tehachapi Variant	0-60	Sandy clay loam	SC	A-6	0-5	90-100	85-100	75-90	35-50	30-40	10-20
184*: Torrifluvents.											
Cajon----------	0-60	Loamy sand------	SM	A-2	0	95-100	75-100	50-80	10-30	10-20	NP-5
185*: Torriorthents.											
Rock outcrop.											
186---------- Tujunga	0-60	Loamy sand------	SW-SM, SM, SP-SM	A-1, A-2, A-3	0-5	90-100	75-95	40-70	5-25	---	NP
187---------- Tunis	0-18	Sandy loam------	SM	A-2, A-4	0	80-100	75-100	50-70	25-50	20-30	NP-5
	18	Weathered bedrock.	---	---	---	---	---	---	---	---	---
188*: Tunis----------	0-18	Loam----------	CL-ML, ML	A-4	0	80-100	75-100	65-95	50-75	20-35	5-10
	18	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Walong----------	0-27	Sandy loam------	SM	A-2, A-4	0-5	95-100	85-100	55-70	30-40	20-30	NP-5
	27	Weathered bedrock.	---	---	---	---	---	---	---	---	---
189, 190---------- Tweedy	0-10	Sandy loam------	SM	A-4	0-25	90-100	75-100	55-70	35-50	20-30	NP-5
	10-38	Sandy clay loam, clay loam.	ML, CL, SM, SC	A-6, A-7	0-25	90-100	75-100	75-90	40-75	35-45	10-20
	38	Weathered bedrock.	---	---	---	---	---	---	---	---	---
191*, 192*: Tweedy----------	0-10	Sandy loam------	SM	A-4	0-25	90-100	75-100	55-70	35-50	20-30	NP-5
	10-38	Sandy clay loam, clay loam.	ML, CL, SM, SC	A-6, A-7	0-25	90-100	75-100	75-90	40-75	35-45	10-20
	38	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Anaverde----------	0-35	Gravelly loam---	SM	A-4	0-10	70-85	50-75	50-65	35-50	25-35	NP-10
	35-62	Gravelly sandy loam, gravelly loam.	GM, SM	A-4, A-1, A-2	5-15	60-70	50-75	45-65	20-50	20-35	NP-10
	62-90	Very stony sandy loam, stony sandy loam.	GM, SM	A-2	25-50	60-70	50-75	45-55	25-35	15-30	NP-5
	90	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
193, 194---------- Walong	0-14	Sandy loam------	SM	A-2, A-4	0-5	95-100	85-100	55-70	30-40	20-30	NP-5
	14-27	Coarse sandy loam, sandy loam, gravelly coarse sandy loam.	SM	A-1, A-2	0-15	70-100	65-95	40-65	20-35	20-30	NP-5
	27	Weathered bedrock.	---	---	---	---	---	---	---	---	---
195*, 196*, 197*: Walong----------	0-14	Sandy loam------	SM	A-2, A-4	0-5	95-100	85-100	55-70	30-40	20-30	NP-5
	14-27	Coarse sandy loam, sandy loam, gravelly coarse sandy loam.	SM	A-1, A-2	0-15	70-100	65-95	40-65	20-35	20-30	NP-5
	27	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Arujo----------	0-3	Sandy loam------	SM	A-2, A-4	0	90-100	85-100	50-70	25-40	15-25	NP-5
	3-23	Loam----------	CL-ML, CL	A-4, A-6	0	90-100	85-100	60-90	50-70	20-35	5-15
	23-45	Clay loam, sandy clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	35-85	25-40	10-20
	45-55	Loam----------	CL-ML, CL	A-4, A-6	0	90-100	85-100	70-95	50-70	20-35	5-15
	55	Weathered bedrock.	---	---	---	---	---	---	---	---	---
198*: Walong----------	0-14	Sandy loam------	SM	A-2, A-4	0-5	95-100	85-100	55-70	30-40	20-30	NP-5
	14-27	Coarse sandy loam, sandy loam, gravelly coarse sandy loam.	SM	A-1, A-2	0-15	70-100	65-95	40-65	20-35	20-30	NP-5
	27	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
199*, 200*: Walong----------	0-14	Sandy loam------	SM	A-2, A-4	0-5	95-100	85-100	55-70	30-40	20-30	NP-5
	14-27	Coarse sandy loam, sandy loam, gravelly coarse sandy loam.	SM	A-1, A-2	0-15	70-100	65-95	40-65	20-35	20-30	NP-5
	27	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Edmundston---------	0-17	Sandy loam------	SM	A-2, A-4	0-10	85-100	75-100	45-70	25-40	15-25	NP-5
	17-50	Sandy loam, gravelly sandy loam, gravelly coarse sandy loam.	SM	A-1, A-2	0-10	75-100	55-95	35-70	20-35	15-25	NP-5
	50-52	Weathered bedrock.	---	---	---	---	---	---	---	---	---
201, 202---------- Wasioja	0-34	Sandy loam------	SM	A-2, A-4	0	80-100	75-100	50-85	25-50	15-25	NP-5
	34-49	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0	80-100	75-100	65-95	35-75	25-40	10-20
	49-62	Sandy loam, loam	SM, SM-SC	A-4	0	80-100	75-100	50-85	35-50	15-30	NP-10

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
203----------	0-32	Loamy sand------	SM	A-1, A-2	0	80-100	75-100	40-75	15-30	---	NP
Whitewolf	32-70	Loamy coarse sand, loamy sand.	SM	A-1, A-2	0	80-100	75-100	40-75	15-30	---	NP
204----------	0-32	Loamy sand------	SM	A-1, A-2	0	80-100	75-100	40-75	15-30	---	NP
Whitewolf	32-60	Sand----------	SP-SM, SM	A-1, A-2, A-3	0	80-100	75-100	40-70	5-15	---	NP
205*:											
Xererts.											
Xerolls.											
206*.											
Xeric Torriorthents											
207*.											
Xerolls											
208*:											
Xerolls.											
Rock outcrop.											
209*, 210*.											
Xerorthents											
211*:											
Xerorthents.											
Rock outcrop.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
100*:									
Alko	0-14	2.0-6.0	0.07-0.12	7.9-8.4	<2	Low	0.24	1	3
	14-23	---	---	---	---	---	---		
	23-60	2.0-6.0	0.05-0.12	7.9-8.4	<2	Low	0.24		
Neuralia	0-7	2.0-6.0	0.09-0.11	6.6-8.4	<2	Low	0.28	5	3
	7-31	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.24		
	31-60	0.2-0.6	0.10-0.13	7.4-8.4	<2	Low	0.20		
101	0-2	0.6-2.0	0.13-0.16	6.6-8.4	<2	Low	0.20	2	---
Anaheim Variant	2-29	0.2-0.6	0.16-0.18	6.6-8.4	<2	Moderate	0.28		
	29	---	---	---	---	---	---		
102, 103	0-8	0.6-2.0	0.11-0.14	6.1-7.3	<2	Low	0.32	5	---
Anaverde	8-35	0.6-2.0	0.08-0.12	6.1-7.3	<2	Low	0.37		
	35-62	0.6-2.0	0.05-0.08	6.1-7.3	<2	Low	0.32		
	62-90	0.6-2.0	0.04-0.07	6.1-7.3	<2	Low	0.28		
	90	---	---	---	---	---	---		
104	0-3	>6.0	0.05-0.07	7.4-8.4	<2	Low	0.10	5	2
Arizo	3-65	>20	0.04-0.06	7.4-8.4	<2	Low	0.10		
105	0-3	2.0-6.0	0.10-0.12	5.6-7.8	<2	Low	0.20	3	---
Arujo	3-23	0.6-2.0	0.14-0.17	5.6-7.8	<2	Moderate	0.32		
	23-45	0.2-0.6	0.15-0.19	5.6-7.8	<2	Moderate	0.20		
	45-55	0.6-2.0	0.14-0.17	5.6-7.8	<2	Moderate	0.32		
	55	---	---	---	---	---	---		
106*, 107*, 108*:									
Arujo	0-3	2.0-6.0	0.10-0.12	5.6-7.8	<2	Low	0.20	3	---
	3-23	0.6-2.0	0.14-0.17	5.6-7.8	<2	Moderate	0.32		
	23-45	0.2-0.6	0.15-0.19	5.6-7.8	<2	Moderate	0.20		
	45-55	0.6-2.0	0.14-0.17	5.6-7.8	<2	Moderate	0.32		
	55	---	---	---	---	---	---		
Friant	0-10	2.0-6.0	0.10-0.13	5.6-7.3	<2	Low	0.32	1	---
	10-18	2.0-6.0	0.08-0.10	5.6-7.3	<2	Low	0.28		
	18	---	---	---	---	---	---		
Tunis	0-2	0.6-2.0	0.14-0.16	6.1-7.8	<2	Low	0.28	1	---
	2-18	0.6-2.0	0.10-0.14	6.1-7.8	<2	Low	0.28		
	18	---	---	---	---	---	---		
109, 110	0-21	2.0-6.0	0.09-0.11	6.1-7.8	<2	Low	0.32	5	3
Arvin	21-60	2.0-6.0	0.09-0.11	6.1-7.8	<2	Low	0.32		
111	0-21	2.0-6.0	0.07-0.09	6.1-7.8	<2	Low	0.28	5	3
Arvin	21-60	2.0-6.0	0.07-0.09	6.1-7.8	<2	Low	0.28		
112*:									
Badland.									
Orthents.									
113	0-4	6.0-20	0.06-0.08	7.4-8.4	<2	Low	0.15	5	1
Cajon	4	---	---	---	---	---	---		
114	0-20	6.0-20	0.06-0.10	7.4-8.4	<2	Low	0.15	5	2
Cajon	20-60	6.0-20	0.04-0.08	7.4-8.4	<2	Low	0.10		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
115	0-48	6.0-20	0.04-0.09	7.4-9.0	>4	Low	0.15	5	2
Cajon	48-60	6.0-20	0.04-0.09	7.4-9.0	>4	Low	0.15		
116	0-36	6.0-20.	0.04-0.07	7.4-8.4	<2	Low	0.10	5	2
Cajon	36-60	6.0-20	0.04-0.06	7.4-8.4	<2	Low	0.15		
117*:									
Cajon	0-42	6.0-20.	0.05-0.08	7.4-8.4	<2	Low	0.15	5	1
	42-60	0.2-0.6	0.15-0.17	7.4-8.4	<2	Low	0.49		
Garlock	0-18	6.0-20	0.06-0.08	6.6-8.4	<2	Low	0.15	5	1
	18-30	0.2-0.6	0.13-0.18	6.6-8.4	<2	Moderate	0.20		
	30-45	2.0-6.0	0.07-0.12	6.6-8.4	<2	Low	0.17		
	45-60	0.6-2.0	0.15-0.17	6.6-8.4	<8	Low	0.49		
118*:									
Chanac	0-10	0.6-2.0	0.13-0.17	7.4-8.4	<2	Moderate	0.20	5	---
	10-31	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32		
	31-41	0.2-0.6	0.12-0.16	7.4-8.4	<2	Low	0.28		
	41-60	0.2-0.6	0.12-0.16	7.4-8.4	<2	Low	0.28		
Badland.									
119*, 120*:									
Chanac	0-10	0.6-2.0	0.13-0.17	7.4-8.4	<2	Moderate	0.20	5	---
	10-31	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32		
	31-41	0.2-0.6	0.12-0.16	7.4-8.4	<2	Low	0.28		
	41-60	0.2-0.6	0.12-0.16	7.4-8.4	<2	Low	0.28		
Pleito	0-16	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.20	5	---
	16-23	0.06-0.2	0.14-0.18	6.6-8.4	<2	Moderate	0.20		
	23-60	0.06-0.2	0.10-0.14	7.9-8.4	<2	Moderate	0.28		
121	0-29	0.2-0.6	0.17-0.18	6.6-8.4	<2	Moderate	0.24	3	---
Chino Variant	29-53	0.6-2.0	0.10-0.12	7.4-7.8	<2	Low	0.20		
	53-60	0.2-0.6	0.15-0.18	7.4-7.8	<2	Moderate	0.20		
122, 123	0-2	0.06-0.2	0.09-0.13	6.1-8.4	<2	High	0.20	2	---
Cibo	2-23	0.06-0.2	0.12-0.15	6.1-8.4	<2	High	0.24		
	23-31	---	---	---	---	---	---		
	31	---	---	---	---	---	---		
124	0-8	6.0-20	0.03-0.05	6.6-8.4	<2	Low	0.10	3	---
Cinco	8-86	6.0-20	0.04-0.06	6.6-8.4	<2	Low	0.15		
	86	---	---	---	---	---	---		
125	0-11	2.0-6.0	0.09-0.12	7.9-8.4	<4	Low	0.20	5	3
DeStazo	11-52	0.2-0.6	0.03-0.09	7.9-8.4	<4	Moderate	0.17		
	52-65	0.2-0.6	0.15-0.18	7.9-8.4	<4	Moderate	0.28		
126	0-3	2.0-6.0	0.09-0.12	7.9-8.4	<4	Low	0.20	5	3
DeStazo	3-44	0.2-0.6	0.03-0.09	7.9-8.4	<4	Moderate	0.17		
	44-65	0.2-0.6	0.11-0.16	7.9-8.4	<4	Low	0.24		
127	0-18	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.20	5	5
DiGiorgio	18-60	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.20		
	60-78	0.6-2.0	0.09-0.13	7.4-8.4	<2	Low	0.24		
128*. Dumps									
129	0-34	2.0-6.0	0.08-0.11	5.6-7.3	<2	Low	0.20	3	---
Edmundston	34-50	2.0-6.0	0.06-0.11	5.6-7.3	<2	Low	0.17		
	50	---	---	---	---	---	---		
130, 131	0-17	2.0-6.0	0.07-0.09	5.6-7.3	<2	Low	0.17	3	---
Edmundston	17-50	2.0-6.0	0.06-0.11	5.6-7.3	<2	Low	0.17		
	50	---	---	---	---	---	---		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
132----------	0-17	2.0-6.0	0.07-0.09	5.6-7.3	<2	Low-------	0.17	3	---
Edmundston	17-50	2.0-6.0	0.06-0.11	5.6-7.3	<2	Low-------	0.17		
	50	---	---	---	---	---	---		
133*, 134*:									
Edmundston------	0-17	2.0-6.0	0.07-0.09	5.6-7.3	<2	Low-------	0.17	3	---
	17-50	2.0-6.0	0.06-0.11	5.6-7.3	<2	Low-------	0.17		
	50	---	---	---	---	---	---		
Godde----------	0-10	0.6-2.0	0.06-0.14	5.6-7.3	<2	Low-------	0.24	1	---
	10	---	---	---	---	---	---		
Tollhouse-------	0-13	2.0-6.0	0.06-0.09	5.6-7.3	<2	Low-------	0.20	1	---
	13	---	---	---	---	---	---		
135*.									
Fluvents									
136----------	0-10	2.0-6.0	0.10-0.13	5.6-7.3	<2	Low-------	0.32	1	---
Friant	10-18	2.0-6.0	0.08-0.10	5.6-7.3	<2	Low-------	0.28		
	18	---	---	---	---	---	---		
137----------	0-12	6.0-20	0.06-0.07	7.4-8.4	<2	Low-------	0.15	5	1
Garlock	12-24	0.2-0.6	0.13-0.16	7.4-8.4	<2	Moderate	0.20		
	24-33	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low-------	0.17		
	33-51	6.0-20	0.03-0.06	7.4-8.4	<2	Low-------	0.17		
	51-60	6.0-20	0.01-0.03	7.4-8.4	<2	Low-------	0.10		
138*:									
Godde----------	0-10	0.6-2.0	0.06-0.14	5.6-7.3	<2	Low-------	0.24	1	---
	10	---	---	---	---	---	---		
Tollhouse-------	0-13	2.0-6.0	0.06-0.09	5.6-7.3	<2	Low-------	0.20	1	---
	13	---	---	---	---	---	---		
139*.									
Haploxerolls									
140, 141---------	0-24	2.0-6.0	0.09-0.13	6.6-8.4	<2	Low-------	0.20	5	---
Havala	24-48	0.2-0.6	0.11-0.16	6.6-8.4	<2	Moderate	0.24		
	48-65	2.0-6.0	0.09-0.13	6.6-8.4	<2	Low-------	0.20		
142----------	0-24	2.0-6.0	0.09-0.13	6.1-8.4	<2	Low-------	0.20	5	---
Havala	24-48	0.2-0.6	0.15-0.18	6.6-8.4	<2	Moderate	0.32		
	48-65	2.0-6.0	0.09-0.13	6.6-8.4	<2	Low-------	0.20		
143----------	0-24	2.0-6.0	0.09-0.13	6.1-8.4	<2	Low-------	0.20	5	---
Havala	24-48	0.2-0.6	0.11-0.16	6.6-8.4	<2	Moderate	0.24		
	48-65	2.0-6.0	0.09-0.13	6.6-8.4	<2	Low-------	0.20		
144----------	0-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-------	0.20	5	3
Hesperia	18-34	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-------	0.28		
	34-70	2.0-6.0	0.08-0.11	7.4-8.4	<2	Low-------	0.20		
145----------	0-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-------	0.20	5	3
Hesperia	18-34	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-------	0.28		
	34-60	2.0-6.0	0.08-0.11	7.4-8.4	<2	Low-------	0.20		
146----------	0-36	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-------	0.20	5	3
Hesperia	36-60	2.0-6.0	0.08-0.11	7.4-8.4	<2	Low-------	0.20		
147----------	0-4	2.0-6.0	0.08-0.11	6.6-8.4	<2	Low-------	0.28	2	3
Hi Vista	4-30	0.2-0.6	0.10-0.14	7.4-8.4	<2	Moderate	0.24		
	30	---	---	---	---	---	---		
148----------	0-10	6.0-20	0.05-0.07	7.9-8.4	<2	Low-------	0.15	1	2
Jawbone	10	---	---	---	---	---	---		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
149----------	0-22	0.2-0.6	0.15-0.18	7.4-8.4	<2	Moderate	0.24	2	---
Los Osos Variant	22-32	0.06-0.2	0.11-0.14	7.4-8.4	<2	High------	0.24		
	32	---	---	---	---	----------	---		
150----------	0-15	2.0-6.0	0.08-0.11	7.9-8.4	<2	Low-------	0.24	1	3
Muroc	15-27	---	---	---	---	----------	---		
	27	---	---	---	---	----------	---		
151*:									
Muroc----------	0-15	2.0-6.0	0.08-0.11	7.9-8.4	<2	Low-------	0.24	1	3
	15-27	---	---	---	---	----------	---		
	27	---	---	---	---	----------	---		
Randsburg-------	0-12	2.0-6.0	0.07-0.11	7.9-8.4	<2	Low-------	0.24	1	3
	12	---	---	---	---	----------	---		
152*, 153*-------	0-12	0.2-0.6	0.17-0.19	7.9-8.4	<2	Moderate	0.32	2	---
Nacimiento	12-24	0.2-0.6	0.15-0.17	7.9-8.4	<2	Moderate	0.32		
	24	---	---	---	---	----------	---		
154----------	0-7	2.0-6.0	0.09-0.11	6.6-8.4	<2	Low-------	0.28	5	3
Neuralia	7-31	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.24		
	31-55	0.2-0.6	0.10-0.13	7.4-8.4	<2	Low-------	0.20		
155*:									
Norob----------	0-6	6.0-20	0.06-0.08	7.4-8.4	<2	Low-------	0.15	1	2
	6-13	0.06-0.2	0.10-0.16	7.9-9.0	>4	Moderate	0.24		
	13-40	0.06-0.2	0.10-0.16	7.9-9.0	>4	Moderate	0.24		
	40-60	2.0-6.0	0.06-0.09	7.4-8.4	<4	Low-------	0.20		
Neuralia--------	0-7	2.0-6.0	0.09-0.11	6.6-8.4	<2	Low-------	0.28	5	3
	7-31	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.24		
	31-55	0.2-0.6	0.10-0.13	7.4-8.4	<2	Low-------	0.20		
156*:									
Pajuela---------	0-12	2.0-6.0	0.06-0.09	6.6-8.4	<2	Low-------	0.20	5	---
	12-22	2.0-6.0	0.04-0.07	6.6-8.4	<2	Low-------	0.17		
	22-60	2.0-6.0	0.02-0.03	6.6-8.4	<2	Low-------	0.10		
Whitewolf-------	0-32	6.0-20	0.05-0.10	6.1-8.4	<2	Low-------	0.17	5	---
	32-70	6.0-20	0.04-0.08	6.1-8.4	<2	Low-------	0.15		
157*. Pits									
158*. Playas									
159----------	0-23	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.20	5	---
Pleito	23-60	0.06-0.2	0.14-0.18	7.9-8.4	<2	Moderate	0.32		
160----------	0-16	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.20	5	---
Pleito	16-23	0.06-0.2	0.14-0.18	6.6-8.4	<2	Moderate	0.20		
	23-60	0.06-0.2	0.10-0.14	7.9-8.4	<2	Moderate	0.28		
161*, 162*:									
Pleito----------	0-16	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.20	5	---
	16-23	0.06-0.2	0.14-0.18	6.6-8.4	<2	Moderate	0.20		
	23-60	0.06-0.2	0.10-0.14	7.9-8.4	<2	Moderate	0.28		
Chanac----------	0-10	0.6-2.0	0.13-0.17	7.4-8.4	<2	Moderate	0.20	5	---
	10-31	0.2-0.6	0.14-0.18	7.4-8.4	<2	Moderate	0.32		
	31-41	0.2-0.6	0.12-0.16	7.4-8.4	<2	Low-------	0.28		
	41-60	0.2-0.6	0.12-0.16	7.4-8.4	<2	Low-------	0.28		
163----------	0-36	0.06-0.2	0.10-0.15	7.4-8.4	<2	High------	0.28	5	---
Porterville	36-60	0.06-0.2	0.17-0.19	7.4-8.4	<2	Moderate	0.37		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
164----------	0-12	0.06-0.2	0.08-0.11	7.4-8.4	<2	High------	0.17	5	---
Porterville	12-36	0.06-0.2	0.11-0.14	7.4-8.4	<2	High------	0.28		
	36-60	0.06-0.2	0.16-0.18	7.4-8.4	<2	High------	0.37		
165*:									
Psamments.									
Xerolls.									
166*.									
Quarries									
167----------	0-12	2.0-6.0	0.07-0.11	7.9-8.4	<2	Low-------	0.24	1	3
Randsburg	12	---	---	---	---	----------	---		
168, 169-----	0-16	0.6-2.0	0.14-0.16	6.1-6.5	<2	Moderate	0.43	5	---
Rescue Variant	16-68	0.2-0.6	0.17-0.18	6.1-6.5	<2	Moderate	0.43		
	68-99	0.6-2.0	0.14-0.16	6.1-6.5	<2	Moderate	0.43		
170*.									
Rock outcrop									
171----------	0-2	2.0-6.0	0.10-0.15	7.4-8.4	<2	Low-------	0.37	5	3
Rosamond	2-12	0.2-0.6	0.15-0.18	7.9-8.4	<2	Moderate	0.37		
	12-60	0.2-0.6	0.15-0.18	7.9-8.4	2-4	Moderate	0.37		
172----------	0-2	0.2-0.6	0.02-0.06	8.5-9.0	>8	Moderate	0.43	5	3
Rosamond	2-10	0.2-0.6	0.03-0.07	8.5-9.0	>8	Moderate	0.43		
	10-60	0.2-0.6	0.03-0.07	8.5-9.0	>8	Moderate	0.43		
173----------	0-7	2.0-6.0	0.08-0.11	6.1-8.4	<2	Low-------	0.24	5	---
Rosamond Variant	7-60	0.2-0.6	0.14-0.18	7.9-8.4	<2	Moderate	0.32		
174, 175-----	0-60	2.0-6.0	0.08-0.11	6.6-8.4	<2	Low-------	0.20	5	---
Steuber									
176----------	0-45	2.0-6.0	0.08-0.11	6.6-8.4	<2	Low-------	0.20	5	---
Steuber	45-60	2.0-6.0	0.07-0.09	6.6-8.4	<2	Low-------	0.20		
177----------	0-12	2.0-6.0	0.08-0.09	6.6-8.4	<2	Low-------	0.17	5	---
Steuber	12-44	2.0-6.0	0.08-0.09	6.6-8.4	<2	Low-------	0.17		
	44-54	2.0-6.0	0.08-0.09	6.6-8.4	<2	Low-------	0.17		
	54-60	2.0-6.0	0.08-0.09	6.6-8.4	<2	Low-------	0.17		
178*:									
Sween Variant---	0-12	0.2-0.6	0.08-0.15	6.6-7.3	<2	Moderate	0.20	2	---
	12-38	0.06-0.2	0.07-0.12	6.1-6.5	<2	High------	0.28		
	38	---	---	---	---	----------	---		
Rock outcrop.									
179----------	0-11	2.0-6.0	0.08-0.11	6.1-8.4	<2	Low-------	0.20	5	---
Tehachapi	11-19	0.2-0.6	0.14-0.18	6.1-8.4	<2	Moderate	0.24		
	19-32	0.06-0.2	0.15-0.18	6.1-8.4	<2	Moderate	0.37		
	32-44	0.06-0.2	0.11-0.18	6.1-8.4	<2	Moderate	0.20		
	44-60	0.6-2.0	0.07-0.15	6.1-8.4	<2	Low-------	0.17		
180----------	0-5	0.6-2.0	0.12-0.16	6.1-8.4	<2	Low-------	0.32	5	---
Tehachapi	5-19	0.2-0.6	0.14-0.18	6.1-8.4	<2	Moderate	0.24		
	19-32	0.06-0.2	0.15-0.18	6.1-8.4	<2	Moderate	0.37		
	32-44	0.06-0.2	0.11-0.18	6.1-8.4	<2	Moderate	0.20		
	44-60	0.6-2.0	0.07-0.15	6.1-8.4	<2	Low-------	0.17		
181----------	0-19	0.2-0.6	0.10-0.12	6.1-8.4	<2	Low-------	0.24	5	---
Tehachapi	19-44	0.06-0.2	0.11-0.13	6.1-8.4	<2	Moderate	0.32		
	44-60	0.6-2.0	0.05-0.10	6.1-8.4	<2	Low-------	0.17		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
182----------	0-19	0.2-0.6	0.10-0.12	6.1-8.4	<2	Low-------	0.24	5	5
Tehachapi	19-30	0.06-0.2	0.11-0.13	6.1-8.4	<2	Moderate	0.32		
	30-60	0.6-2.0	0.05-0.10	6.1-8.4	<2	Low-------	0.17		
183----------	0-60	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.17	5	---
Tehachapi Variant									
184*:									
Torrifluvents.									
Cajon----------	0-60	6.0-20	0.06-0.10	7.4-8.4	<2	Low-------	0.15	5	2
185*:									
Torriorthents.									
Rock outcrop.									
186----------	0-60	6.0-20	0.05-0.10	6.6-7.8	<2	Low-------	0.20	5	---
Tujunga									
187----------	0-18	0.6-2.0	0.08-0.11	6.1-7.8	<2	Low-------	0.28	1	---
Tunis	18	---	---	---	---	----------	---		
188*:									
Tunis----------	0-18	0.6-2.0	0.12-0.16	6.1-7.8	<2	Low-------	0.32	1	---
	18	---	---	---	---	----------	---		
Walong----------	0-27	2.0-6.0	0.09-0.11	6.6-7.8	<2	Low-------	0.20	2	---
	27	---	---	---	---	----------	---		
189, 190----------	0-10	2.0-6.0	0.10-0.12	6.6-8.4	<2	Low-------	0.20	2	---
Tweedy	10-38	0.2-0.6	0.16-0.18	6.1-7.8	<2	Moderate	0.24		
	38	---	---	---	---	----------	---		
191*, 192*:									
Tweedy----------	0-10	2.0-6.0	0.10-0.12	6.6-8.4	<2	Low-------	0.20	2	---
	10-38	0.2-0.6	0.16-0.18	6.1-7.8	<2	Moderate	0.24		
	38	---	---	---	---	----------	---		
Anaverde---------	0-35	0.6-2.0	0.11-0.14	6.1-7.3	<2	Low-------	0.32	5	---
	35-62	0.6-2.0	0.05-0.08	6.1-7.3	<2	Low-------	0.32		
	62-90	0.6-2.0	0.04-0.07	6.1-7.3	<2	Low-------	0.28		
	90	---	---	---	---	----------	---		
193, 194----------	0-14	2.0-6.0	0.09-0.11	6.6-7.8	<2	Low-------	0.20	2	---
Walong	14-27	2.0-6.0	0.07-0.10	6.6-7.8	<2	Low-------	0.17		
	27	---	---	---	---	----------	---		
195*, 196*, 197*:									
Walong----------	0-14	2.0-6.0	0.09-0.11	6.6-7.8	<2	Low-------	0.20	2	---
	14-27	2.0-6.0	0.07-0.10	6.6-7.8	<2	Low-------	0.17		
	27	---	---	---	---	----------	---		
Arujo----------	0-3	2.0-6.0	0.10-0.12	5.6-7.8	<2	Low-------	0.20	3	---
	3-23	0.6-2.0	0.14-0.17	5.6-7.8	<2	Moderate	0.32		
	23-45	0.2-0.6	0.15-0.19	5.6-7.8	<2	Moderate	0.20		
	45-55	0.6-2.0	0.14-0.17	5.6-7.8	<2	Moderate	0.32		
	55	---	---	---	---	----------	---		
198*:									
Walong----------	0-14	2.0-6.0	0.09-0.11	6.6-7.8	<2	Low-------	0.20	2	---
	14-27	2.0-6.0	0.07-0.10	6.1-7.3	<2	Low-------	0.17		
	27	---	---	---	---	----------	---		
Rock outcrop.									

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
199*, 200*:									
Walong----------	0-14	2.0-6.0	0.09-0.11	6.6-7.8	<2	Low-------	0.20	2	---
	14-27	2.0-6.0	0.07-0.10	6.1-7.3	<2	Low-------	0.17		
	27	---	---	---	---	----------	---		
Edmundston------	0-17	2.0-6.0	0.08-0.11	5.6-7.3	<2	Low-------	0.20	3	---
	17-50	2.0-6.0	0.06-0.11	5.4-7.3	<2	Low-------	0.17		
	50-52	---	---	---	---	----------	---		
201, 202---------	0-34	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low-------	0.28	5	3
Wasioja	34-49	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.32		
	49-62	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low-------	0.32		
203---------------	0-32	6.0-20	0.05-0.10	6.1-8.4	<2	Low-------	0.17	5	2
Whitewolf	32-70	6.0-20	0.05-0.08	6.1-8.4	<2	Low-------	0.17		
204---------------	0-32	6.0-20	0.05-0.10	6.1-8.4	<2	Low-------	0.17	5	---
Whitewolf	32-60	6.0-20	0.04-0.08	6.1-8.4	<2	Low-------	0.15		
205*:									
Xererts.									
Xerolls.									
206*.									
Xeric Torriorthents									
207*.									
Xerolls									
208*:									
Xerolls.									
Rock outcrop.									
209*, 210*.									
Xerorthents									
211*:									
Xerorthents.									
Rock outcrop.									

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--SOIL AND WATER FEATURES

[See text for definitions of terms. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that the data were not estimated]

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
100*:							
Alko	D	>60	---	5-14	Rippable	High	Low.
Neuralia	C	>60	---	---	---	High	Low.
101, Anaheim Variant	B	24-35	Rippable	---	---	High	Low.
102, 103, Anaverde	B	>60	---	---	---	Moderate	Low.
104, Arizo	A	>60	---	---	---	Moderate	Low.
105, Arujo	B	40-60	Rippable	---	---	Moderate	Low.
106*, 107*, 108*:							
Arujo	B	40-60	Rippable	---	---	Moderate	Low.
Friant	D	6-20	Rippable	---	---	Moderate	Moderate.
Tunis	D	10-20	Rippable	---	---	Moderate	Low.
109, 110, 111, Arvin	B	>60	---	---	---	Moderate	Low.
112*:							
Badland.							
Orthents.							
113, 114, Cajon	A	>60	---	---	---	Moderate	Low.
115, Cajon	B	>60	---	---	---	High	High.
116, Cajon	A	>60	---	---	---	Moderate	Low.
117*:							
Cajon	B	>60	---	---	---	Moderate	Low.
Garlock	B	>60	---	---	---	High	Low.
118*:							
Chanac	B	>60	---	---	---	High	Low.
Badland.							
119*, 120*:							
Chanac	B	>60	---	---	---	High	Low.
Pleito	C	>60	---	---	---	High	Low.
121, Chino Variant	D	>60	---	---	---	High	Low.
122, 123, Cibo	D	24-36	Hard	---	---	High	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
124---------- Cinco	A	>60	---	---	---	Moderate----	Low.
125---------- DeStazo	B	>60	---	---	---	High--------	Low.
126---------- DeStazo	B	>60	---	---	---	High--------	Low.
127---------- DiGiorgio	B	>60	---	---	---	High--------	Low.
128*. Dumps							
129, 130, 131, 132---------- Edmundston	B	40-60	Rippable	---	---	Moderate----	Moderate.
133*, 134*: Edmundston-------	B	40-60	Rippable	---	---	Moderate----	Moderate.
Godde----------	D	10-20	Hard	---	---	Moderate----	Moderate.
Tollhouse--------	D	10-20	Rippable	---	---	Low---------	Moderate.
135*. Fluvents							
136---------- Friant	D	6-20	Rippable	---	---	Moderate----	Moderate.
137---------- Garlock	B	>60	---	---	---	High--------	Low.
138*: Godde----------	D	10-20	Hard	---	---	Moderate----	Moderate.
Tollhouse--------	D	5-15	Rippable	---	---	Low---------	Moderate.
139*. Haploxerolls							
140, 141, 142, 143---------- Havala	B	>60	---	---	---	High--------	Low.
144, 145, 146----- Hesperia	B	>60	---	---	---	High--------	Low.
147---------- Hi Vista	C	20-40	Hard	---	---	High--------	Low.
148---------- Jawbone	D	4-12	Rippable	---	---	Moderate----	Low.
149---------- Los Osos Variant	C	25-40	Hard	---	---	High--------	Low.
150---------- Muroc	D	20-30	Rippable	8-20	Rippable	High--------	Low.
151*: Muroc----------	D	20-30	Rippable	8-20	Rippable	High--------	Low.
Randsburg--------	D	8-20	Rippable	---	---	High--------	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
152*, 153*-------- Nacimiento	C	20-40	Rippable	---	---	High---------	Low.
154---------- Neuralia	C	>60	---	---	---	High---------	Low.
155*: Norob----------	C	>60	---	---	---	High---------	Moderate.
Neuralia---------	C	>60	---	---	---	High---------	Low.
156*: Pajuela----------	B	>60	---	---	---	Moderate-----	Low.
Whitewolf--------	A	>60	---	---	---	High---------	Low.
157*. Pits							
158*. Playas							
159, 160---------- Pleito	C	>60	---	---	---	High---------	Low.
161*, 162*: Pleito----------	C	>60	---	---	---	High---------	Low.
Chanac----------	B	>60	---	---	---	High---------	Low.
163, 164---------- Porterville	D	>60	---	---	---	High---------	Low.
165*: Psamments.							
Xerolls.							
166*. Quarries							
167---------- Randsburg	D	8-20	Rippable	---	---	High---------	Low.
168, 169---------- Rescue Variant	C	>40	---	---	---	Moderate-----	Low.
170*. Rock outcrop							
171, 172---------- Rosamond	C	>60	---	---	---	High---------	Low.
173---------- Rosamond Variant	B	>60	---	---	---	High---------	Low.
174---------- Steuber	B	>60	---	---	---	High---------	Low.
175, 176, 177----- Steuber	B	>60	---	---	---	High---------	Low.
178*: Sween Variant----	C	24-40	Hard	---	---	High---------	Low.
Rock outcrop.							

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
179, 180, 181, 182---------- Tehachapi	C	>60	---	---	---	High--------	Low.
183---------- Tehachapi Variant	C	>60	---	---	---	High--------	Low.
184*: Torrifluvents.							
Cajon----------	A	>60	---	---	---	Moderate----	Low.
185*: Torriorthents.							
Rock outcrop.							
186---------- Tujunga	A	>60	---	---	---	Low---------	Low.
187---------- Tunis	D	10-20	Rippable	---	---	Moderate----	Low.
188*: Tunis----------	D	10-20	Rippable	---	---	Moderate----	Low.
Walong----------	B	20-40	Rippable	---	---	Moderate----	Low.
189, 190---------- Tweedy	C	20-40	Rippable	---	---	High--------	Low.
191*, 192*: Tweedy----------	C	20-40	Rippable	---	---	High--------	Low.
Anaverde---------	B	>60	---	---	---	Moderate----	Low.
193, 194---------- Walong	B	20-40	Rippable	---	---	Moderate----	Low.
195*, 196*, 197*: Walong----------	B	20-40	Rippable	---	---	Moderate----	Low.
Arujo----------	B	40-60	Rippable	---	---	Moderate----	Low.
198*: Walong----------	B	20-40	Rippable	---	---	Moderate----	Low.
Rock outcrop.							
199*, 200*: Walong----------	B	20-40	Rippable	---	---	Moderate----	Low.
Edmundston-------	B	40-60	Rippable	---	---	Moderate----	Moderate.
201, 202---------- Wasioja	B	>60	---	---	---	High--------	Low.
203, 204---------- Whitewolf	A	>60	---	---	---	High--------	Low.
205*: Xererts.							
Xerolls.							

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
206*. Xeric Torriorthents							
207*. Xerolls							
208*: Xerolls.							
Rock outcrop.							
209*, 210*. Xerorthents							
211*: Xerorthents.							
Rock outcrop.							

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alko	Loamy, mixed, thermic, shallow Typic Durorthids
Anaheim Variant	Fine-loamy,mixed,thermic Pachic Haploxerolls
Anaverde	Fine-loamy, mixed, mesic Pachic Haploxerolls
Arizo	Sandy-skeletal, mixed, thermic Typic Torriorthents
Arujo	Fine-loamy, mixed, thermic Pachic Argixerolls
Arvin	Coarse-loamy, mixed, nonacid, thermic Mollic Xerofluvents
Cajon	Mixed, thermic Typic Torripsamments
Chanac	Fine-loamy, mixed, thermic Calcixerollic Xerochrepts
Chino Variant	Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls
Cibo	Fine, montmorillonitic, thermic Typic Chromoxererts
Cinco	Mixed, thermic Xeric Torripsamments
DeStazo	Loamy-skeletal, carbonatic, thermic Typic Calciorthids
DiGiorgio	Fine-loamy, mixed, nonacid, thermic Xeric Torriorthents
Edmundston	Coarse-loamy, mixed, mesic Pachic Haploxerolls
Friant	Loamy, mixed, thermic Lithic Haploxerolls
Garlock	Fine-loamy, mixed, thermic Typic Haplargids
Godde	Loamy, mixed, mesic Lithic Haploxerolls
Havala	Fine-loamy, mixed, thermic Typic Argixerolls
Hesperia	Coarse-loamy, mixed, nonacid, thermic Xeric Torriorthents
Hi Vista	Fine-loamy, mixed, thermic Typic Haplargids
Jawbone	Mixed, thermic, shallow Typic Torripsamments
Los Osos Variant	Fine, montmorillonitic, thermic Pachic Argixerolls
Muroc	Loamy, mixed, thermic, shallow Typic Durorthids
Nacimiento	Fine-loamy, mixed, thermic Calcic Haploxerolls
Neuralia	Fine-loamy, mixed, thermic Typic Haplargids
Norob	Fine-loamy, mixed, thermic Typic Natrargids
Pajuela	Sandy-skeletal, mixed, thermic Xeric Torriorthents
Pleito	Fine-loamy, mixed, thermic Calcic Pachic Haploxerolls
Porterville	Fine, montmorillonitic, thermic Typic Chromoxererts
Randsburg	Loamy, mixed (calcareous), thermic, shallow Typic Torriorthents
Rescue Variant	Fine-loamy, mixed, thermic Mollic Haploxeralfs
Rosamond	Fine-loamy, mixed, (calcareous), thermic Typic Torrifluvents
Rosamond Variant	Fine-loamy, mixed, (calcareous), thermic Typic Xerofluvents
Steuber	Coarse-loamy, mixed, nonacid, thermic Mollic Xerofluvents
Sween Variant	Fine, montmorillonitic, mesic Typic Argixerolls
Tehachapi	Fine-loamy, mixed, thermic Typic Argixerolls
Tehachapi Variant	Fine-loamy, mixed, thermic Pachic Argixerolls
Tollhouse	Loamy, mixed, mesic, shallow Entic Haploxerolls
Tujunga	Mixed, thermic Typic Xeropsamments
Tunis	Loamy, mixed, thermic, shallow Typic Haploxerolls
Tweedy	Fine-loamy, mixed, mesic Typic Argixerolls
Walong	Coarse-loamy, mixed, thermic Typic Haploxerolls
Wasioja	Fine-loamy, mixed, thermic Typic Haploxeralfs
Whitewolf	Mixed, thermic Xeric Torripsamments

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