United States Department of Agriculture

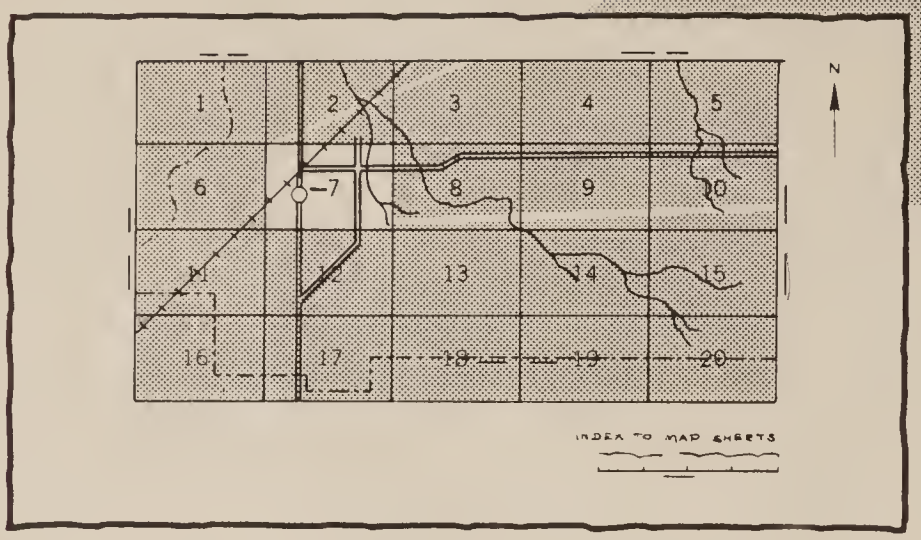
Soil Conservation Service

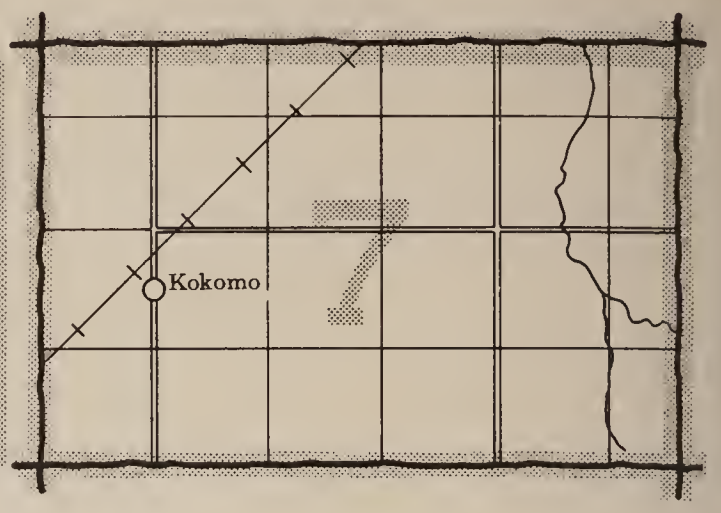
in cooperation with the United States Department of the Interior Bureau of Land Management and the New Mexico Agricultural Experiment Station

Soil Survey of Lincoln County Area New Mexico

HOW TO USE

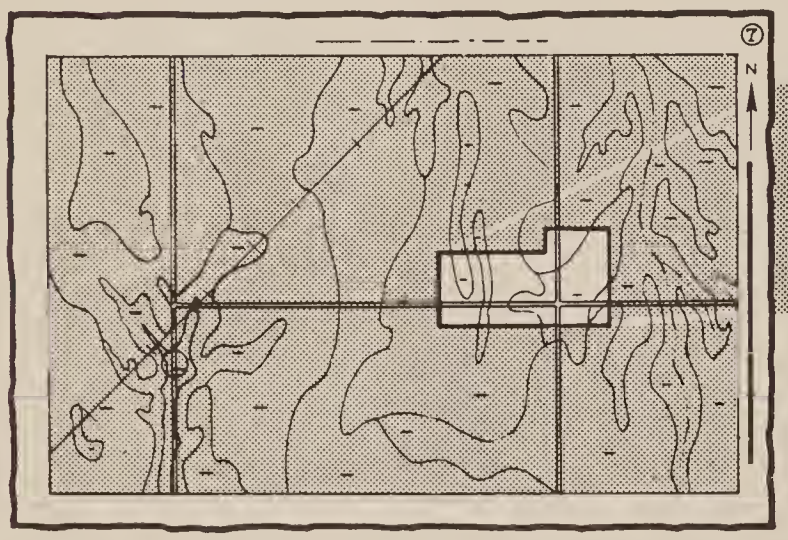
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

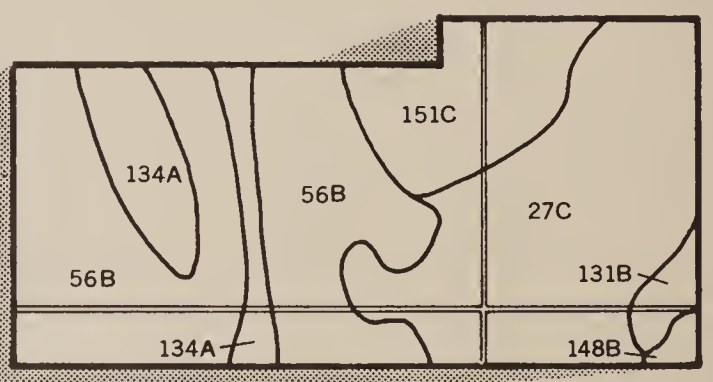




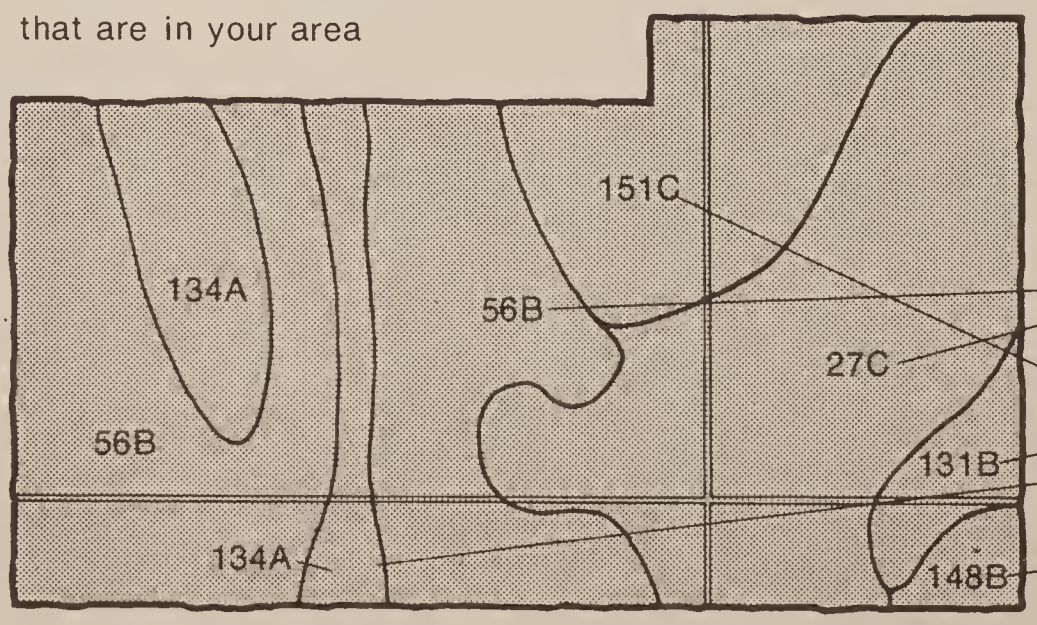
2. Note the number of the map sheet and turn to that sheet.

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





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

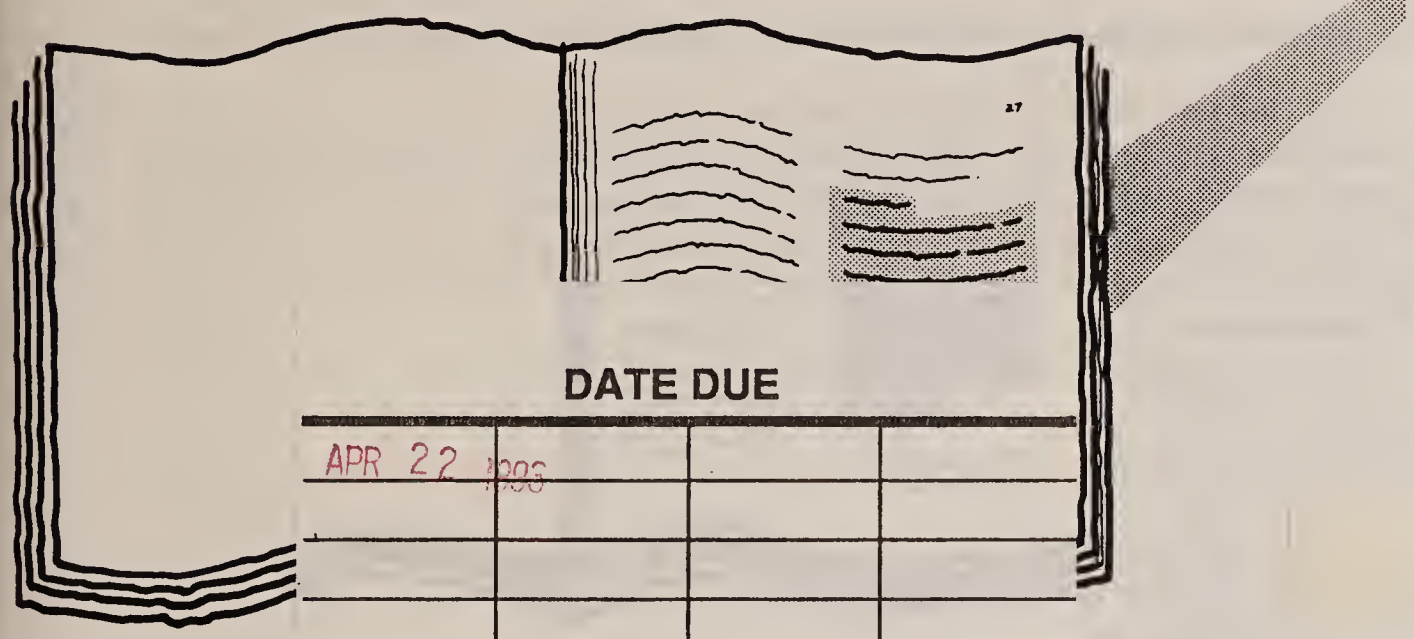


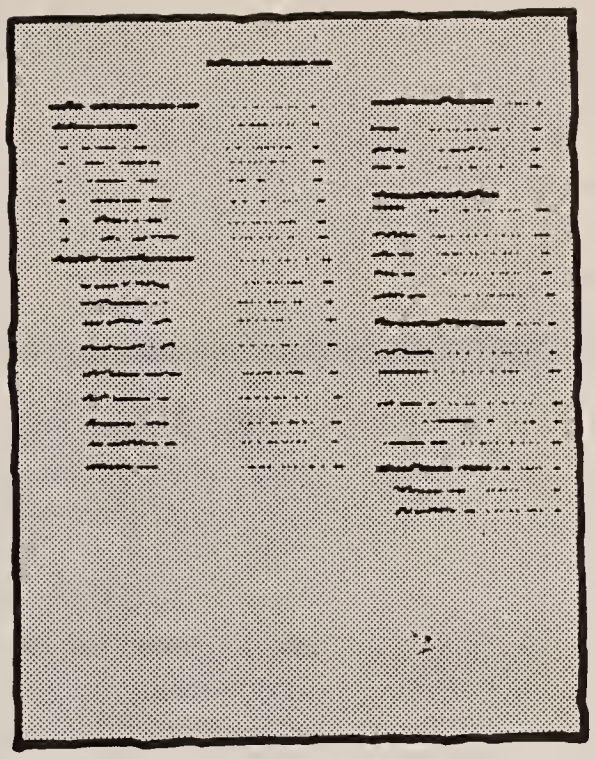
Symbols

- 27C
- 56B
- 131B
- 134A
- 148B
- 151C

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 "Sum
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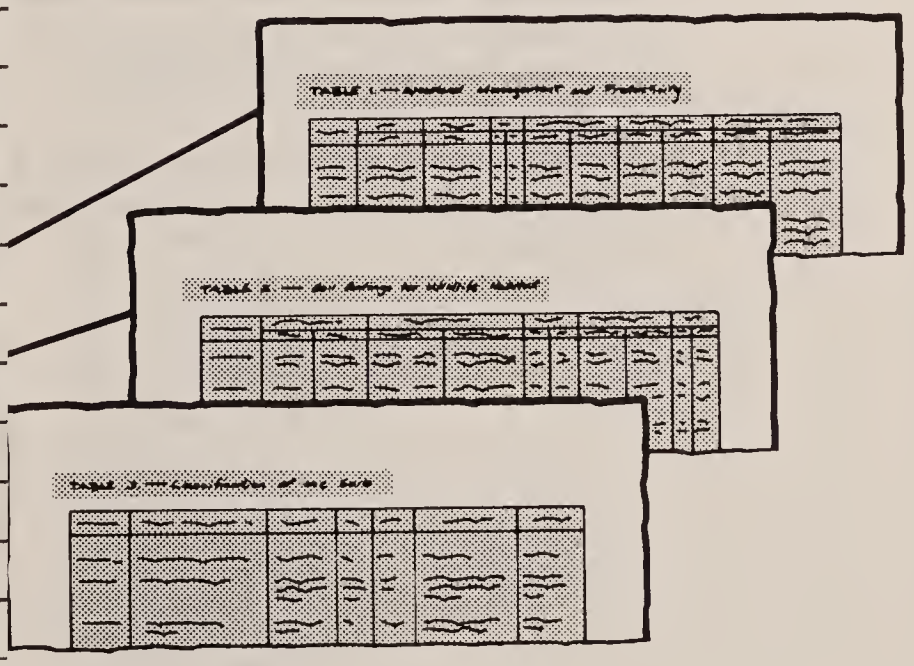

7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists,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

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

Major fieldwork for this soil survey was performed in the period 1973-80. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service, the Bureau of Land Management, and the New Mexico Agricultural Experiment Station. It is part of the technical assistance furnished to the Chaves, Upper Hondo, Carrizozo, Otero, and Claunch-Pinto Soil and Water 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: Area of Tulargo-Andergeorge association, gently sloping, in foreground; Lithic Argiustolls-Rock outcrop association, extremely steep, in background.

contents

soil series

Issued August 1983

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summary of tables

foreword

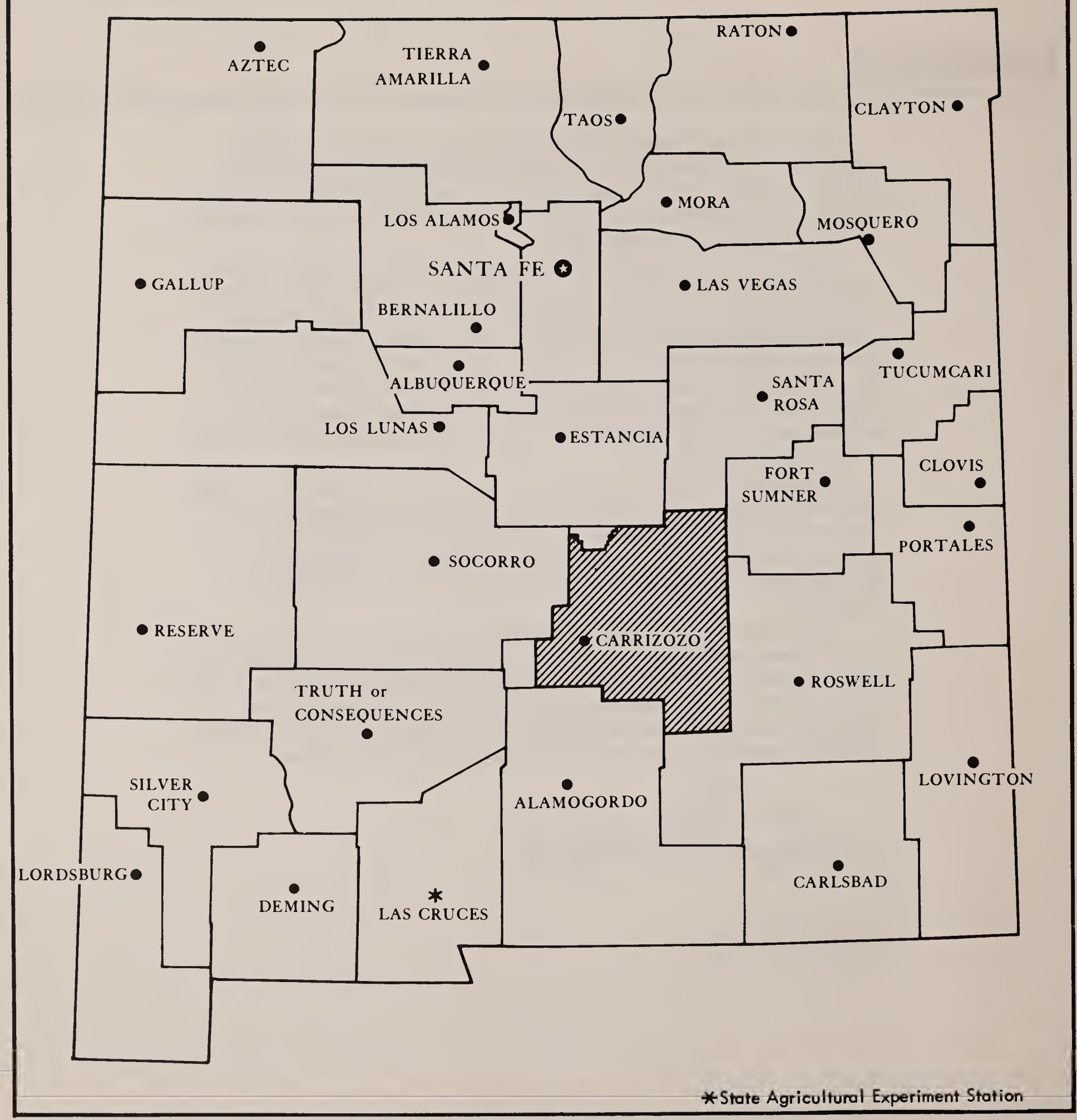
This soil survey contains information that can be used in land-planning programs in Lincoln County Area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

This soil survey is designed for many different users. Farmers, 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.

Ray T. Margo, Jr.
State Conservationist
Soil Conservation Service



Location of Lincoln County Area in New Mexico.

soil survey of
Lincoln County Area, New Mexico

By Dale G. Sprankle, Soil Conservation Service

Fieldwork by Dale G. Sprankle, Daniel Carter, and Rodney Perkins
Soil Conservation Service

United States Department of Agriculture,
Soil Conservation Service,
in cooperation with
United States Department of the Interior,
Bureau of Land Management, and
New Mexico Agricultural Experiment Station

LINCOLN COUNTY AREA is in south-central New Mexico. It has a total area of 2,448,762 acres, or 3,826 square miles. According to a 1980 estimate, Lincoln County has a population of 10,500. Carrizozo, the third largest village in the survey area, is the county seat of Lincoln County. Carrizozo has a population of about 1,400.

The survey area has a wide range of topographic relief. The south-central and central parts of the area are foothills that surround the northern extension of the Sierra Blanca Range and the Tuscon, Carrizo, Patos, Jicarilla, and Capitan Mountains. The Capitan Mountains are the only mountains that extend from east to west. The east side of this mountainous area serves as the watershed area for the Rio Bonito and Rio Ruidoso, which converge at Hondo to form the Rio Hondo. The west side of the mountains serves as the watershed area for numerous intermittent streams that flow toward the closed Tularosa Basin.

The southwestern part of the survey area includes the upper reaches of the Tularosa Basin. The elevation in this area ranges from 4,500 feet along the Lincoln-Otero county line to 5,700 feet near Little Black Peak. Extending southward from Little Black Peak is a basalt lava flow known as the Malpais. It is about 20 miles long within the survey area and ranges in width from less than 1 mile to slightly more than 4 miles.

The eastern third of the survey area, which is mainly treeless rangeland, is characterized by gently sloping to very steep limestone hills. One notable feature on this landscape is in the southeastern corner of the area, where Border Hill forms a conspicuous northeasterly trending bedrock outcrop that rises as much as 200 feet above the surrounding countryside. Border Hill extends more than 20 miles within the area.

The survey area is used mainly for agriculture, and a large part of the income is derived from livestock enterprises. Most of the land is used for livestock grazing, but a small acreage is used for the production of irrigated crops. Most of the irrigated land is used for orchards, pastures, and small gardens, or it is used for the production of alfalfa, corn, or small grain.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent counties. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey area.

climate

By Frank Houghton, climatologist for New Mexico, National Weather Service, U. S. Department of Commerce.

Temperature and precipitation in the survey area vary greatly because of topography and elevation. The closed Tularosa Basin, which extends southwest from Carrizozo, is separated from the eastern plains by foothills and mountains. The main source of moisture-laden air is the Gulf of Mexico, and this air enters New Mexico in the general southeasterly circulation about the Bermuda high pressure area, which is most pronounced in summer. Precipitation generally increases with elevation as this moist air is heated by solar radiation and flows upslope in the foothills and mountains.

Half the annual precipitation falls in summer during brief but often heavy thunderstorms that are occasionally accompanied by hail. Annual precipitation averages 11 to 13 inches in the eastern plains, increases to nearly 20 inches at elevations of 7,000 feet, and reaches 25 to 30 inches or more in the mountains. Precipitation is less in the Tularosa Basin, which is partially shielded from the Gulf moisture by the mountains. Precipitation is comparatively light in winter because the mountains to the west remove much of the moisture from Pacific Ocean storms before they reach New Mexico. Much of the precipitation in winter falls as snow at the upper elevations in the mountains, where the average annual snowfall totals more than 4 feet.

Mean annual temperature ranges from 58 degress F at the lower elevations in the survey area, to less than 48 degrees on the higher mountains. At the lower elevations about two-thirds of the summer days have 90-degree temperatures, and a few days have 100-degree temperatures. In the mountains, few days reach 90 degrees. With the possible exception of the higher mountains, there are few days when the temperature drops to zero or below or fails to go above freezing. Throughout the area, most nights in winter have freezing temperatures, and in the mountains, most nights during the coldest half of the year have freezing temperatures.

The growing season, or freeze-free season, at the lower elevations is about 190 days. In midelevation grazing areas, it is about 155 days, and in mountainous areas, it is less than 100 days.

Table 1 shows the annual patterns of temperature and precipitation at Corona. These patterns generally apply to other localities in the area when adjusted for higher precipitation and lower temperatures with increased elevation.

Semiarid, continental climate is typical of the area except in the mountains, and it is characterized by wide ranges in diurnal and seasonal temperatures, variable precipitation, and plentiful sunshine. The average diurnal temperature range is more than 30 degrees. The variability of precipitation from year to year and from month to month is illustrated by the annual total near Arabela that has ranged from 43.74 inches in 1941 to only 9.97 inches in 1933 and by September totals of 13.54 inches in 1919 and only 0.21 inch in 1934. Greatest one-day rainfall in Lincoln County was 7.71 inches at Meek on September 16, 1919. The sun shines about 75 percent of the possible hours, or about 3,400 hours annually. Spring is the windiest season, and where the soil is dry and the vegetation sparse, strong winds may occasionally be laden with dust and sand.

In winter and during rainy periods, the average relative humidity in most of the area is in the upper 60's early in the morning and is about 50 percent in the afternoon. In other seasons, the average ranges about 50 percent early in the morning to the lower 20's in the afternoon. Mean annual relative humidity is about 50 percent. In the higher mountains, because of the lower temperatures, the relative humidity is higher. Because of increased condensation, cloudiness is greater, allowing the sun to shine about 60 percent of the total time possible.

how this survey was made

This survey was made to provide information about the soils or miscellaneous areas in the survey area. The information includes a description of the soils or miscellaneous areas and their location and a discussion of the suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

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

Individual soils on the landscape commonly merge gradually into one another, which reflects gradual changes in characteristics. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these

observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

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

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

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

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

map unit composition

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

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

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

general soil map units

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

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

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

The general map units in this survey have been grouped into general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages.

Soils and Rock outcrop on uplands and in valleys

This group consists of six map units. It makes up about 76 percent of the survey area. The soils in this group are nearly level to extremely steep. The vegetation is mainly short and mid grasses with areas of pinyon and juniper. Elevation is 4,500 to 7,000 feet. The average annual precipitation is 11 to 17 inches, the average annual air temperature is 45 to 61 degrees F, and the frost-free season is mainly 150 to 190 days but ranges from 130 to 200 days.

The soils in this group are very shallow, shallow, moderately deep, and very deep and are well drained. They formed in material derived dominantly from limestone, sandstone, shale, and igneous rock.

This group is used mainly for livestock grazing, woodland, and wildlife habitat. Some areas of the soils of minor extent are used for cultivated crops.

1. Ector-Kimbrough-Rock outcrop

Very shallow and shallow, well drained, nearly level to very steep soils, and Rock outcrop; on hills

This map unit is in the southeastern part of the survey area. Slope is 0 to 50 percent. The vegetation is mainly short and mid grasses. Elevation is mainly 4,000 to 4,500 feet but ranges to 4,700 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 57 to 61 degrees F, and the average frost-free season is 180 to 200 days.

This unit makes up about 6 percent of the survey area. It is about 56 percent Ector soils, about 15 percent Kimbrough and similar soils, and about 11 percent Rock outcrop. The remaining 18 percent is components of minor extent.

Ector soils are on hills. These soils are very shallow and shallow and are well drained. They formed in material derived dominantly from limestone. The surface layer is dark grayish brown very cobbly loam 7 inches thick over limestone.

Kimbrough soils are on hills. These soils are very shallow and shallow and are well drained. They formed in alluvium derived dominantly from limestone. The surface layer is grayish brown and dark grayish brown gravelly loam 8 inches thick over indurated caliche.

Rock outcrop consists of areas of exposed limestone.

Of minor extent in this unit are the very deep, excessively drained Roswell soils on hummocky uplands and the very deep, well drained Arch soils on uplands.

This unit is used for livestock grazing and wildlife habitat. The main limitations for livestock grazing are limited rooting depth and steepness of slope.

This unit supports a characteristic wildlife community that includes pronghorn antelope, kit fox, black-tailed jackrabbit, spotted ground squirrel, banner-tailed kangaroo rat, ferruginous hawk, white-necked raven, roadrunner, scaled quail, mourning dove, western kingbird, horned lark, meadowlark, red-spotted toad, Texas horned lizard, and western diamondback rattlesnake.

The wildlife community on the minor Roswell soils is characterized by Ord's kangaroo rat, western box turtle, and hognose snake.

2. Deama-Rock outcrop

Very shallow and shallow, well drained, nearly level to very steep soils, and Rock outcrop; on hills, mesa sides, and breaks

This map unit is in the southeastern and east-central parts of the survey area. Slope is 0 to 60 percent. The vegetation is mainly short and mid grasses. Elevation is

4,500 to 6,000 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free season is 150 to 190 days.

This unit makes up about 12 percent of the survey area. It is about 55 percent Deama soils and about 18 percent Rock outcrop. The remaining 27 percent is components of minor extent.

Deama soils are on hills and mesa sides. These soils are very shallow and shallow and are well drained. They formed in material derived dominantly from limestone. The surface layer is brown very cobbly loam 7 inches thick over limestone.

Rock outcrop consists of areas of exposed limestone on breaks, hills, and mesa sides.

Of minor extent in this unit are the very deep Gabaldon and Darvey soils on valley sides and valley floors and the very shallow and shallow Pastura soils on uplands. In some areas the Gabaldon and Darvey soils are along the Hondo and Ruidoso Rivers.

This unit is used mainly for livestock grazing and wildlife habitat. Some areas of the minor soils along the Hondo and Ruidoso Rivers are used for cultivated crops. The main limitations for livestock grazing are limited rooting depth, the areas of Rock outcrop, and very steep slope.

This unit supports a characteristic wildlife community that includes mule deer, Barbary sheep, bobcat, kit fox, ringtail, desert cottontail, rock squirrel, white-throated woodrat, huspid cotton rat, rock mouse, golden eagle, prairie falcon, Swainson's hawk, roadrunner, scrub jay, Cassin's kingbird, scaled quail, white-throated swift, rock wren, red-spotted toad, Texas horned lizard, mountain patchnose snake, and western rattlesnake.

The minor soils along the Hondo and Ruidoso Rivers support tall, deciduous riparian trees that are associated with wet soils. Irrigated crops are grown in several areas. The riparian plant communities provide habitat for a large and diverse wildlife population that includes both nesting and migrating birds. The cropland is a seasonal source of food that attracts wildlife, particularly birds. Waterfowl, shore birds, marsh birds, and other wetland wildlife inhabit areas of streams, ponds, or marshes.

3. Pastura-Deama-Darvey

Very shallow, shallow, and very deep, well drained, nearly level to moderately sloping soils; on hills, mesa sides, piedmonts, and valley sides

This map unit is in the northeastern part of the survey area. Slope is dominantly 0 to 15 percent but ranges to 30 percent. The vegetation is mainly short and mid grasses. Elevation is dominantly 4,500 to 6,500 feet but ranges to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free season is dominantly 150 to 190 days but ranges to 130 days.

This unit makes up about 41 percent of the survey area. It is about 28 percent Pastura soils, about 27 percent Deama soils, and about 16 percent Darvey and similar soils. The remaining 29 percent is components of minor extent.

Pastura soils are uplands. These soils are very shallow and shallow and are well drained. They formed in alluvium derived dominantly from limestone. The upper 2 inches of the surface layer is brown loam, and the lower 5 inches is brown clay loam. The substratum is brown gravelly clay loam about 6 inches thick. Indurated caliche is at a depth of 13 inches.

Deama soils are on hills and mesas. These soils are very shallow and shallow and are well drained. They formed in material derived dominantly from limestone. The surface layer is brown very cobbly loam 7 inches thick over limestone.

Darvey soils are on piedmonts and valley sides. These soils are very deep and well drained. They formed in alluvium derived dominantly from limestone. The surface layer is dark brown loam 6 inches thick. The subsoil is brown loam 25 inches thick. The substratum to a depth of 60 inches or more is pink and light brown loam.

Of minor extent in this unit are the very deep Pena and Hogadero soils on remnants of valley floors.

This unit is used for livestock grazing and wildlife habitat. The main limitation for livestock grazing is limited rooting depth of the Pastura and Deama soils.

This unit supports a characteristic wildlife community that includes pronghorn antelope, coyote, black-tailed jackrabbit, ferruginous hawk, white-necked raven, roadrunner, scaled quail, mourning dove, western kingbird, horned lark, meadowlark, plains spadefoot toad, Texas horned lizard, and prairie rattlesnake.

4. Penistaja-Plack-Travessilla

Very shallow, shallow, and very deep, well drained, nearly level to moderately sloping soils; on valley sides, ridges, hills, mesas, and piedmonts

This map unit is in the north-central part of the survey area. Slope is dominantly 2 to 15 percent. The vegetation is mainly short and mid grasses and scattered pinyon and juniper. Elevation is 5,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 57 degrees F, and the frost-free season is 150 to 190 days.

This unit makes up about 4 percent of the survey area. It is about 40 percent Penistaja soils, about 18 percent Plack soils, and about 15 percent Travessilla and similar soils. The remaining 27 percent is components of minor extent.

Penistaja soils are on piedmonts and valley sides. These soils are very deep and well drained. They formed in alluvium derived dominantly from sandstone. The surface layer is brown fine sandy loam 2 inches thick. The upper 6 inches of the subsoil is brown fine sandy

loam, and the lower 30 inches is brown and strong brown sandy clay loam. The substratum to a depth of 60 inches or more is pink fine sandy loam.

Plack soils are on uplands. These soils are shallow and well drained. They formed in alluvium. The surface layer is brown loam 11 inches thick over indurated caliche.

Travessilla soils are on ridges, hills, and mesas. These soils are very shallow and shallow and are well drained. They formed in material derived dominantly from sandstone. The surface layer is pinkish gray gravelly fine sandy loam 3 inches thick. The substratum is light brown gravelly fine sandy loam 4 inches thick. Sandstone is at a depth of 7 inches.

Of minor extent in this unit are the very deep Dioxice soils in valleys, Rock outcrop on breaks, and the moderately deep Stroupe soils on hills and mesas.

This unit is used for livestock grazing and wildlife habitat. The main limitation for livestock grazing is the limited rooting depth of the Plack and Travessilla soils.

This unit supports a characteristic wildlife community that includes mule deer, gray fox, porcupine, black-tailed jackrabbit, spotted ground squirrel, Ord's kangaroo rat, southern plains woodrat, pinyon mouse, Swainson's hawk, common raven, scrub jay, Cassin's kingbird, scaled quail, chipping sparrow, short-horned lizard, and western rattlesnake.

5. Tortugas-Rock outcrop-Asparas

Very shallow, shallow, and very deep, well drained, nearly level to extremely steep soils, and Rock outcrop; in valleys and on hills, piedmonts, ridges, and mountainsides

This map unit is in the north-central and southeastern parts of the survey area. Slope is 0 to 75 percent. The vegetation is mainly pinyon and juniper. Elevation is dominantly 6,000 to 7,000 feet but ranges to 5,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free season is 150 to 190 days.

This unit makes up about 9 percent of the survey area. It is about 37 percent Tortugas soils, about 19 percent Rock outcrop, and about 15 percent Asparas and similar soils. The remaining 29 percent is components of minor extent.

Tortugas soils are on hills and mountainsides. These soils are very shallow and shallow and are well drained. They formed in material derived dominantly from limestone. The surface layer is dark grayish brown and grayish brown very cobbly loam 12 inches thick over limestone.

Rock outcrop consists of areas of exposed limestone ridges.

Asparas soils are in valleys. These soils are very deep and well drained. They formed in alluvium derived dominantly from limestone. The upper 2 inches of the surface layer is grayish brown loam, and the lower 5 inches is dark grayish brown clay loam. The subsoil is brown clay loam and loam 27 inches thick. The substratum to a depth of 60 inches or more is light brown loam.

Of minor extent in this unit are the moderately deep Stroupe soils on hills and mountainsides, the very deep Ruidoso soils in valleys, the very shallow and shallow Deama and Travessilla soils on hills and mesas, and the very deep Witt soils in valleys.

This unit is used for livestock grazing, woodland, and wildlife habitat. The main limitations for livestock grazing and woodland are very shallow and shallow soil depth and very steep and extremely steep slope.

This unit supports a characteristic wildlife community that includes mule deer, bobcat, gray fox, ringtail, porcupine, desert cottontail, rock squirrel, chipmunk, white-throated woodrat, pinyon mouse, golden eagle, Swainson's hawk, common raven, pinyon jay, Cassin's kingbird, scaled quail, chipping sparrow, short-horned lizard, tree lizard, mountain patchnose snake, and western rattlesnake.

The included areas in this unit that support deciduous riparian trees provide habitat for a large and diverse wildlife population, and the included areas of irrigated cropland provide seasonal food for large numbers of birds and other wildlife. This unit provides habitat for many species of nesting birds and serves as a migration route for others. Streams, ponds, and marshes provide habitat for waterfowl, shore birds, marsh birds, and other wetland wildlife.

6. Tortugas-Witt-Stroupe

Very shallow, shallow, moderately deep, and very deep, well drained, nearly level to extremely steep soils; in valleys and on hills, mesas, mountainsides, and breaks

This map unit is in the northwestern part of the survey area. Slope is 0 to 75 percent. The vegetation on the Tortugas and Stroupe soils is mainly pinyon and juniper, and the vegetation on the Witt soils is mainly short and mid grasses. Elevation is 5,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free season is 150 to 190 days.

This unit makes up about 4 percent of the survey area. It is about 39 percent Tortugas and similar soils, about 21 percent Witt and similar soils, and about 15 percent Stroupe and similar soils. The remaining 25 percent is components of minor extent.

Tortugas soils are on hills and mountainsides. These soils are very shallow and shallow and are well drained. They formed in material derived dominantly from limestone. The surface layer is dark grayish brown and grayish brown very cobbly loam 12 inches thick over limestone.

Witt soils are in valleys. These soils are very deep and well drained. They formed in alluvium. The surface layer

is brown silt loam 7 inches thick. The subsoil is brown and light brown silty clay loam 27 inches thick. The substratum to a depth of 60 inches or more is pink loam.

Stroupe soils are on hills, mesas, and mountainsides. These soils are moderately deep and well drained. They formed in sediment derived dominantly from sandstone, shale, and igneous rock. The surface layer is brown very cobbly loam 3 inches thick. The upper 5 inches of the subsoil is brown very cobbly clay loam, and the lower 18 inches is yellowish red very cobbly clay. The substratum is pink extremely cobbly clay loam 4 inches thick. Rhyolite is at a depth of 30 inches.

Of minor extent in this unit are the very deep Penistaja soils on piedmonts and valley sides, Rock outcrop on breaks and ridges, the very deep Dioxice soils on valley sides, and the very deep Pajara soils on piedmonts.

This unit is used for livestock grazing and wildlife habitat. The main limitations for livestock grazing are the limited rooting depth of the Tortugas soils and the steepness of slope.

This unit supports mixed pinyon, juniper, and grasses that provide habitat for a wildlife community that includes mule deer, gray fox, porcupine, desert cottontail, rock squirrel, bannertail kangaroo rat, white-throated woodrat, pinyon mouse, Swainson's hawk, common raven, scrub jay, Cassin's kingbird, scaled quail, chipping sparrow, short-horned lizard, and western rattlesnake.

Soils and Lava flows on uplands and in valleys

This group consists of six map units. It makes up about 24 percent of the survey area. The soils in this group are nearly level to extremely steep. The vegetation is mainly short and mid grasses with areas of pinyon, juniper, and shrubs. Elevation is 4,500 to 7,500 feet. The average annual precipitation is mainly 17 to 25 inches but is as little as 8 inches, the average annual air temperature is 45 to 60 degrees F, and the frost-free season is mainly 130 to 210 days but ranges to 100 days.

The soils in this group are very shallow to moderately deep and very deep and are well drained and somewhat excessively drained. They formed in material derived dominantly from limestone, sandstone, gypsum, siltstone, shale, and acid igneous rock.

This group is used mainly for livestock grazing, woodland, and wildlife habitat. Some areas are used as homesites.

7. Mokiak-Reventon-Sampson

Moderately deep and very deep, well drained, nearly level to extremely steep soils; in valleys and on valley sides, piedmonts, and mountainsides

This map unit is in the central and southwestern parts of the survey area. Slope is 0 to 80 percent. The vegetation is mainly pinyon, juniper, and grass. Elevation is mainly 5,700 to 7,500 feet but ranges to 4,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is mainly 50 to 57 degrees F but ranges from 45 to 60 degrees F, and the frost-free season is mainly 150 to 190 days but ranges to 210 days.

This unit makes up about 6 percent of the survey area. It is about 28 percent Mokiak and similar soils, about 25 percent Reventon and similar soils, and about 15 percent Sampson and similar soils. The remaining 32 percent is components of minor extent.

Mokiak soils are on mountainsides. These soils are moderately deep and well drained. They formed in material derived dominantly from igneous rock. The surface layer is brown stony loam 9 inches thick. The upper 7 inches of the subsoil is brown very gravelly clay loam, and the lower 8 inches is extremely gravelly clay loam. Acid igneous rock is at a depth of 24 inches.

Reventon soils are on valley sides and piedmonts. These soils are very deep and well drained. They formed in alluvium. The surface layer is brown loam 7 inches thick. The subsoil is brown and strong brown clay loam 33 inches thick. The substratum to a depth of 60 inches or more is light brown loam.

Sampson soils are on valley floors and valley sides. These soils are very deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is dark brown loam 6 inches thick. The upper 15 inches of the subsoil is dark brown loam, and the lower 26 inches is dark brown clay loam. The substratum to a depth of 60 inches or more is brown loam.

Of minor extent in this unit are Rock outcrop on mountainsides and breaks, the very shallow and shallow Lithic Argiustolls on uplands, and the very shallow and shallow Plack soils on uplands and remnants of old landforms in valleys.

This unit is used for livestock grazing, woodland, and wildlife habitat. The main limitation for livestock grazing and woodland is the steepness of slope.

This unit supports a characteristic wildlife community that includes mule deer, bobcat, gray fox, ringtail, porcupine, desert cottontail, rock squirrel, chipmunk, white-throated woodrat, pinyon mouse, golden eagle, Swainson's hawk, harlequin quail, pinyon jay, Cassin's kingbird, scaled quail, chipping sparrow, short-horned lizard, tree lizard, mountain patchnose snake, and black-tailed rattlesnake.

8. Romine-Hightower-Oro Grande

Very shallow to moderately deep and very deep, well drained, nearly level to extremely steep soils; on ridges, hills, and alluvial plains and in swales

This map unit is in the south-central part of the survey area. Slope is 0 to 75 percent. The vegetation is mainly pinyon, juniper, and grass. Elevation is mainly 6,300 to 7,000 feet but ranges from 5,700 to 7,500 feet. The average annual precipitation is mainly 14 to 18 inches but ranges to 25 inches, the average annual air

temperature is 45 to 56 degrees F, and the frost-free season is mainly 130 to 160 days but ranges to 100 days.

This unit makes up about 3 percent of the survey area. It is about 40 percent Romine and similar soils, about 24 percent Hightower and similar soils, and about 15 percent Oro Grande and similar soils. The remaining 21 percent is components of minor extent.

Romine soils are on dissected alluvial plains. These soils are very deep and well drained. They formed in alluvium. The surface layer is grayish brown extremely gravelly loam 9 inches thick. The upper 6 inches of the subsoil is brown very cobbly loam, and the lower 8 inches is light yellowish brown very cobbly clay loam. The substratum to a depth of 60 inches or more is brownish yellow extremely cobbly loam.

Hightower soils are on uplands and in swales. These soils are moderately deep and well drained. They formed in residuum and local alluvium derived dominantly from sandstone, andesite, and shale. The upper 3 inches of the surface layer is brown loam, and the lower 12 inches is brown clay loam. The subsoil is brown clay loam 10 inches thick. Andesite is at a depth of 25 inches.

Oro Grande soils are on ridges and hills and in swales. These soils are very shallow and shallow and are well drained. They formed in material derived dominantly from sandstone and from andesite and other acid igneous rock. The surface layer is dark grayish brown very cobbly clay loam 8 inches thick. The substratum is yellowish brown extremely cobbly clay loam 9 inches thick. Andesite is at a depth of 17 inches.

Of minor extent in this unit are Rock outcrop on breaks and ridges and the very shallow and shallow Plack soils on upland remnants in valleys.

This unit is used for livestock grazing, woodland, homesites, and wildlife habitat. The main limitations are the very shallow and shallow depth of the Oro Grande soils and the steepness of slope.

This unit supports a unique wildlife community that includes elk, deer, mountain lion, black bear, gray fox, porcupine, chipmunk, desert cottontail, red squirrel, rock squirrel, white-throated woodrat, pinyon mouse, red-tailed hawk, Cooper's hawk, great horned owl, turkey, harlequin quail, band-tailed pigeon, scrub jay, meadowlark, chestnut-collared longspur, woodpecker, hummingbird, tiger salamander, short-horned lizard, tree lizard, mountain patchnose snake, garter snake, and black-tailed rattlesnake.

Areas of this unit that support deciduous riparian forest are on the flood plains of Eagle, Little, and Bonita Creeks and are commonly in areas of wet soils. In addition to the wildlife noted above, they provide habitat for many species of nesting birds and migration routes for others. Streams, ponds, lakes, and marshes provide habitat for waterfowl, shore birds, marsh birds, and other wetland wildlife.

9. Tulargo-Harvey-Clovis

Very deep, well drained, nearly level to gently sloping soils; on piedmonts and valley sides

This map unit is in the southwestern part of the survey area. Slope is 0 to 8 percent. The vegetation is mainly short and mid grasses. Elevation is mainly 5,200 to 6,500 feet but ranges from 4,500 to 7,000 feet. The average annual precipitation is mainly 12 to 16 inches but ranges from 11 to 17 inches, the average annual air temperature is 45 to 57 degrees F, and the frost-free season is mainly 150 to 190 days but ranges to 200 days.

This unit makes up about 6 percent of the survey area. It is about 32 percent Tulargo and similar soils, about 25 percent Harvey and similar soils, and about 19 percent Clovis and similar soils. The remaining 24 percent is components of minor extent.

Tulargo soils are on piedmonts. These soils are very deep and well drained. They formed in alluvium derived dominantly from gypsiferous material. The surface layer is yellowish brown loam 15 inches thick. The upper 6 inches of the subsoil is light brown loam, and the lower 19 inches is pink clay loam. The upper 8 inches of the substratum is pink loam, and the lower part to a depth of 60 inches or more is light brown gravelly loam.

Harvey soils are on piedmonts and valley sides. These soils are very deep and well drained. They formed in alluvium derived dominantly from limestone. The surface layer is brown loam 6 inches thick. The subsoil is pinkish gray clay loam 5 inches thick. The upper 22 inches of the substratum is pinkish gray and pink clay loam, and the lower part to a depth of 60 inches or more is light brown loam.

Clovis soils are on piedmonts and valley sides. These soils are very deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is reddish brown loam 2 inches thick. The subsoil is reddish brown and brown clay loam 14 inches thick. The substratum to a depth of 60 inches or more is pink and reddish yellow clay loam.

Of minor extent in this unit are the very shallow and shallow Pastura, Tortugas, and Deama soils on hills, the very shallow and shallow Plack soils on upland remnants in valleys, and the very deep Penistaja and Pena soils on valley sides and piedmonts.

This unit is used for livestock grazing and wildlife habitat. It has few limitations for these uses.

This unit supports a characteristic wildlife community that is typical of that of rolling plains grassland. The wildlife includes pronghorn antelope, coyote, black-tailed jackrabbit, ferruginous hawk, common raven, roadrunner, Gambel's quail, mourning dove, Cassin's kingbird, horned lark, meadowlark, plains spadefoot toad, round-tailed horned lizard, and prairie rattlesnake.

10. Lava flows

Geologically recent basalt lava

This map unit is in the southwestern part of the survey area. The vegetation is mainly scattered juniper and shrubs growing in crevices filled with eolian soil material. Elevation is 5,000 to 5,700 feet.

This unit makes up about 1 percent of the survey area. It is nearly 100 percent lava flows.

This unit is used for wildlife habitat.

This unit consists entirely of the Carrizozo Malpais. It provides habitat that supports a unique wildlife community that includes mule deer, bobcat, ringtail, rock squirrel, Apache pocket mouse, ferruginous hawk, white-necked woodrat, roadrunner, Gambel's quail, scrub jay, ash-throated flycatcher, chipping sparrow, loggerhead shrike, red-spotted toad, crevice spiny lizard, and western rattlesnake. Some species of wildlife on this unit have adapted to the black basalt by developing a darker coat or skin color.

11. Malargo-Lozier-Bluepoint

Very shallow, shallow, and very deep, well drained and somewhat excessively drained, nearly level to extremely steep soils; on hills and piedmonts

This map unit is in the southwestern part of the survey area. Slope is 0 to 75 percent. The vegetation is mainly short and mid grasses. Elevation is mainly 4,500 to 6,000 feet but ranges to 7,200 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 60 degrees F, and the frost-free season is 190 to 210 days.

This unit makes up about 3 percent of the survey area. It is about 32 percent Malargo and similar soils, about 22 percent Lozier soils, and about 18 percent Bluepoint and similar soils. The remaining 28 percent is components of minor extent.

Malargo soils are in swales and interdunal areas on piedmonts. These soils are very deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is light brown loam 4 inches thick. The subsoil is pink and light reddish brown loam 21 inches thick. The upper 24 inches of the substratum is reddish yellow loam, and the lower part to a depth of 60 inches or more is pink fine sandy loam.

Lozier soils are on hills. These soils are very shallow and shallow and are well drained. They formed in material derived dominantly from limestone. The upper 5 inches of the surface layer is pale brown very gravelly loam, and the lower part to a depth of 13 inches is pale brown extremely gravelly loam. Limestone is at a depth of 13 inches.

Bluepoint soils are on dunes on piedmonts. These soils are very deep and somewhat excessively drained. They formed in sediment derived dominantly from sandstone. The surface layer is light brown loamy fine sand 4 inches thick. The substratum to a depth of 60 inches or more is light brown loamy fine sand.

Of minor extent in this unit are the very shallow and shallow Lithic Argiustolls on uplands and Rock outcrop on breaks.

This unit is used for livestock grazing and wildlife habitat. The main limitations for livestock grazing are the limited rooting depth of the Lozier soils and the slope.

This unit supports a characteristic wildlife community that includes mule deer, kit fox, black-tailed jackrabbit, spotted ground squirrel, Ord's kangaroo rat, ferruginous hawk, white-necked raven, roadrunner, Gambel's quail, mourning dove, western kingbird, horned lark, meadowlark, western box turtle, hognose snake, and western diamondback rattlesnake.

12. Gabaldon-Sharps-Rance

Moderately deep and very deep, well drained, nearly level to gently sloping soils; on uplands, valley floors, and stream terraces

This map unit is in the west-central part of the survey area. Slope is mainly 0 to 5 percent but ranges to 15 percent. The vegetation is mainly short and mid grasses. Elevation is mainly 5,000 to 6,500 feet but ranges to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the frost-free season is 150 to 190 days.

This unit makes up about 5 percent of the survey area. It is about 27 percent Gabaldon and similar soils, about 21 percent Sharps and similar soils, and about 15 percent Rance soils. The remaining 37 percent is components of minor extent.

Gabaldon soils are on valley floors and stream terraces. These soils are very deep and well drained. They formed in alluvium. The upper 8 inches of the surface layer is brown silt loam, and the lower 13 inches is dark brown loam. The subsoil is dark grayish brown loam 33 inches thick. The substratum to a depth of 60 inches or more is brown silty clay loam.

Sharps soils are on uplands. These soils are moderately deep and well drained. They formed in material derived dominantly from shale and siltstone. The surface layer is reddish brown silt loam 4 inches thick. The subsoil is red and light red silty clay loam 18 inches thick. The substratum is light reddish brown silty clay loam 8 inches thick. Layered shale and siltstone are at a depth of 30 inches.

Rance soils are on uplands. These soils are moderately deep and well drained. They formed in material derived dominantly from gypsum. The surface layer is pale brown silt loam 7 inches thick. The next layer is very pale brown loam 17 inches thick. White gypsiferous shale is at a depth of 24 inches.

Of minor extent in this unit are the very shallow and shallow Travessilla soils on ridges, hills, and mesas,

Rock outcrop on ridges and breaks, and the shallow Tanbark soils on hills.

This unit is used for livestock grazing and wildlife habitat. It has few limitations for these uses.

This unit supports a characteristic wildlife community that is typical of undulating grasslands. It includes pronghorn antelope, coyote, black-tailed jackrabbit, ferruginous hawk, common raven, roadrunner, scaled quail, mourning dove, Cassin's kingbird, horned lark, meadowlark, plains spadefoot toad, round-tailed horned lizard, and prairie rattlesnake.

detailed soil map units

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

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

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, Reventon loam, 0 to 3 percent slopes, is one of several phases in the Reventon 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. Nogal-Rock outcrop complex, moderately steep, 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. Onite-Bluepoint association, hummocky, 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.

This survey was mapped at two levels of intensity, or detail. The more detailed part is identified by narrowly defined units and the less detailed part is identified by broadly defined units. In the narrowly defined units the soil delineation boundaries were plotted and verified at closely spaced intervals. In the broadly defined units the soil delineation boundaries were plotted and verified by some observations. The intensity of mapping was based on the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use. On the soil map legend at the back of this survey the narrowly defined units are identified by an asterisk following the map unit name.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

map unit descriptions

1—Andergeorge-Darvey-Asparas association, gently sloping. This map unit is on piedmonts. Slope is 0 to 5 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses (fig. 1). Elevation is 5,200 to 6,200 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

Figure 1.—Area of Andergeorge-Darvey-Asparas association, gently sloping.

This unit is 45 percent Andergeorge gravelly fine sandy loam, 0 to 5 percent slopes; 20 percent Darvey loam, 0 to 5 percent slopes; and 15 percent Asparas loam, 0 to 3 percent slopes. The Andergeorge soil is on gravelly knobs and ridges, the Darvey soil is on valley sides, and the Asparas soil is in swales.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Tulargo soils on valley sides, Harvey soils on ridges, Reventon soils in swales, and Gabaldon soils on valley floors. Included areas make up about 20 percent of the total acreage.

The Andergeorge soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown gravelly fine sandy loam about 5 inches thick. The next layer is light yellowish brown extremely gravelly loam about 4 inches thick. The upper 13 inches of the substratum is very pale brown very gravelly loam, and the lower part to a depth of 60 inches or more is white and pink very gravelly sandy loam and extremely gravelly sandy loam.

Permeability of the Andergeorge soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Darvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is dark brown loam about 6 inches thick. The subsoil is brown loam about 25 inches thick. The upper 7 inches of the substratum is pink loam, and the lower part to a depth of 60 inches or more is light brown loam.

Permeability of the Darvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard

of water erosion is moderate. The hazard of soil blowing is high.

The Asparas soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is grayish brown loam and the lower 5 inches is dark grayish brown clay loam. The upper 17 inches of the subsoil is brown clay loam, and the lower 10 inches is brown loam. The substratum to a depth of 60 inches or more is light brown loam.

Permeability of the Asparas soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Andergeorge soil is mainly black grama, winterfat, and sideoats grama. The potential plant community on the Darvey and Asparas soils is mainly blue grama, galleta, vine-mesquite, and western wheatgrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, ring muhly, broom snakeweed, and burrograss, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, sideoats grama, winterfat, and vine-mesquite. Rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments are difficult to apply on the Andergeorge soil because of the cobbles in the soil profile.

The average annual production of air-dry vegetation on this unit ranges from 1,150 pounds per acre in favorable years to 400 pounds in unfavorable years.

2—Bernal gravelly loam, 3 to 15 percent slopes. This shallow, well drained soil is on broad ridges and mesas. It formed in material derived dominantly from sandstone. Areas are irregular in shape and are 10 to 250 acres in size. The native vegetation is mainly pinyon and oneseed juniper. Elevation is 6,300 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is brown gravelly loam about 4 inches thick. The upper 8 inches of the subsoil is brown gravelly clay loam, and the lower 5 inches is brown gravelly loam. Sandstone is at a depth of 17 inches.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Stroupe soils on the steeper slopes, Rock outcrop on ridges, and Hightower and Reventon soils in swales. Included areas make up about 20 percent of the total acreage.

Permeability of this Bernal soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on this unit is mainly sideoats grama, plains lovegrass, little bluestem, and spike muhly. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in blue grama, threeawn, oneseed juniper, and wavyleaf oak, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, and plains lovegrass. The unit can support scattered juniper and pinyon. The unit is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, and mechanical brush management because of the shallow depth to sandstone.

The average annual production of air-dry vegetation on this unit ranges from 1,150 pounds per acre in favorable years to 500 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are the shallow depth to bedrock and moderate permeability. The shallow depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings. Cuts needed to provide essentially level building sites can expose bedrock.

3—Blakeney-Arch association, moderately undulating. This map unit is on uplands. Slope is 0 to 8 percent. Areas are irregular in shape and are 500 to 10,000 acres in size. The native vegetation is mainly mid and short grasses. Elevation is 4,000 to 4,700 feet. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 57 to 61 degrees F, and the average frost-free period is 180 to 200 days.

This unit is 60 percent Blakeney fine sandy loam, 0 to 5 percent slopes, and 20 percent Arch sandy loam, 1 to 8 percent slopes.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Ector soils on hills. Included areas make up about 20 percent of the total acreage.

The Blakeney soil is shallow and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsoil is pale brown fine sandy loam about 10 inches thick over indurated caliche.

Permeability of the Blakeney soil is moderately rapid. Effective rooting depth is 12 to 20 inches. Available water capacity is very low. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Arch soil is very deep and well drained. It formed in sediment derived from mixed sources. Typically, the surface layer is brown sandy loam about 8 inches thick. The subsoil is light yellowish brown loam about 10 inches thick. The upper 21 inches of the substratum is white loam, and the lower part to a depth of 60 inches or more is light yellowish brown sandy loam.

Permeability of the Arch soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Blakeney soil is mainly sideoats grama, black grama, New Mexico feathergrass, and blue grama. The potential plant community on the Arch soil is mainly black grama, winterfat, blue grama, and sideoats grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in sand dropseed, threeawn, broom snakeweed, and annual forbs, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, sideoats grama, winterfat, and New Mexico feathergrass. Rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments are difficult to apply on the Blakeney soil because of the shallow depth to caliche. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

4—Clovis-Harvey association, gently sloping. This map unit is on piedmonts and valley sides. Slope is 0 to 5 percent. Areas are irregular in shape and are 500 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,000 to 6,500 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 40 percent Clovis fine sandy loam, 0 to 5 percent slopes, and 35 percent Harvey fine sandy loam, 0 to 5 percent slopes. The Clovis soil is on piedmonts and lower valley sides, and the Harvey soil is on upper valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Pastura soils on ridges, Darvey soils between Clovis and Harvey soils on valley sides, and Penistaja soils in swales. Included areas make up about 25 percent of the total acreage.

The Clovis soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown fine sandy loam about 4 inches thick. The subsoil is reddish brown clay loam about 16 inches thick. The upper 14 inches of the substratum is pink loam, and the lower part to a depth of 60 inches or more is reddish yellow loam.

Permeability of the Clovis soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Harvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil is brown loam about 12 inches thick. The substratum to a depth of 60 inches or more is pink loam.

Permeability of the Harvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly black grama, sideoats grama, blue grama, and little bluestem. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in sand dropseed, threeawn, yucca, and buckwheat, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and little bluestem. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 300 pounds in unfavorable years.

5—Clovis-Harvey association, loam surface, gently sloping. This map unit is on piedmonts and valley sides. Slope is 0 to 5 percent. Areas are irregular in shape and are 1,000 to 8,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,000 to 6,000 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Clovis loam, 0 to 5 percent slopes, and 20 percent Harvey loam, 0 to 5 percent slopes. The Clovis soil is on piedmonts and uplands, and the Harvey soil is on piedmonts and valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Darvey soils on valley sides, Sharps soils on shale knobs, Penistaja soils in sandy areas, and

Pena soils in gravelly areas. Included areas make up about 20 percent of the total acreage.

The Clovis soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is reddish brown loam about 2 inches thick. The subsoil is reddish brown clay loam about 14 inches thick. The upper 19 inches of the substratum is pink clay loam, and the lower part to a depth of 60 inches or more is reddish yellow clay loam.

Permeability of the Clovis soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Harvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is brown loam about 11 inches thick. The substratum to a depth of 60 inches or more is pink clay loam.

Permeability of the Harvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Clovis soil is mainly blue grama, galleta, bottlebrush squirreltail, and western wheatgrass. The potential plant community on the Harvey soil is mainly black grama, winterfat, and sideoats grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, ring muhly, broom snakeweed, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, winterfat, and black grama. Rangeland seeding is suitable if the rangeland is in poor condition.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 300 pounds in unfavorable years.

6—Clovis-Pastura association, gently sloping. This map unit is on uplands. Slope is 0 to 8 percent. Areas are irregular in shape and are 500 to 3,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 53 to 57 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 50 percent Clovis loam, 0 to 5 percent slopes, and 35 percent Pastura loam, 0 to 8 percent slopes.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Harvey soils on valley sides and Gabaldon soils on valley floors. Included areas make up about 15 percent of the total acreage.

The Clovis soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is reddish brown loam about 2 inches thick. The subsoil is reddish brown clay loam about 14 inches thick. The upper 19 inches of the substratum is pink clay loam, and the lower part to a depth of 60 inches or more is reddish yellow clay loam.

Permeability of the Clovis soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Pastura soil is very shallow and shallow and is well drained. It formed in alluvium derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is brown loam and the lower 5 inches is brown clay loam. The substratum is brown gravelly clay loam about 6 inches thick over indurated caliche.

Permeability of the Pastura soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Clovis soil is mainly blue grama, galleta, western wheatgrass, and bottlebrush squirreltail. The potential plant community on the Pastura soil is mainly sideoats grama, New Mexico feathergrass, black grama, and blue grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, broom snakeweed, and threeawn, which normally occur in small amounts in the potential plant commuity. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, western wheatgrass, and black grama. Rangeland improvement practices such as fences, pipelines to provide stock water, and water impoundments are difficult to apply on the Pastura soil because of shallow and very shallow depth to caliche.

The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 300 pounds in unfavorable years.

7—Cumulic Haplustolls, gently sloping. These deep, well drained soils are on valley bottoms. They formed in alluvium derived from mixed sources. Slope is 0 to 8 percent. Areas are long and narrow and are 25 to 300 acres. The native vegetation is mainly short grasses, mid grasses, and trees. Elevation is 6,300 to 7,100 feet. The average annual precipitation is 16 to 24 inches, the average annual air temperature is 45 to 54 degrees F, and the average frost-free period is 100 to 140 days.

No single profile of Cumulic Haplustolls is typical, but one commonly observed in the survey area has a

surface layer of dark grayish brown gravelly sandy clay loam about 6 inches thick. The subsoil is dark grayish brown very gravelly sandy clay loam about 22 inches thick. The upper 17 inches of the substratum is brown very gravelly sandy clay loam, and the lower part to a depth of 60 inches or more is brown extremely gravelly sandy loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Ruidoso soils on valley bottoms, many cuts and fills, and paved areas. Included areas make up about 25 percent of the total acreage.

Permeability of Cumulic Haplustolls is slow to rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate to very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight to high. These soils are subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used mainly for homesite development. It is also used for farming. This unit is so variable that suitable use and management should be determined by onsite examination.

8—Darvey-Asparas association, gently sloping. This map unit is on piedmonts and valley sides (fig. 2). Slope is 0 to 5 percent. Areas are irregular in shape and are 300 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,500 to 5,800 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 50 percent Darvey loam, 2 to 5 percent slopes, and 30 percent Asparas loam, 0 to 5 percent slopes.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Deama and Pastura soils on knobs and ridges, Dioxice soils on valley sides, and Gabaldon soils on valley floors. Included areas make up about 20 percent of the total acreage.

The Darvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is dark brown loam about 6 inches thick. The subsoil is brown loam about 25 inches thick. The upper 7 inches of the substratum is pink loam,

Figure 2.—Area of Darvey-Asparas association, gently sloping.

and the lower part to a depth of 60 inches or more is light brown loam.

Permeability of the Darvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Asparas soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is grayish brown loam and the lower 5 inches is dark grayish brown clay loam. The upper 17 inches of the subsoil is brown clay loam, and the lower 10 inches is brown loam. The substratum to a depth of 60 inches or more is light brown loam.

Permeability of the Asparas soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Darvey soil is mainly sideoats grama, blue grama, galleta, and bottlebrush squirreltail. The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Asparas soil is mainly western wheatgrass, vine-mesquite, galleta, and alkali sacaton. The average annual production of air-dry vegetation ranges from 1,800 pounds per acre in favorable years to 900 pounds in unfavorable years.

As the plant community on this unit deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, threeawn, mat muhly, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, and vine-mesquite.

9—Darvey-Pastura association, gently sloping. This map unit is on uplands and valley sides. Slope is 0 to 8 percent. Areas are irregular in shape and are 1,000 to 3,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,600 to 5,800 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 50 percent Darvey loam, 1 to 5 percent slopes, and 35 percent Pastura loam, 0 to 8 percent slopes. The Darvey soil is on valley sides, and the Pastura soil is on uplands.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Harvey and Clovis soils on valley sides, Gabaldon soils on valley floors, and Deama soils and exposed gypsum and limestone on ridges. Included areas make up about 15 percent of the total acreage.

The Darvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is yellowish brown and brown loam about 23 inches thick. The substratum to a depth of 60 inches or more is pink and light brown loam.

Permeability of the Darvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Pastura soil is very shallow and shallow and is well drained. It formed in alluvium derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is brown loam and the lower 5 inches is brown clay loam. The substratum is brown gravelly clay loam about 6 inches thick over indurated caliche.

Permeability of the Pastura soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Darvey soil is mainly blue grama, galleta, black grama, and sideoats grama. The potential plant community on the Pastura soil is mainly sideoats grama, New Mexico feathergrass, black grama, and blue grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, and ring muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and New Mexico feathergrass. Rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments are difficult to apply on the Pastura soil because of the shallow and very shallow depth to caliche.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

10—Deacon loam, 0 to 8 percent slopes. This very deep, well drained soil is on uplands. It formed in alluvium derived dominantly from sedimentary rock. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,700 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is brown loam about 10 inches thick. The subsoil is brown loam about 15 inches

thick. The substratum to a depth of 60 inches or more is light brown loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Reventon soils on valley floors, Dioxice soils on uplands, and Tortugas soils on knolls and ridges. Included areas make up about 15 percent of the total acreage.

Permeability of this Deacon soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and homesite development.

The potential plant community on this unit is mainly blue grama, bottlebrush squirreltail, vine-mesquite, and galleta. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ear muhly, sand dropseed, threeawn, and broom snakeweed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of vine-mesquite, bottlebrush squirreltail, galleta, and blue grama.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 450 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are the moderately slow permeability and shrink-swell potential. The moderately slow permeability limits the operation of septic tank absorption fields. Buildings and roads should be designed to offset the effects of shrinking and swelling.

11—Deama very cobbly loam, moderately sloping. This very shallow and shallow, well drained soil is on uplands. It formed in material derived dominantly from limestone. Slope is 0 to 15 percent. Areas are irregular in shape and are 500 to 2,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,600 to 5,800 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 150 to 190 days.

Typically, the surface layer is brown very cobbly loam about 7 inches thick over limestone.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Harvey and Darvey soils on valley sides, Gabaldon soils on valley floors, and limestone and gypsum outcrops on ridges and breaks. Included areas make up about 25 percent of the total acreage.

Permeability of this Deama soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, New Mexico feathergrass, black grama, and plains lovegrass. The unit can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, and ring muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, New Mexico feathergrass, and black grama. The Deama soil is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments because of the shallow and very shallow depth to limestone.

The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

12—Deama-Pastura association, moderately undulating. This map unit is on uplands. Slope is 0 to 8 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,500 to 6,500 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 40 percent Deama very cobbly loam, 0 to 8 percent slopes, and 30 percent Pastura loam, 0 to 8 percent slopes.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Harvey and Darvey soils on valley sides, gypsum outcrops on edges of sinkholes, limestone outcrops on ridges, and sinkholes. Included areas make up about 30 percent of the total acreage.

The Deama soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the Deama soil is brown very cobbly loam about 7 inches deep over limestone.

Permeability of the Deama soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Pastura soil is very shallow and shallow and is well drained. It formed in alluvium derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is brown loam and the lower 5 inches is brown clay loam. The substratum is brown gravelly clay loam about 6 inches thick over indurated caliche.

Permeability of the Pastura soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity

is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, New Mexico feathergrass, black grama, and plains lovegrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, and sacahuista, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and New Mexico feathergrass. This unit is poorly suited to rangeland improvement practices such as fences, water impoundments, and pipelines for providing stock water because of the shallow and very shallow depth. The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

13—Deama-Pastura association, moderately sloping. This map unit is on uplands. Slope is 0 to 15 percent. Areas are irregular in shape and are 500 to 10,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,600 to 6,500 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 40 percent Deama very cobbly loam, 0 to 15 percent slopes, and 35 percent Pastura loam, 1 to 9 percent slopes. The Deama and Pastura soils are on uplands.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Harvey and Darvey soils on valley sides, Gabaldon soils on valley floors, Rock outcrop on ridges, and a few sinkholes. Included areas make up about 25 percent of the total acreage.

The Deama soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the Deama soil is brown very cobbly loam about 7 inches deep over limestone.

Permeability of the Deama soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Pastura soil is very shallow and shallow and is well drained. It formed in alluvium derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is brown loam and the lower 5 inches is brown clay loam. The substratum is brown gravelly clay loam about 6 inches thick over indurated caliche.

Permeability of the Pastura soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, New Mexico feathergrass, plains lovegrass, and black grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, and ring muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, New Mexico feathergrass, and black grama. This unit is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments because of the shallow and very shallow depth.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

14—Deama-Rock outcrop association, very steep. This map unit is on hills and breaks. Slope is 15 to 50 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,500 to 6,000 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Deama very cobbly loam, 15 to 50 percent slopes, and 20 percent Rock outcrop of limestone. The Deama soil is on hills, and Rock outcrop is on breaks.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Harvey, Dioxice, and Pena soils on hillsides and Pastura soils on summits. Included areas make up about 20 percent of the total acreage.

The Deama soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the Deama soil is brown very cobbly loam about 7 inches deep over limestone.

Permeability of the Deama soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed limestone. Surface runoff is rapid.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, New Mexico feathergrass, plains lovegrass, and little bluestem. The unit can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, curlyleaf muhly, and

catclaw acacia, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of plains lovegrass, sideoats grama, and little bluestem. This unit is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, water impoundment facilities, and mechanical brush management because of the shallow and very shallow depth to bedrock and steepness of slope.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

15—Dioxice loam, 2 to 5 percent slopes. This very deep, well drained soil is on valley sides. It formed in old alluvium derived from mixed sources. Areas are irregular in shape and are 20 to 250 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 6,300 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is brown loam about 11 inches thick. The upper 15 inches of the subsoil is pale brown clay loam, and the lower 8 inches is light yellowish brown loam. The substratum to a depth of 60 inches or more is very pale brown loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Reventon soils in swales, Deacon soils on valley sides, and Plack soils in level areas on uplands. Included areas make up about 10 percent of the total acreage.

Permeability of this Dioxice soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on this unit is mainly western wheatgrass, blue grama, galleta, and vine-mesquite. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, ring muhly, broom snakeweed, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass and vine-mesquite.

The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 450 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are the moderately slow permeability and shrink-swell potential. The moderately slow permeability limits the operation of septic tank absorption fields. Buildings and roads should be designed to offset the effects of shrinking and swelling.

16—Ector-Kimbrough association, gently sloping. This map unit is on uplands. Slope is 0 to 8 percent. Areas are irregular in shape and are 500 to 10,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,000 to 4,500 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 57 to 61 degrees F, and the average frost-free period is 180 to 200 days.

This unit is 55 percent Ector very cobbly loam, 1 to 8 percent slopes, and 30 percent Kimbrough gravelly loam, 0 to 5 percent slopes.

Included in this unit are areas of Rock outcrop and deeper soils that may or may not be present in all mapped areas. The Rock outcrop is on ridges and breaks, and the deeper soils are on sides of ridges. Included areas make up about 15 percent of the total acreage.

The Ector soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the soil is dark grayish brown very cobbly loam about 7 inches deep over limestone.

Permeability of the Ector soil is moderate. Effective rooting depth is 4 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Kimbrough soil is very shallow and shallow and is well drained. It formed in alluvium derived dominantly from limestone. Typically, the soil is grayish brown and dark grayish brown gravelly loam about 8 inches deep over indurated caliche.

Permeability of the Kimbrough soil is moderate. Effective rooting depth is 4 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, black grama, plains lovegrass, and little bluestem. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, curlyleaf muhly, catclaw acacia, and sacahuista, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and plains lovegrass. Rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments are difficult to apply because of the shallow and very shallow depth.

The average annual production of air-dry vegetation on this unit ranges from 950 pounds per acre in favorable years to 350 pounds in unfavorable years.

17—Ector-Rock outcrop association, moderately sloping. This map unit is on uplands. Slope is 1 to 15 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,000 to 4,500 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 180 to 200 days.

This unit is 70 percent Ector very cobbly loam, 1 to 15 percent slopes, and 10 percent Rock outcrop.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Kimbrough soils in level areas on summits and deeper soils in sloping areas. Included areas make up about 20 percent of the total acreage.

The Ector soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the Ector soil is dark grayish brown very cobbly loam about 7 inches deep over limestone.

Permeability of the Ector soil is moderate. Effective rooting depth is 4 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed limestone. Surface runoff is rapid.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, black grama, and plains lovegrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, curlyleaf muhly, and catclaw acacia, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, sideoats grama, and plains lovegrass. This unit is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, water impoundment facilities, and mechanical brush management because of the shallow and very shallow depth to bedrock.

The average annual production of air-dry vegetation on this unit ranges from 950 pounds per acre in favorable years to 350 pounds in unfavorable years.

18—Ector-Rock outcrop association, moderately steep. This map unit is on hills. Slope is 15 to 50 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,000 to 4,500 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 180 to 200 days.

This unit is 60 percent Ector very cobbly loam, 15 to 50 percent slopes, and 25 percent Rock outcrop.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Kimbrough soils on summits and deeper soils on sloping hillsides. Included areas make up about 15 percent of the total acreage.

The Ector soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the soil is dark grayish brown very cobbly loam about 7 inches deep over limestone.

Permeability of the Ector soil is moderate. Effective rooting depth is 4 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed limestone. Surface runoff is rapid.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, black grama, plains lovegrass, and little bluestem. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, curlyleaf muhly, and catclaw acacia, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, sideoats grama, and plains lovegrass. This unit is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, water impoundment facilities, and mechanical brush management because of the shallow and very shallow depth to bedrock and steepness of slope.

The average annual production of air-dry vegetation on this unit ranges from 950 pounds per acre in favorable years to 350 pounds in unfavorable years.

19—Gabaldon silt loam, 0 to 2 percent slopes. This very deep, well drained soil is on valley floors. It formed in alluvium derived from mixed sources. Areas are long and narrow or irregular in shape and are 300 to 4,000 acres in size. The native vegetation is mainly mid and short grasses. Elevation is 5,000 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

Typically, the surface layer is brown silt loam about 4 inches thick. The upper 12 inches of the subsoil is brown silty clay loam, and the lower 10 inches is yellowish brown silt loam. The substratum to a depth of 60 inches or more is brown loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Sampson soils on valley floors, Darvey soils on low terraces, recent gravelly alluvium at arroyo outlets, and clayey soils in depressional areas. Included areas make up about 25 percent of the total acreage.

Permeability of this Gabaldon soil is moderate. Effective rooting depth is 60 inches or more. Available

water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to frequent, very brief periods of flooding in summer.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly alkali sacaton, western wheatgrass, vine-mesquite, and galleta. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in mat muhly, ring muhly, broom snakeweed, and blue grama, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, vine-mesquite, and alkali sacaton. This unit receives runoff from adjoining areas, which increases the production and palatability of forage. Consequently, it is often excessively grazed.

The average annual production of air-dry vegetation on this unit ranges from 2,500 pounds per acre in favorable years to 1,100 pounds in unfavorable years.

20—Gabaldon-Riverwash association, nearly level. This map unit is on valley floors. Slope is 0 to 3 percent. Areas are long and narrow and are 1,000 to 5,000 acres. The vegetation is mainly irrigated crops. Elevation is 4,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Gabaldon silt loam, 0 to 3 percent slopes, and 15 percent Riverwash. The Gabaldon soil is on valley floors and stream terraces, and Riverwash is on flood plains and in intermittent drainageways.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are soils that have more clay than the Gabaldon soil and are on upper stream terraces, soils that have a thinner surface layer and are in level areas, and stratified soils on recent flood plains. Included areas make up about 25 percent of the total acreage.

The Gabaldon soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the upper 8 inches of the surface layer is brown silt loam and the lower 13 inches is dark brown loam. The subsoil is dark grayish brown loam about 33 inches thick. The substratum to a depth of 60 inches or more is brown silty clay loam.

Permeability of the Gabaldon soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to frequent, very brief periods of flooding in summer.

Riverwash consists of unstabilized stony, cobbly, or gravelly sediment that is periodically reworked by water. It is subject to common, very brief periods of flooding in summer.

Most areas of this unit are used for irrigated pasture. Among the other crops grown are orchard fruit and alfalfa. Some areas are used for home gardens and riparian wildlife habitat.

The Gabaldon soil is well suited to hay and pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Leveling helps to insure the uniform application of water. Fertilizer is needed to insure optimum growth of grasses and legumes.

The Gabaldon soil is well suited to orchard and annual crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Most crops respond to nitrogen and phosphorus fertilizer. In summer, irrigation is needed for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. If sprinkler irrigation is used, water should be applied slowly to minimize runoff. 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.

21—Gavilan loam, 0 to 8 percent slopes. This very deep, well drained soil is on mesas and alluvial terraces. It formed in old gravelly alluvium derived from mixed sources. Areas are irregular in shape and are 20 to 300 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 18 to 24 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 145 days.

Typically, the surface layer is dark grayish brown loam about 8 inches thick. The upper 8 inches of the subsoil is brown gravelly clay loam, and the lower 27 inches is reddish brown and yellowish red very gravelly clay. The substratum to a depth of 60 inches or more is pinkish gray extremely gravelly clay loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Paco and Nolten soils on mesas. Included areas make up about 10 percent of the total acreage.

Permeability of this Gavilan soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

If this unit is used for homesite development, the main limitations are slow permeability and shrink-swell potential. Slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on the unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling.

This unit is suited to ponderosa pine. The site index for ponderosa pine ranges from 51 to 63. Based on a site index of 60, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 3,570 cubic feet or 14,600 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), production is 46 cubic feet or 177 board feet (International rule) per acre. This unit has few limitations for use as woodland. Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

If the planting site is not adequately prepared, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees.

22—Gavilan gravelly loam, 15 to 30 percent slopes. This very deep, well drained soil is on mesas and alluvial terraces. It formed in old gravelly alluvium derived from mixed sources. Areas are irregular in shape and are 20 to 250 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 18 to 24 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 145 days.

Typically, the surface is covered with pine needles and decomposed bark. The surface layer is dark grayish brown gravelly loam about 6 inches thick. The upper 5 inches of the subsoil is dark grayish brown very cobbly clay loam, and the lower 49 inches is brown very gravelly clay.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Monjeau, Docdee, and Nolten soils on sides of mesas. Included areas make up about 15 percent of the total acreage.

Permeability of this Gavilan soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

If this unit is used for homesite development, the main limitations are slow permeability, shrink-swell potential, and slope. The slow permeability limits the operation of septic tank absorption fields. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

This unit is suited to ponderosa pine. The site index for ponderosa pine ranges from 59 to 68. Based on a site index of 65, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,000 cubic feet or 18,300 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), production is 51 cubic feet or 203 board feet (International rule) per acre. The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

If the planting site is not adequately prepared, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Brushy plants such as oak limit natural regeneration of ponderosa pine. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees.

23—Gavilan very gravelly loam, 30 to 50 percent slopes. This very deep, well drained soil is on mesas and alluvial terraces. It formed in old gravelly alluvium derived from mixed sources. Areas are irregular in shape and are 15 to 200 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 18 to 24 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 145 days.

Typically, the surface is covered with pine needles and decomposed bark. The surface layer is dark grayish brown very gravelly loam about 18 inches thick. The upper 9 inches of the subsoil is brown very cobbly clay loam, and the lower 33 inches is light brown very cobbly clay.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Monjeau, Docdee, and Nolten soils on sides of mesas. Included areas make up about 15 percent of the total acreage.

Permeability of this Gavilan soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

This unit is poorly suited to homesite development. The main limitations are slope, slow permeability, and shrink-swell potential. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from the buildings help to prevent structural damage because of shrinking and swelling.

This unit is suited to ponderosa pine. The site index for ponderosa pine ranges from 59 to 65. Based on a site index of 65, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,000 cubic feet or 18,300 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), production is 51 cubic feet or 203 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are the hazard of erosion, slope, and plant competition. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Conventional methods of harvesting timber are difficult to use because of slope. High-lead or other cable logging methods can be used for harvesting trees.

If the planting site is not adequately prepared, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Plants such as juniper, grass, and oak limit natural regeneration of ponderosa pine. The moderate available water capacity generally influences seedling survival in areas where understory plants are numerous. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees.

24—Harvey-Darvey association, gently sloping. This map unit is on ridges and valley sides. Slope is 0 to 5 percent. Areas are irregular in shape and are 500 to 5,000 acres in size. The native vegetation is mainly mid and short grasses. Elevation is 5,000 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 40 percent Harvey fine sandy loam, 0 to 5 percent slopes, and 35 percent Darvey fine sandy loam, 0 to 5 percent slopes. The Harvey soil is on ridges and upper valley sides, and the Darvey soil is on the lower valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Pastura soils on ridges, Pena soils on gravelly knobs, and Clovis and Penistaja soils in swales. Included areas make up about 25 percent of the total acreage.

The Harvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown fine sandy loam about 4 inches thick. The subsoil is pale brown loam about 12 inches thick. The substratum to a depth of 60 inches or more is pink loam.

Permeability of the Harvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Darvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil is pale brown loam about 18 inches thick. The substratum to a depth of 60 inches or more is pink loam.

Permeability of the Darvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly black grama, sideoats grama, galleta, and mesa dropseed. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in sand dropseed, ring muhly, broom snakeweed, and buckwheat, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and galleta. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 400 pounds in unfavorable years.

25—Harvey-Darvey association, loam surface, gently sloping. This map unit is on piedmonts, valley sides, and ridges. Slope is 0 to 5 percent. Areas are irregular in shape and are 400 to 5,000 acres in size. The native vegetation is mainly mid and short grasses. Elevation is 5,000 to 6,200 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Harvey loam, 0 to 5 percent slopes, and 20 percent Darvey loam, 0 to 5 percent slopes. The Harvey soil is on ridges and upper valley sides, and the Darvey soil is on the lower valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Asparas soils in areas adjacent to drainageways, Gabaldon soils on valley floors, and Andergeorge soils on gravelly ridges. Included areas make up about 20 percent of the total acreage.

The Harvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown loam about 6 inches thick. The subsoil is light brown clay loam about 6 inches thick. The substratum to a depth of 60 inches or more is pink clay loam and light brown loam.

Permeability of the Harvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Darvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is dark brown loam about 6 inches thick. The subsoil is brown loam about 25 inches thick. The upper 7 inches of the substratum is pink loam, and the lower part to a depth of 60 inches or more is light brown loam.

Permeability of the Darvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Harvey soil is mainly black grama, winterfat, sideoats grama, and blue grama. The potential plant community on the Darvey soil is mainly blue grama, galleta, vine-mesquite, and alkali sacaton. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, burrograss, and ring muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, winterfat, and sideoats grama.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

26—Hightower loam, 3 to 8 percent slopes. This moderately deep, well drained soil is on uplands and in swales. It formed in residuum and local alluvium derived dominantly from andesite and shale. Areas are irregular in shape and are 30 to 200 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 6,300 to 7,500 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is brown loam about 10 inches thick. The subsoil is yellowish brown loam about 12 inches thick. Sandstone is at a depth of 22 inches.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are soils that have bedrock at a depth of 40 to 60 inches and are in swales and Bernal and Oro Grande soils on ridges. Included areas make up about 15 percent of the total acreage.

Permeability of this Hightower soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on this unit is mainly blue grama, galleta, vine-mesquite, and bottlebrush squirreltail. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in broom snakeweed, walkingstick cholla, wolftail, and threeawn, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of vine-mesquite and bottlebrush squirreltail.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 450 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are depth to bedrock, shrink-swell potential, and moderate permeability. Cuts needed to provide essentially level building sites can expose bedrock. The moderate depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings. Buildings and roads should be designed to offset the effects of shrinking and swelling.

27—Hightower-Oro Grande complex, 3 to 8 percent slopes. This map unit is on uplands, in swales, and on ridges. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly mid and short grasses. Elevation is 6,300 to 7,500 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

This unit is 40 percent Hightower loam, 3 to 8 percent slopes, and 30 percent Oro Grande very gravelly loam, 3 to 8 percent slopes. The Hightower soil is on uplands and in swales, and the Oro Grande soil is on ridges. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Deacon and Reventon soils in concave areas and Rock outcrop on ridges. Included areas make up about 30 percent of the total acreage.

The Hightower soil is moderately deep and well drained. It formed in residuum and local alluvium derived dominantly from andesite and shale. Typically, the upper 3 inches of the surface layer is brown loam and the lower 12 inches is brown clay loam. The subsoil is brown clay loam about 10 inches thick. Andesite is at a depth of 25 inches.

Permeability of the Hightower soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

The Oro Grande soil is very shallow and shallow and is well drained. It formed in material derived dominantly from andesite and sandstone. Typically, the surface layer is brown very gravelly loam about 3 inches thick. The next layer is brown very cobbly loam about 5 inches thick. The substratum is yellowish brown very gravelly loam about 5 inches thick over sandstone.

Permeability of the Oro Grande soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and homesite development.

The potential plant community on the Hightower soil is mainly blue grama, galleta, bottlebrush squirreltail, and vine-mesquite. The potential plant community on the Oro Grande soil is mainly plains lovegrass, sideoats grama, mountain brome, and big bluestem. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in wavyleaf oak, broom snakeweed, wolftail, and Carruth sagewort, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of plains lovegrass, sideoats grama, galleta,and blue grama. The unit can support scattered juniper and pinyon. The Oro Grande soil is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, water impoundments, and mechanical brush management because of the very shallow and shallow depth to sandstone.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 450 pounds in unfavorable years.

If the Hightower soil is used for homesite development, the main limitations are the moderate depth to bedrock, shrink-swell potential, and moderate permeability. Cuts needed to provide essentially level building sites can expose bedrock. The moderate depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings. Buildings and roads should be designed to offset the effects of shrinking and swelling.

The Oro Grande soil is poorly suited to homesite development. It is limited mainly by the very shallow and shallow depth to bedrock, which limits the installation of septic tank systems and the construction of streets and dwellings.

28—Hightower-Oro Grande complex, moderately steep. This map unit is on uplands, in swales, and on ridges. Slope is 8 to 30 percent. Areas are irregular in shape and are 15 to 220 acres in size. The native vegetation is mainly short grasses, mid grasses, pinyon, and oneseed juniper. Elevation is 6,300 to 7,500 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

This unit is 40 percent Hightower loam, 8 to 30 percent slopes, and 30 percent Oro Grande very gravelly loam, 8 to 30 percent slopes. The Hightower soil is on uplands and in swales, and the Oro Grande soil is on ridges. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Paco and Deacon soils in concave areas, Rock outcrop on ridges, and nongravelly Oro Grande soils. Included areas make up about 30 percent of the total acreage.

The Hightower soil is moderately deep and well drained. It formed in residuum and local alluvium derived dominantly from sandstone and shale. Typically, the surface layer is brown loam about 14 inches thick. The subsoil is yellowish brown clay loam about 10 inches thick. The substratum is very pale brown gravelly clay loam about 7 inches thick over andesite.

Permeability of the Hightower soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

The Oro Grande soil is very shallow and shallow and is well drained. It formed in material derived dominantly from andesite or sandstone. Typically, the surface layer is brown very gravelly loam about 3 inches thick. The next layer is brown very gravelly loam about 5 inches thick. The substratum is yellowish brown extremely gravelly clay loam about 4 inches thick over andesite.

Permeability of the Oro Grande soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and homesite development.

The potential plant community on the Hightower soil is mainly blue grama, bottlebrush squirreltail, galleta, and vine-mesquite. The potential plant community on the Oro Grande soil is mainly plains lovegrass, little bluestem, sideoats grama, and mountain brome. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in wavyleaf oak, broom snakeweed, Carruth sagewort, and wolftail, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of plains lovegrass, sideoats grama, vine-mesquite, and little bluestem. This unit can support stands of pinyon and juniper as well as stands of grass. The Oro Grande soil is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, water impoundments, and mechanical brush management because of the steepness of slope and very shallow and shallow depth to sandstone.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 450 pounds in unfavorable years.

If the Hightower soil is used for homesite development, the main limitations are the moderate depth to bedrock, slope, shrink-swell potential, and moderate permeability. Cuts needed to provide essentially level building sites can expose bedrock. The moderate depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings. Buildings and roads should be designed to offset the effects of shrinking and swelling.

The Oro Grande soil is poorly suited to homesite development. The main limitations are the very shallow and shallow depth to bedrock and slope. The very shallow and shallow depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings.

29—Hightower Variant sandy loam, 3 to 8 percent slopes. This moderately deep, well drained soil is on ridges. It formed in residuum derived dominantly from sandstone. Areas are long and narrow and are 10 to 50 acres. The native vegetation is mainly short and mid grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the upper 2 inches of the surface layer is pale brown sandy loam and the lower 4 inches is yellowish brown loam. The subsoil is pale brown and very pale brown loam about 12 inches thick. The substratum is very pale brown loam about 8 inches thick over partially weathered bedrock.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Reventon soils in swales, Rock outcrop and Pena soils on ridges, and Deacon soils on the lower side slopes. Included areas make up about 15 percent of the total acreage.

Permeability of this Hightower Variant soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, blue grama, galleta, and hairy grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in broom snakeweed, threeawn, and sand dropseed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, galleta, and blue grama. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 500 pounds in unfavorable years.

30—Hogadero-Pena association, moderately undulating. This map unit is on dissected remnants of valley floors and on valley sides. Slope is 0 to 8 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,800 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 40 percent Hogadero loam, 1 to 8 percent slopes, and 35 percent Pena gravelly loam, 0 to 8 percent slopes. The Hogadero soil is on dissected remnants of valley floors, and the Pena soil is on valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Harvey and Dioxice soils on valley sides, Asparas soils in swales, and Plack soils on ridges. Included areas make up about 25 percent of the total acreage.

The Hogadero soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the upper 4 inches of surface layer is brown loam, the next 4 inches is brown gravelly clay loam, and the lower 3 inches is brown gravelly loam. The upper 4 inches of the substratum is white gravelly loam, the next 15 inches is light gray very gravelly loam, and the lower part to a depth of 60 inches or more is light yellowish brown extremely gravelly loam.

Permeability of the Hogadero soil is moderate. Effective rooting depth is 60 inches or more. Available

water capacity is low. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Pena soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown gravelly loam about 14 inches thick. The upper 4 inches of the substratum is white gravelly loam, and the lower part to a depth of 60 inches or more is light gray and pink very gravelly loam.

Permeability of the Pena soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is medium, and the hazards of water erosion and soil blowing are moderate.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, New Mexico feathergrass, black grama, and little bluestem. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, and oneseed juniper, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, sideoats grama, and New Mexico feathergrass. This unit can support scattered oneseed juniper. Rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments are difficult to apply on the unit because of the content of gravel and cobbles in the soils.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 450 pounds in unfavorable years.

31—Lava flows. Lava flows is geologically recent basalt lava that has been deposited in a valley on the western edge of the survey area. Only one area of this unit has been mapped. It is long and narrow and is about 33,024 acres. It consists of angular boulders and continuous flows that have sharp, jagged surfaces and crevices and a few smooth areas (fig. 3). The deposit ranges from a few feet to about 65 feet in thickness. Elevation is 5,000 to 5,700 feet.

Numerous juniper trees and shrubs grow in the cracks and crevices where wind-deposited soil material has been trapped.

Figure 3.—Area of Lava flows west of Carrizozo.

32—Lithic Argiustolls-Rock outcrop association, extremely steep. This map unit is on uplands and breaks. Slope is 30 to 80 percent. Areas are irregular in shape and are 250 to 6,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 6,000 to 7,200 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 190 to 210 days.

This unit is 60 percent Lithic Argiustolls, 30 to 80 percent slopes, and 20 percent Rock outcrop. Lithic Argiustolls are on uplands, and Rock outcrop is on breaks.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are deep soils in swales and along stream channels. Included areas make up about 20 percent of the total acreage.

The Lithic Argiustolls are very shallow and shallow and are well drained. They formed in material derived dominantly from igneous rock. No single profile is typical of Lithic Argiustolls, but one commonly observed in the survey area has a surface layer of brown extremely cobbly loam about 2 inches thick. The upper 9 inches of the subsoil is brown extremely cobbly clay loam, and the lower 6 inches is pale brown extremely cobbly loam. Igneous bedrock is at a depth of 17 inches.

Permeability of the Lithic Argiustolls is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed igneous bedrock. Surface runoff is rapid.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly black grama, sideoats grama, blue grama, and bush muhly. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in broom snakeweed, threeawn, creosotebush, and cactus, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, sideoats grama, and bush muhly. This unit is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments because of the shallow and very shallow depth to bedrock and the steepness of slope.

The average annual production of air-dry vegetation on this unit ranges from 900 pounds per acre in favorable years to 300 pounds in unfavorable years.

33—Lozier very gravelly loam, very steep. This very shallow and shallow, well drained soil is on hills. It formed in material derived dominantly from limestone. Slope is 15 to 75 percent. Areas are irregular in shape and are 500 to 2,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,800 to 6,000 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 190 to 210 days.

Typically, the surface layer is pale brown very gravelly and extremely gravelly loam about 13 inches thick over limestone.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Ector soils on north-facing slopes and Rock outcrop on breaks. Included areas make up about 20 percent of the total acreage.

Permeability of this Lozier soil is moderate. Effective rooting depth is 4 to 16 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, black grama, and New Mexico feathergrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, curlyleaf muhly, sacahuista, and slim tridens, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and New Mexico feathergrass. This unit can support scattered oneseed juniper. It is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments because of the shallow and very shallow depth to bedrock and steepness of slope.

The average annual production of air-dry vegetation on this unit ranges from 800 pounds per acre in favorable years to 300 pounds in unfavorable years.

34—Malargo-Bluepoint association, hummocky. This map unit is in hummocky areas on piedmonts (fig. 4). Slope is 0 to 8 percent. Areas are irregular in shape and are 500 to 2,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 190 to 210 days.

This unit is 50 percent Malargo loam, 0 to 8 percent slopes, and 30 percent Bluepoint loamy fine sand, 0 to 8 percent slopes. The Malargo soil is in interdunal areas, and the Bluepoint soil is on dunes.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Onite soils in areas between dunes and very gravelly alluvial soils

Figure 4.—Area of Malargo-Bluepoint association, hummocky.

along drainageways. Included areas make up about 20 percent of the total acreage.

The Malargo soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is light brown loam about 4 inches thick. The upper 7 inches of the subsoil is pink loam, and the lower 14 inches is light reddish brown loam. The upper 24 inches of the substratum is reddish yellow loam, and the lower part to a depth of 60 inches or more is pink fine sandy loam.

Permeability of the Malargo soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Bluepoint soil is very deep and somewhat excessively drained. It formed in sediment derived dominantly from sandstone. Typically, the surface layer is light brown loamy fine sand about 4 inches thick. The substratum to a depth of 60 inches or more is light brown loamy fine sand.

Permeability of the Bluepoint soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly mesa dropseed, bush muhly, fourwing saltbush, and plains bristlegrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in sand dropseed, mesquite, broom snakeweed, and creosotebush, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of bush muhly, plains bristlegrass, and fourwing saltbush. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 250 pounds in unfavorable years.

35—Manzano loam, 0 to 3 percent slopes. This very deep, well drained soil is on valley bottoms. It formed in alluvium derived from mixed sources. Areas are long and narrow and are 20 to 250 acres. The native vegetation is mainly short and mid grasses. Elevation is 6,000 to 6,900 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is brown loam about 24 inches thick. The subsoil is brown silty clay loam and loam about 24 inches thick. The substratum to a depth of 60 inches or more is yellowish brown clay loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are gravelly soils near drainageways, Gabaldon soils in silty areas, and Reventon soils on older landscapes. Included areas make up about 20 percent of the total acreage.

Permeability of this Manzano soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. This soil is subject to occasional, very brief periods of flooding in summer.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, vine-mesquite, alkali sacaton, and bottlebrush squirreltail. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in mat muhly, broom snakeweed, blue grama, and ring muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, vine-mesquite, and alkali sacaton. This unit receives runoff from adjoining areas, which increases the production and palatability of forage. Consequently, it is often excessively grazed.

The average annual production of air-dry vegetation on this unit ranges from 2,500 pounds per acre in favorable years to 1,000 pounds in unfavorable years.

36—Mokiak-Rock outcrop association, extremely steep. This map unit is on mountainsides and breaks. Slope is 30 to 70 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly grass with scattered pinyon and juniper. Elevation is 5,700 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Mokiak very gravelly loam, 30 to 70 percent slopes, and 20 percent Rock outcrop. The Mokiak soil is on mountainsides, and Rock outcrop is on breaks.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are deep soils in swales and Stroupe soils on the lower part of mountainsides. Included areas make up about 20 percent of the total acreage.

The Mokiak soil is moderately deep and well drained. It formed in material derived dominantly from igneous rock. Typically, the surface layer is brown very gravelly loam about 3 inches thick. The subsoil is brown and light brown very gravelly clay loam about 19 inches thick. Andesite is at a depth of 22 inches.

Permeability of the Mokiak soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed igneous bedrock. Surface runoff is rapid.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, black grama, plains lovegrass, and mountainmahogany. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, wolftail, and hairy grama, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, mountainmahogany, and plains lovegrass. The unit is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, and water impoundments because of the steepness of slope, stoniness, and moderate depth to bedrock.

The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 400 pounds in unfavorable years.

This unit has limited suitability for the production of juniper and pinyon for use as firewood, fenceposts, Christmas trees, or ornamentals.

37—Mokiak-Stroupe-Rock outcrop association, very steep. This map unit is on mountainsides. Slope is 5 to 50 percent. Areas are irregular in shape and are 100 to 5,000 acres in size. The native vegetation is mainly pinyon and juniper with an understory of short and mid grasses. Elevation is 5,500 to 7,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 35 percent Mokiak stony loam, 5 to 50 percent slopes; 30 percent Stroupe very cobbly loam, 15 to 50 percent slopes; and 15 percent Rock outcrop.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Reventon soils in nonstony areas and Purcella and Patos soils on stony piedmonts. Included areas make up about 20 percent of the total acreage.

The Mokiak soil is moderately deep and well drained. It formed in material derived dominantly from igneous rock. Typically, the surface layer is brown stony loam about 9 inches thick. The subsoil is brown very gravelly and extremely gravelly clay loam about 15 inches thick. Igneous bedrock is at a depth of 24 inches.

Permeability of the Mokiak soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Stroupe soil is moderately deep and well drained. It formed in sediment derived dominantly from sandstone, shale, and igneous rock. Typically, the surface layer is brown very cobbly loam about 3 inches thick. The upper 5 inches of the subsoil is brown very cobbly clay loam, and the lower 18 inches is yellowish red very cobbly clay. The substratum is pink extremely cobbly clay loam about 4 inches thick over rhyolite.

Permeability of the Stroupe soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed igneous bedrock. Surface runoff is rapid.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on this unit is mainly plains lovegrass, sideoats grama, littleseed ricegrass, and pinyon ricegrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in wavyleaf oak, wolftail, and blue grama, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, plains lovegrass, and pinyon ricegrass. The unit is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, and water impoundments because of the steepness of slope, stoniness, and areas of Rock outcrop.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 400 pounds in unfavorable years.

This unit has limited suitability for production of pinyon and juniper to be used as firewood, fenceposts, Christmas trees, or ornamentals.

38—Monjeau-Docdee complex, 8 to 15 percent slopes. This map unit is on ridgetops and mountainsides. Areas are irregular in shape and are 15 to 250 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper. Elevation is 7,000 to 7,500 feet. The average annual precipitation is 18 to 24 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

This unit is 50 percent Monjeau loam, 8 to 15 percent slopes, and 30 percent Docdee very cobbly loam, 8 to 15 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Paco soils in upland valleys, Nolten soils on uplands, and Rock outcrop on ridges. Included areas make up about 20 percent of the total acreage.

The Monjeau soil is moderately deep and well drained. It formed in material derived dominantly from andesite, sandstone, siltstone, and shale. Typically, the surface layer is dark grayish brown loam about 6 inches thick. The upper 7 inches of the subsoil is dark brown clay loam, and the lower 6 inches is dark yellowish brown clay. The substratum is reddish yellow clay loam about 19 inches thick over partially weathered shale.

Permeability of the Monjeau soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

The Docdee soil is very shallow and shallow and is well drained. It formed in material derived dominantly from andesite and sandstone. Typically, the surface is covered with pine needles. The surface layer is brown very cobbly loam about 8 inches thick over sandstone.

Permeability of the Docdee soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

If the Monjeau soil is used for homesite development, the main limitations are the slow permeability, shrink-swell potential, and slope. Slow permeability limits the operation of septic tank absorption fields. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to control surface runoff and to help stabilize cut slopes.

If the Docdee soil is used for homesite development, the main limitations are the very shallow and shallow depth to bedrock and slope. Cuts needed to provide essentially level building sites can expose bedrock. The very shallow and shallow depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings. Access roads should be

designed to control surface runoff and to help stabilize cut slopes.

The Monjeau soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. Based on a site index of 70, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,480 cubic feet or 22,000 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 55 cubic feet or 232 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Plants such as oak and grass limit natural regeneration of ponderosa pine.

The Docdee soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 50 to 80. Based on a site index of 70, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,480 cubic feet or 22,000 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 55 cubic feet or 232 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are plant competition, seedling mortality, and the hazard of erosion. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Brushy plants such as oak limit natural regeneration of ponderosa pine. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. The very low available water capacity generally influences seedling survival in areas where understory plants are numerous. Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

39—Monjeau-Docdee complex, 15 to 30 percent slopes. This map unit is on ridgetops and mountainsides. Areas are irregular in shape and are 10 to 250 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper. Elevation is 7,000 to 7,500 feet. The average annual precipitation is 18 to 24 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

This unit is 45 percent Monjeau loam, 15 to 30 percent slopes, and 35 percent Docdee very cobbly loam, 15 to 30 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Paco soils in upland valleys, Nolten soils on uplands, and Rock outcrop on ridges. Included areas make up about 20 percent of the total acreage.

The Monjeau soil is moderately deep and well drained. It formed in material derived dominantly from andesite, sandstone, siltstone, and shale. Typically, the surface layer is dark grayish brown loam about 7 inches thick. The upper 7 inches of the subsoil is light brown clay, and the lower 4 inches is light brownish gray clay. The substratum is gray clay about 13 inches thick over partially weathered shale and sandstone.

Permeability of the Monjeau soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

The Docdee soil is very shallow and shallow and is well drained. It formed in material derived dominantly from andesite and sandstone. Typically, the surface is covered with pine needles and oak leaves. The upper 4 inches of the surface layer is dark grayish brown very cobbly loam, and the lower 8 inches is dark grayish brown very gravelly loam. Sandstone is at a depth of 12 inches.

Permeability of the Docdee soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used as homesites and for wildlife habitat. It can be used for woodland.

If the Monjeau soil is used for homesite development, the main limitations are slow permeability, shrink-swell potential, and slope. Slow permeability limits the operation of septic tank absorption fields. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

If the Docdee soil is used for homesite development, the main limitations are very shallow and shallow depth to bedrock and slope. Cuts needed to provide essentially level building sites can expose bedrock. The very shallow and shallow depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings. Access roads should be designed to control surface runoff and to help stabilize cut slopes.

The Monjeau soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 58 to 73. Based on a site index of 70, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,480 cubic feet or 22,000 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 55 cubic feet or 232 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Plants such as oak and grass limit natural regeneration of ponderosa pine.

The Docdee soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. Based on a site index of 70, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,480 cubic feet or 22,000 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), production is 55 cubic feet or 232 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are plant competition, seedling mortality, and the hazard of erosion. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Brushy plants such as oak limit natural regeneration of ponderosa pine. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. The very low available water capacity generally influences seedling survival in areas where understory plants are numerous. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

40—Monjeau-Docdee complex, 30 to 75 percent slopes. This map unit is on ridgetops and mountainsides. Areas are irregular in shape and are 10 to 300 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper. Elevation is 7,000 to 7,500 feet. The average annual precipitation is 18 to 24 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

This unit is 40 percent Monjeau loam, 30 to 75 percent slopes, and 40 percent Docdee very cobbly loam, 30 to 75 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Paco soils in upland valleys, Nolten soils on mountainsides, and Rock outcrop on ridges. Included areas make up about 20 percent of the total acreage.

The Monjeau soil is moderately deep and well drained. It formed in material derived dominantly from andesite, sandstone, siltstone, and shale. Typically, the surface layer is dark grayish brown loam about 2 inches thick. The subsoil is dark grayish brown and light yellowish brown clay about 14 inches thick. The substratum is yellowish brown clay about 16 inches thick over partially weathered andesite.

Permeability of the Monjeau soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

The Docdee soil is very shallow and shallow and is well drained. It formed in material derived dominantly from andesite and sandstone. Typically, the surface layer is grayish brown and brown very cobbly loam about 10 inches thick over sandstone.

Permeability of the Docdee soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

The Monjeau soil is poorly suited to homesite development. The main limitations are slope, shrink-swell potential, and slow permeability. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. The slow permeability limits the operation of septic tank absorption fields.

The Docdee soil is poorly suited to homesite development. The main limitations are slope and the very shallow and shallow depth to bedrock, which limit the installation of septic tank systems and the construction of streets and dwellings.

The Monjeau soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 58 to 73. Based on a site index of 65, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,000 cubic feet or 18,300 board feet (International rule, 1/8-inch kerf). At the culmination of

the mean annual increment (CMAI), production is 51 cubic feet or 203 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are slope, the hazard of erosion, and plant competition. The steepness of slope limits the kinds of equipment that can be used in forest management. High-lead or other cable logging methods can be used for harvesting trees. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Plants such as pinyon and oak limit natural regeneration of ponderosa pine.

The Docdee soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. Based on a site index of 65, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,000 cubic feet or 18,300 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 51 cubic feet or 203 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are slope, the hazard of erosion, and plant competition. The steepness of slope limits the kinds of equipment that can be used in forest management. High-lead or other cable logging methods can be used for harvesting trees. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Plants such as juniper, pinyon, and oak limit natural regeneration of ponderosa pine. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. The very low available water capacity generally influences seedling survival in areas where understory plants are numerous.

41—Nogal sandy clay loam, 8 to 15 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from shale. Areas are irregular in shape and are 10 to 150 acres in size. The native vegetation is mainly mid and short grasses. Elevation is 6,000 to 7,500 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is pale brown sandy clay loam about 2 inches thick. The subsoil is dark yellowish brown clay about 17 inches thick. The substratum is grayish brown clay about 11 inches thick over partially weathered shale.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Ruidoso soils along drainageways, Remunda soils on valley sides, and Rock outcrop on ridges. Included areas make up about 20 percent of the total acreage.

Permeability of this Nogal soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and homesite development.

The potential plant community on this unit is mainly blue grama, galleta, bottlebrush squirreltail, and vine-mesquite. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, broom snakeweed, walkingstick cholla, and threeawn, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of vine-mesquite, bottlebrush squirreltail, and blue grama.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 350 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are slow permeability, shrink-swell potential, and slope. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

42—Nogal-Rock outcrop complex, moderately steep. This map unit is on uplands. Slope is 8 to 30 percent. Areas are irregular in shape and are 15 to 200 acres in size. The native vegetation is mainly pinyon and alligator juniper with an understory of short and mid grasses. Elevation is 6,000 to 7,500 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

This unit is 75 percent Nogal very cobbly sandy clay loam, 8 to 30 percent slopes, and 15 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Bernal and Oro Grande soils near areas of Rock outcrop and Remunda soils on valley sides. Included areas make up about 10 percent of the total acreage.

The Nogal soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is brown very cobbly sandy clay loam about 2 inches thick. The subsoil is yellowish brown, reddish yellow, brownish yellow, and yellow clay about 29 inches thick. The substratum is grayish brown clay about 9 inches thick over gray and yellowish brown gypsiferous shale.

Permeability of the Nogal soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed shale and igneous rock. Surface runoff is rapid.

This unit is used for livestock grazing and homesite development.

The potential plant community on this unit is mainly sideoats grama, mountain muhly, little bluestem, and hairy grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in wavyleaf oak, threeawn, oneseed juniper, and wolftail, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, mountain muhly, and little bluestem. Rangeland improvement practices such as water impoundments, fences, pipelines for providing stock water, and mechanical brush management are difficult to apply on this unit because of the steepness of slope.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 350 pounds in unfavorable years.

This unit has limited suitability for production of pinyon and juniper for use as fuelwood, fenceposts, Christmas trees, or ornamentals.

If this unit is used for homesite development, the main limitations are the slow permeability, shrink-swell potential, and slope of the Nogal soil and the areas of Rock outcrop. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from the buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

43—Nolten loam, 8 to 15 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from andesite, sandstone, siltstone, and shale. Areas are irregular in shape and are 10 to 150 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper. Elevation is 7,000 to 7,500 feet. The average annual precipitation is 17 to 25 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the surface is covered with pine needles. The surface layer is dark grayish brown loam about 15 inches thick. The upper 6 inches of the subsoil is yellowish brown clay loam, and the lower 14 inches is brown and brownish yellow clay. Below 35 inches is partially weathered shale.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Monjeau and Docdee soils near ridgetops and small areas of soils that have cobbles and stones on the surface. Included areas make up about 15 percent of the total acreage.

Permeability of this Nolten soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

If this unit is used for homesite development, the main limitations are slow permeability, shrink-swell potential, and slope. The slow permeability limits the operation of septic tank absorption fields. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to control surface runoff and help to stabilize cut slopes.

This unit is suited to ponderosa pine. The site index for ponderosa pine ranges from 55 to 68. Based on a site index of 60, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 3,570 cubic feet or 14,600 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 46 cubic feet or 177 board feet (International rule) per acre. This unit has few limitations for use as woodland. Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

44—Nolten loam, 15 to 30 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from sandstone, andesite, siltstone, and shale. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper.

Elevation is 7,000 to 7,500 feet. The average annual precipitation is 17 to 25 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The upper 4 inches of the subsoil is dark grayish brown clay loam, and the lower 13 inches is yellowish brown clay. The substratum is brownish yellow clay loam about 18 inches thick over very pale brown partially weathered andesite.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Monjeau and Docdee soils near ridgetops and small areas of soils that have cobbles and stones on the surface. Included areas make up about 15 percent of the total acreage.

Permeability of this Nolten soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

If this unit is used for homesite development, the main limitations are slow permeability, shrink-swell potential, and slope. The slow permeability limits the operation of septic tank absorption fields. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

This unit is suited to ponderosa pine. The site index for ponderosa pine ranges from 55 to 68. Based on a site index of 60, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 3,570 cubic feet or 14,600 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 46 cubic feet or 177 board feet (International rule) per acre. This unit has few limitations for use as woodland. Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

45—Onite-Bluepoint association, hummocky. This map unit is in hummocky areas on piedmonts. Slope is 1 to 8 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly mid and short grasses. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 8 to 11 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 190 to 210 days.

This unit is 50 percent Onite loamy fine sand, 1 to 8 percent slopes, and 35 percent Bluepoint loamy fine sand, 1 to 8 percent slopes. The Onite soil is in interdunal areas, and the Bluepoint soil is on dunes.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are very gravelly alluvial soils along drainageways. Included areas make up about 15 percent of the total acreage.

The Onite soil is very deep and well drained. It formed in sediment derived from mixed sources. Typically, the surface layer is reddish yellow loamy fine sand about 7 inches thick. The subsoil is reddish yellow fine sandy loam and sandy loam about 27 inches thick. The substratum to a depth of 60 inches or more is reddish yellow sandy loam.

Permeability of the Onite soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is very high.

The Bluepoint soil is very deep and somewhat excessively drained. It formed in sediment derived dominantly from sandstone. Typically, the surface layer is light brown loamy fine sand about 4 inches thick. The substratum to a depth of 60 inches or more is light brown loamy fine sand.

Permeability of the Bluepoint soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly mesa dropseed, black grama, plains bristlegrass, and fourwing saltbush. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in mesquite, sand dropseed, broom snakeweed, and yucca, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, plains bristlegrass, and fourwing saltbush. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 1,250 pounds per acre in favorable years to 450 pounds in unfavorable years.

46—Oro Grande very cobbly clay loam, moderately steep. This very shallow and shallow, well drained soil is on hills and ridges (fig. 5). It formed in material derived dominantly from acid igneous rock. Slope is 8 to 30 percent. Areas are irregular in shape and are 15 to 250 acres in size. The native vegetation is mainly pinyon and oneseed juniper with an understory of short and mid

grasses. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is dark grayish brown very cobbly clay loam about 8 inches thick. The substratum is yellowish brown extremely cobbly clay loam about 9 inches thick over andesite.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Reventon and Remunda soils in swales, Stroupe soils on hillsides, and Rock outcrop on ridges. Included areas make up about 30 percent of the total acreage.

Permeability of this Oro Grande soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on this unit is mainly sideoats grama, little bluestem, plains lovegrass, and mountainmahogany. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in oneseed juniper, wavyleaf oak, and wolftail, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, and plains lovegrass. This unit is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, water impoundments, and mechanical brush management because of the very shallow and shallow depth to andesite and slope.

Figure 5.—Area of Oro Grande very cobbly clay loam, moderately steep.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 600 pounds in unfavorable years.

This unit is poorly suited to homesite development. The main limitations are the very shallow and shallow depth to bedrock and slope. The very shallow and shallow depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings.

This unit has limited suitability for production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

47—Oro Grande very cobbly clay loam, very steep. This very shallow and shallow, well drained soil is on hills and ridges. It formed in material derived dominantly from acid igneous rock. Slope is 30 to 50 percent. Areas are irregular in shape and are 15 to 200 acres in size. The native vegetation is mainly pinyon and oneseed juniper with an understory of short and mid grasses. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is dark grayish brown very cobbly clay loam about 8 inches thick. The substratum is pale brown very cobbly clay loam 5 inches thick over andesite.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Stroupe soils on hillsides, Reventon soils in valleys, Hightower soils on valley sides, and Rock outcrop on ridges. Included areas make up about 25 percent of the total acreage.

Permeability of this Oro Grande soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for wildlife habitat and homesite development.

This unit is poorly suited to homesite development. The main limitations are the very shallow and shallow depth to bedrock and slope. The very shallow and shallow depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings.

48—Paco loam, 15 to 30 percent slopes. This deep, well drained soil is on toe slopes. It formed in residuum and local alluvium derived dominantly from andesite. Areas are irregular in shape and are 20 to 200 acres in size. The native vegetation is mainly ponderosa pine and alligator juniper. Elevation is 6,700 to 7,500 feet. The average annual precipitation is 18 to 25 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the surface layer is grayish brown loam about 5 inches thick. The upper 5 inches of the subsoil is dark grayish brown clay loam, and the lower 35 inches is yellowish brown and brownish yellow clay. The substratum is light yellowish brown gravelly clay loam about 4 inches thick over partially weathered andesite.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Nolten soils on uplands, Rock outcrop on ridges, and Ruidoso soils along drainageways. Included areas make up about 20 percent of the total acreage.

Permeability of this Paco soil is slow. Effective rooting depth is 40 to 60 inches. Available water capacity is high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

If this unit is used for homesite development, the main limitations are slow permeability, shrink-swell potential, and slope. Slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

This unit is suited to ponderosa pine. The site index for ponderosa pine ranges from 61 to 68. Based on a site index of 65, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,000 cubic feet or 18,000 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 51 cubic feet or 203 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Plants such as oak, grass, and juniper limit natural regeneration of ponderosa pine.

49—Paco loam, dry, 3 to 8 percent slopes. This deep, well drained soil is in valleys. It formed in residuum and local alluvium derived dominantly from andesite. Areas are irregular in shape and are 20 to 500 acres in size. The native vegetation is mainly pinyon and alligator juniper with an understory of short and mid grasses. Elevation is 6,700 to 7,500 feet. The average annual precipitation is 17 to 23 inches, the average annual air

temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 145 days.

Typically, the surface layer is brown loam about 9 inches thick. The upper 19 inches of the subsoil is brown clay loam, and the lower 25 inches is brown and reddish yellow clay. The underlying material to a depth of 60 inches or more is partially weathered andesite.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Oro Grande soils and Rock outcrop on knolls and ridges, Hightower soils at the lower elevations on uplands, Nolten and Monjeau soils at the higher elevations on uplands, and Sampson and Ruidoso soils on valley bottoms. Included areas make up about 25 percent of the total acreage.

Permeability of this Paco soil is slow. Effective rooting depth is 40 to 60 inches. Available water capacity is high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and homesite development.

The potential plant community on this unit is mainly western wheatgrass, bottlebrush squirreltail, prairie junegrass, and alligator juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in oneseed juniper, wavyleaf oak, mat muhly, and broom snakeweed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, bottlebrush squirreltail, and prairie junegrass.

The average annual production of air-dry vegetation on this unit ranges from 1,500 pounds per acre in favorable years to 500 pounds in unfavorable years.

This unit has limited suitability for the production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

If this unit is used for homesite development, the main limitations are slow permeability and shrink-swell potential. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling.

50—Paco loam, dry, 8 to 15 percent slopes. This deep, well drained soil is in valleys and on toe slopes. It formed in residuum and local alluvium derived dominantly from andesite. Areas are irregular in shape and are 20 to 500 acres in size. The native vegetation is mainly pinyon and alligator juniper with an understory of short and mid grasses. Elevation is 6,700 to 7,500 feet. The average annual precipitation is 17 to 23 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 145 days.

Typically, the surface layer is brown loam about 7 inches thick. The upper 5 inches of the subsoil is brown clay loam, and the lower 37 inches is reddish yellow and strong brown clay. The underlying material is partially weathered andesite.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Oro Grande soils and Rock outcrop on knolls and ridges, Hightower soils at the lower elevations on uplands, Nolten and Monjeau soils at the higher elevations on uplands, and Sampson and Ruidoso soils on valley bottoms. Included areas make up about 25 percent of the total acreage.

Permeability of this Paco soil is slow. Effective rooting depth is 40 to 60 inches. Available water capacity is high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and homesite development.

The potential plant community on this unit is mainly western wheatgrass, bottlebrush squirreltail, prairie junegrass, and alligator juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in wavyleaf oak, oneseed juniper, mat muhly, and broom snakeweed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, bottlebrush squirreltail, and prairie junegrass.

The average annual production of air-dry vegetation ranges from 1,500 pounds per acre in favorable years to 500 pounds in unfavorable years.

This unit has limited suitability for the production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

If this unit is used for homesite development, the main limitations are slow permeability, shrink-swell potential, and slope. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

51—Paco-Penapon complex, moderately sloping. This map unit is in valleys and on alluvial fans. Slope is 3 to 15 percent. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly ponderosa pine, pinyon, and alligator juniper. Elevation is 6,200 to 6,800 feet. The average annual precipitation is 18 to 24 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 145 days.

This unit is 45 percent Paco loam, 3 to 15 percent slopes, and 30 percent Penapon very gravelly loam, 8 to 15 percent slopes. The Paco soil is in valleys, and the Penapon soil is on alluvial fans. The components of this

unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Ruidoso and Sampson soils along drainageways. Included areas make up about 25 percent of the total acreage.

The Paco soil is deep and well drained. It formed in local alluvium derived dominantly from andesite. Typically, the surface layer is grayish brown loam about 7 inches thick. The upper 26 inches of the subsoil is grayish brown and yellowish brown clay loam, and the lower 21 inches is yellowish brown clay. The substratum to a depth of 60 inches or more is very pale brown clay loam over weathered shale.

Permeability of the Paco soil is slow. Effective rooting depth is 40 to 60 inches. Available water capacity is very high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

The Penapon soil is very deep and well drained. It formed in alluvium and colluvium derived dominantly from limestone. Typically, the surface layer is dark grayish brown very gravelly loam about 10 inches thick. The upper 7 inches of the substratum is light brownish gray extremely gravelly loam, and the lower part to a depth of 60 inches or more is very pale brown and white extremely gravelly loam.

Permeability of the Penapon soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat.

If the Paco soil is used for homesite development, the main limitations are the slow permeability and shrink-swell potential. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling.

If the Penapon soil is used for homesite development, the main limitations are moderate permeability and slope. Use of sandy backfill for the trench and long absorption lines helps to compensate for the moderate permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

52—Pajara-Witt association, moderately sloping. This map unit is on dissected piedmonts and valley sides (fig. 6). Slope is 2 to 15 percent. The area is irregular in shape and is about 5,000 acres in size. The native vegetation is mainly scattered pinyon and juniper. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 65 percent Pajara extremely cobbly loam, 5 to 15 percent slopes, and 15 percent Witt silt loam, 2 to 5 percent slopes. The Pajara soil is on dissected piedmonts, and the Witt soil is on valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Reventon soils on valley floors and Tortugas soils on ridges and breaks. Included areas make up about 20 percent of the total acreage.

The Pajara soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown extremely cobbly loam about 4 inches thick. The subsoil is reddish brown extremely cobbly sandy clay about 10 inches thick. The upper 3 inches of the substratum is weakly cemented, pinkish white extremely cobbly loam, and the lower part to a depth of 60 inches or more is pinkish gray and white extremely cobbly loam.

Permeability of the Pajara soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Witt soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is brown silty clay loam about 27 inches thick. The substratum to a depth of 60 inches or more is reddish brown loam.

Permeability of the Witt soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for woodland, livestock grazing, and wildlife habitat.

The potential plant community on the Pajara soil is mainly sideoats grama, plains lovegrass, and littleseed ricegrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, blue grama, oneseed juniper, and wavyleaf oak, which normally occur in small amounts in the potential plant community.

The average annual production of air-dry vegetation on this soil ranges from 1,400 pounds per acre in favorable years to 500 pounds in unfavorable years.

The Pajara soil has limited suitability for the production of juniper and pinyon for use as firewood, fenceposts, Christmas trees, or ornamentals.

The potential plant community on the Witt soil is mainly western wheatgrass, vine-mesquite, and blue grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, mat muhly, and broom snakeweed, which normally occur in small amounts in the potential plant community.

Figure 6.—Area of Pajara-Witt association, moderately sloping.

The average annual production of air-dry vegetation on this soil ranges from 1,200 pounds per acre in favorable years to 400 pounds in unfavorable years.

Grazing management on this unit should be designed to increase the productivity and reproduction of sideoats grama, western wheatgrass, plains lovegrass, and vine-mesquite. Rangeland improvement practices such as water impoundments, fences, and pipelines for providing stock water are difficult to apply on the Pajara soil because of cobbles in the profile and slope.

53—Pastura loam, gently sloping. This very shallow and shallow, well drained soil is on uplands. It formed in alluvium derived dominantly from limestone. Slope is 0 to 8 percent. Areas are irregular in shape and are 1,000 to 3,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,600 to 5,800 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 150 to 190 days.

Typically, the upper 2 inches of the surface layer is brown loam and the lower 5 inches is brown clay loam. The substratum is brown gravelly clay loam about 6 inches thick over indurated caliche.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Harvey and Darvey soils on valley sides, Deama soils and Rock outcrop on ridges, Clovis soils in swales, and Gabaldon soils on valley floors. Included areas make up about 25 percent of the total acreage.

Permeability of this Pastura soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, New Mexico feathergrass, black grama, and blue grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, and ring muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and New Mexico feathergrass. Range improvement practices such as pipelines for providing stock water, fences, water impoundments, and mechanical brush management are difficult to apply because of the shallow and very shallow depth to caliche.

The average annual production of air-dry vegetation on this unit ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

54—Pastura-Harvey association, moderately rolling. This map unit is on valley sides and uplands. Slope is 0 to 15 percent. Areas are irregular in shape and are 500 to 3,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,600 to 5,800 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Pastura sandy loam, 0 to 15 percent slopes, and 20 percent Harvey sandy loam, 0 to 5 percent slopes. The Pastura soil is on uplands, and the Harvey soil is on valley sides.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Penistaja soils on valley sides, Clovis soils in swales, and Deama soils and Rock outcrop on ridges. Included areas make up about 20 percent of the total acreage.

The Pastura soil is very shallow and shallow and is well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown sandy loam about 7 inches thick. The substratum is brown very fine sandy loam about 6 inches thick over indurated caliche.

Permeability of the Pastura soil is moderately rapid. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

The Harvey soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown sandy loam about 4 inches thick. The subsoil is light brown sandy loam about 11 inches thick. The substratum to a depth of 60 inches or more is pink loam.

Permeability of the Harvey soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Pastura soil is mainly sideoats grama, New Mexico feathergrass, black grama, and little bluestem. The potential plant community on the Harvey soil is mainly black grama, sideoats grama, winterfat, and blue grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, sand dropseed, broom snakeweed, and annual forbs, which normally occur in small amounts in the potential plant community.

Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, winterfat, and little bluestem. Rangeland improvement practices such as pipelines for providing stock water, fences, water impoundments, and mechanical brush management are difficult to apply on the Pastura soil because of the shallow and very shallow depth to caliche. The Harvey soil is well suited to rangeland management practices. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 300 pounds in unfavorable years.

55—Pastura-Partri association, gently sloping. This map unit is in valleys and on uplands. Slope is 0 to 5 percent. Areas are irregular in shape and are 1,000 to 3,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 50 to 57 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 45 percent Pastura loam, 0 to 5 percent slopes, and 40 percent Partri loam, 0 to 5 percent slopes. The Pastura soil is on uplands, and the Partri soil is in valleys.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Harvey and Dioxice soils on valley sides and Asparas soils in swales. Included areas make up about 15 percent of the total acreage.

The Pastura soil is very shallow and shallow and is well drained. It formed in alluvium derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is brown loam and the lower 5 inches is brown clay loam. The substratum is brown gravelly clay loam about 6 inches thick over indurated caliche.

Permeability of the Pastura soil is moderate. Effective rooting depth is 5 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

The Partri soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is brown loam about 4 inches thick. The upper 6 inches of the subsoil is brown clay loam, the next 8 inches is brown silty clay loam, and the lower 4 inches is brown clay loam. The upper 9 inches of the substratum is pink clay loam, and the lower part to a depth of 60 inches or more is pink loam.

Permeability of the Partri soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Pastura soil is mainly sideoats grama, New Mexico feathergrass, black grama, and blue grama. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Partri soil is mainly western wheatgrass, sideoats grama, blue grama, and vine-mesquite. The average annual production of air-dry vegetation ranges from 1,500 pounds per acre in favorable years to 450 pounds in unfavorable years.

As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, ring muhly, and sand dropseed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, western wheatgrass, and black grama. Rangeland improvement practices such as fences, pipelines for providing stock water, and water impoundments are difficult to apply on the Pastura soil because of the shallow and very shallow depth to caliche.

56—Patos stony loam, gently sloping. This very deep well drained soil is on piedmonts. It formed in alluvium derived from mixed sources. Slope is 1 to 5 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly pinyon and juniper with an understory of short and mid grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 12 to 18 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 160 to 180 days.

Typically, the surface layer is dark brown stony loam about 4 inches thick. The upper 3 inches of the subsoil is reddish brown stony clay loam, the next 23 inches is reddish brown very stony clay, and the lower 10 inches is brown extremely stony clay loam. The substratum to a depth of 60 inches or more is pink extremely stony clay loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Ruidoso and Sampson soils on valley floors, Purcella soils in nonstony areas, and a soil that is similar to this Patos soil but has a darker colored surface layer. Included areas make up about 30 percent of the total acreage.

Permeability of this Patos soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on this unit is mainly plains lovegrass, sideoats grama, littleseed ricegrass, and black grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, ring muhly, mat muhly, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, plains lovegrass, littleseed ricegrass, and black grama. This unit is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, mechanical brush management, and water impoundments because of stoniness.

The average annual production of air-dry vegetation on this unit ranges from 1,900 pounds per acre in favorable years to 700 pounds in unfavorable years.

This unit has limited suitability for production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

57—Patos bouldery loam, moderately steep. This very deep, well drained soil is on piedmonts. It formed in alluvium derived from mixed sources. Slope is 5 to 50 percent. Areas are irregular in shape and are 1,000 to 3,000 acres in size. The native vegetation is mainly pinyon and juniper with an understory of short and mid grasses. Elevation is 5,500 to 7,000 feet. The average annual precipitation is 12 to 18 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 160 to 180 days.

Typically, the surface layer is brown bouldery loam about 5 inches thick. The upper 4 inches of the subsoil is reddish brown stony clay loam, the next 22 inches is reddish brown very stony clay, and the lower 9 inches is brown extremely stony clay loam. The substratum to a depth of 60 inches or more is pink extremely stony clay loam.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Purcella soils in the lower lying areas, Reventon soils in nonstony areas, and Riverwash in arroyos. Included areas make up about 30 percent of the total acreage.

Permeability of this Patos soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is

moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, plains lovegrass, littleseed ricegrass, and pinyon. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, mat muhly, ring muhly, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, plains lovegrass, and littleseed ricegrass. This unit is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fences, mechanical brush management, and water impoundments because of boulders on the surface and slope.

The average annual production of air-dry vegetation on this unit ranges from 1,900 pounds per acre in favorable years to 700 pounds in unfavorable years.

This unit has limited suitability for production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

58—Pena-Dioxice complex, moderately sloping. This map unit is on remnants of valley floors and on valley sides. Slope is 3 to 15 percent. Areas are irregular in shape and are 10 to 250 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 6,300 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

This unit is 40 percent Pena gravelly loam, 3 to 15 percent slopes, and 30 percent Dioxice loam, 3 to 5 percent slopes. The Pena soil is on remnants of valley floors, and the Dioxice soil is on valley sides. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Plack soils in level areas on ridges, Deacon soils on valley sides, Manzano soils along drainageways, and Romine soils on north-facing side slopes. Included areas make up about 30 percent of the total acreage.

The Pena soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is dark grayish brown gravelly loam about 12 inches thick. The next layer is light yellowish brown very cobbly loam about 11 inches thick. The substratum to a depth of 60 inches or more is very pale brown extremely cobbly loam.

Permeability of the Pena soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Dioxice soil is very deep and well drained. It formed in old alluvium derived from mixed sources. Typically, the surface layer is dark grayish brown loam about 10 inches thick. The upper 8 inches of the subsoil is yellowish brown loam, and the lower 12 inches is yellowish brown clay loam. The substratum to a depth of 60 inches or more is white loam.

Permeability of the Dioxice soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Pena soil is mainly sideoats grama, little bluestem, plains lovegrass, and hairy grama. The potential plant community on the Dioxice soil is mainly blue grama, galleta, bottlebrush squirreltail, and western wheatgrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, sand dropseed, broom snakeweed, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, plains lovegrass, western wheatgrass, and little bluestem.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 450 pounds in unfavorable years.

59—Pena-Hogadero association, hilly. This map unit is on dissected remnants of valley floors and on valley sides. Slope is 1 to 30 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,800 to 6,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 50 percent Pena gravelly loam, 8 to 30 percent slopes, and 30 percent Hogadero gravelly loam, 1 to 8 percent slopes. The Pena soil is on valley sides, and the Hogadero soil is on dissected remnants of valley floors.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Dioxice and Harvey soils on valley sides and Gabaldon soils on valley floors. Included areas make up about 20 percent of the total acreage.

The Pena soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown gravelly loam about 10 inches

thick. The substratum to a depth of 60 inches or more is light yellowish brown very gravelly loam.

Permeability of the Pena soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Hogadero soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown gravelly loam about 10 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown very gravelly loam.

Permeability of the Hogadero soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, New Mexico feathergrass, black grama, and little bluestem. The unit can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, broom snakeweed, and oneseed juniper, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and New Mexico feathergrass. Rangeland improvement practices such as fences, pipelines for providing stock water, and water impoundments are difficult to apply on this unit because of the content of gravel and cobbles in the soils and steepness of slope.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 400 pounds in unfavorable years.

60—Penapon-Tortugas very cobbly loams, extremely steep. This map unit is on mountainsides. Slope is 30 to 75 percent. Areas are long and narrow and are 50 to 250 acres. The native vegetation is mainly ponderosa pine, pinyon, and alligator juniper. Elevation is 6,000 to 7,500 feet. The average annual precipitation is 18 to 24 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

This unit is 45 percent Penapon very cobbly loam, 30 to 75 percent slopes, and 30 percent Tortugas very cobbly loam, 30 to 75 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are moderately deep soils, nongravelly soils, and Rock outcrop on mountainsides. Included areas make up about 25 percent of the total acreage.

The Penapon soil is very deep and well drained. It formed in alluvium and colluvium derived dominantly from limestone. Typically, the surface layer is dark grayish brown very cobbly loam about 11 inches thick. The upper 37 inches of the substratum is pale brown and very pale brown very gravelly loam, and the lower part to a depth of 60 inches or more is very pale brown extremely gravelly loam.

Permeability of the Penapon soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Tortugas soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the surface layer is dark grayish brown very cobbly loam about 13 inches thick over limestone.

Permeability of the Tortugas soil is moderate. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

If the Penapon soil is used for homesite development, the main limitations are slope, large stones, and the hazard of erosion. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. Excavation for roads and buildings increases the hazard of erosion.

The Tortugas soil is poorly suited to homesite development. The main limitations are depth to bedrock and slope. The very shallow and shallow depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings.

The Penapon soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 62 to 65. Based on a site index of 65, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 4,000 cubic feet or 18,300 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 51 cubic feet or 203 board feet (International rule) per acre.

The main concerns in producing and harvesting timber are slope and the hazard of erosion. Conventional methods of harvesting timber are difficult to use because of slope. High-lead or other cable logging methods can be used for harvesting trees. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. If

the planting site is not adequately prepared, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees.

The Tortugas soil is poorly suited to the production of ponderosa pine.

61—Penistaja-Travessilla association, gently sloping. This map unit is on piedmonts, low ridges, and valley sides. Slope is 2 to 5 percent. Areas are irregular in shape and are 500 to 5,000 acres in size. The native vegetation is mainly grass with scattered pinyon and juniper. Elevation is 6,100 to 6,800 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 57 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Penistaja fine sandy loam, 2 to 5 percent slopes, and 20 percent Travessilla sandy loam, 2 to 5 percent slopes. The Penistaja soil is on piedmonts and valley sides, and the Travessilla soil is on low ridges.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Deama and Pastura soils on knobs and ridges, Stroupe soils on breaks, Sampson soils on valley floors, and Clovis soils on valley sides. Included areas make up about 20 percent of the total acreage.

The Penistaja soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 2 inches thick. The upper 6 inches of the subsoil is brown fine sandy loam, and the lower 30 inches is brown and strong brown sandy clay loam. The substratum to a depth of 60 inches or more is pink fine sandy loam.

Permeability of the Penistaja soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Travessilla soil is very shallow and shallow and is well drained. It formed in material derived dominantly from sandstone. Typically, the soil is light brown sandy loam about 12 inches deep over fractured sandstone.

Permeability of the Travessilla soil is moderately rapid. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Penistaja soil is mainly sideoats grama, blue grama, western wheatgrass, and Indian ricegrass. The average annual production of air-dry vegetation ranges from 1,400 pounds per acre in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Travessilla soil is mainly sideoats grama, little bluestem, black grama, and blue grama. The average annual production of air-dry vegetation ranges from 1,000 pounds per acre in favorable years to 400 pounds in unfavorable years.

As the plant community on this unit deteriorates, the desirable forage plants decrease and there is an increase in sand dropseed, threeawn, broom snakeweed, and oneseed juniper, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of little bluestem, Indian ricegrass, sideoats grama, and western wheatgrass.

The Travessilla soil is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, water impoundments, and mechanical brush management because of the shallow and very shallow depth to sandstone. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

This unit can support scattered oneseed juniper and pinyon.

62—Plack-Dioxice loams, 0 to 8 percent slopes. This map unit is on mesas. Areas are irregular in shape and are 15 to 250 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 6,400 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

This unit is 50 percent Plack loam, 0 to 8 percent slopes, and 30 percent Dioxice loam, 0 to 5 percent slopes. The Plack soil is in slightly convex areas, and the Dioxice soil is in slightly depressional areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Deacon soils in concave areas and soils that are similar to this Plack soil but have indurated caliche at a depth of 20 to 40 inches. Included areas make up about 20 percent of the total acreage.

The Plack soil is very shallow and shallow and is well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is dark grayish brown loam about 17 inches thick over indurated caliche.

Permeability of the Plack soil is moderate. Effective rooting depth is 4 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

The Dioxice soil is very deep and well drained. It formed in old alluvium derived from mixed sources. Typically, the surface layer is dark grayish brown loam about 10 inches thick. The upper 9 inches of the subsoil is grayish brown loam, and the lower 20 inches is yellowish brown clay loam. The substratum to a depth of 60 inches or more is very pale brown loam.

Permeability of the Dioxice soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on the Plack soil is mainly plains lovegrass, sideoats grama, black grama, and little bluestem. The potential plant community on the Dioxice soil is mainly blue grama, galleta, western wheatgrass, and bottlebrush squirreltail. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, ring muhly, broom snakeweed, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, and western wheatgrass. Rangeland improvement practices such as fences, pipelines for providing stock water, and water impoundments are difficult to apply on the Plack soil because of the shallow depth to caliche.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 450 pounds in unfavorable years.

The Plack soil is poorly suited to homesite development. The shallow depth to caliche limits the installation of septic tank systems and the construction of streets and dwellings.

If the Dioxice soil is used for homesite development, the main limitations are the moderately slow permeability and shrink-swell potential. The moderately slow permeability limits the operation of septic tank absorption fields. Buildings and roads should be designed to offset the effects of shrinking and swelling.

63—Plack-Dioxice association, gently sloping. This map unit is on dissected remnants of old landforms in valleys and on valley sides. Slope is 0 to 15 percent. Areas are irregular in shape and are 1,000 to 3,000 acres in size. The native vegetation is mainly pinyon and oneseed juniper with an understory of short and mid grasses. Elevation is 5,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Plack loam, 3 to 15 percent slopes, and 20 percent Dioxice loam, 0 to 5 percent slopes. The Plack soil is on landform remnants in valleys, and the Dioxice soil is on valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Tortugas soils on limestone ridges, Darvey and Pena soils on valley sides, Asparas soils in swales, Hogadero soils on gravelly knobs, and Rock outcrop within areas of the Plack soil. Included areas make up about 20 percent of the total acreage.

The Plack soil is very shallow and shallow and is well drained. It formed in alluvium derived from mixed sources. Typically, the soil is brown loam about 11 inches deep over indurated caliche.

Permeability of the Plack soil is moderate. Effective rooting depth is 4 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

The Dioxice soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is dark grayish brown loam about 8 inches thick. The upper 14 inches of the subsoil is grayish brown and brown clay loam, and the lower 5 inches is light yellowish brown loam. The substratum to a depth of 60 inches or more is pink and light yellowish brown loam.

Permeability of the Dioxice soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Plack soil is mainly sideoats grama, plains lovegrass, black grama, and pinyon. The potential plant community on the Dioxice soil is mainly western wheatgrass, blue grama, galleta, and sideoats grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, ring muhly, broom snakeweed, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, western wheatgrass, and blue grama. Rangeland improvement practices such as fences, pipelines for providing stock water, water impoundment facilities, and mechanical brush management are difficult to apply on the Plack soil because of the shallow and very shallow depth to caliche.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 450 pounds in unfavorable years.

The Plack soil has limited suitability for production of firewood, fenceposts, Christmas trees, or ornamentals.

64—Plack-Penistaja association, gently sloping. This map unit is on piedmonts, valley sides, and dissected remnants of valley floors. Slope is 0 to 5 percent. Areas are irregular in shape and are 200 to 3,000 acres in size. The native vegetation is mainly pinyon and juniper with an understory of short and mid grasses. Elevation is 5,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average

annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 50 percent Plack fine sandy loam, 0 to 5 percent slopes, and 30 percent Penistaja sandy loam, 0 to 5 percent slopes. The Plack soil is on remnants of valley floors, and the Penistaja soil is on piedmonts and valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Dioxice soils on valley sides, sandstone outcrops on low ridges, and a soil that is similar to the Penistaja soil but has a darker colored surface layer and is in swales. Included areas make up about 20 percent of the total acreage.

The Plack soil is very shallow and shallow and is well drained. It formed in alluvium derived from mixed sources. Typically, the soil is brown fine sandy loam about 12 inches deep over indurated caliche.

Permeability of the Plack soil is moderate. Effective rooting depth is 4 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

The Penistaja soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil is brown sandy clay loam about 25 inches thick. The substratum to a depth of 60 inches or more is light brown sandy loam.

Permeability of the Penistaja soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Plack soil is mainly sideoats grama, black grama, New Mexico feathergrass, and littleseed ricegrass. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 450 pounds in unfavorable years.

The potential plant community on the Penistaja soil is mainly sideoats grama, little bluestem, and blue grama. The average annual production of air-dry vegetation ranges from 1,400 pounds per acre in favorable years to 500 pounds in unfavorable years.

As the plant community on this unit deteriorates, the desirable forage plants decrease and there is an increase in sand dropseed, broom snakeweed, threeawn, and oneseed juniper, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and little bluestem. Rangeland improvement practices such as pipelines for providing stock water, fences, water impoundments, and mechanical brush management are difficult to apply on the Plack soil because of the shallow and very shallow depth to caliche. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

This unit has limited suitability for the production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

65—Purcella-Riverwash association, gently sloping. This map unit is on piedmonts. Slope is 0 to 5 percent. Areas are irregular in shape and are 500 to 2,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,500 to 7,000 feet. The average annual precipitation is 16 to 18 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 160 to 180 days.

This unit is 60 percent Purcella loam, 0 to 5 percent slopes, and 15 percent Riverwash. The Purcella soil is on piedmonts, and Riverwash is along drainageways.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Reventon and Sampson soils in swales and Patos soils in the higher lying areas. Included areas make up about 25 percent of the total acreage.

The Purcella soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is dark brown loam about 12 inches thick. The upper 10 inches of the subsoil is brown cobbly loam, and the lower 21 inches is brown extremely cobbly clay loam. The substratum to a depth of 60 inches or more is pink extremely cobbly clay loam.

Permeability of the Purcella soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Riverwash consists of unstabilized stony, cobbly, or gravelly sediment that is periodically reworked by water. It is subject to common, very brief periods of flooding in summer.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, blue grama, vine-mesquite, and sideoats grama. The Purcella soil can support scattered juniper and pinyon. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in wolftail, mat muhly, and broom snakeweed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, vine-mesquite, and sideoats grama. Rangeland improvement practices such as pipelines for providing stock water and water impoundments are difficult to apply on this unit because cobbles are within 12 inches of the soil surface.

The average annual production of air-dry vegetation on this unit ranges from 1,700 pounds per acre in favorable years to 600 pounds in unfavorable years.

66—Rance silt loam, 2 to 5 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from gypsum. Areas are irregular in shape and are 500 to 2,500 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

Typically, the surface layer is brown silt loam about 6 inches thick. The underlying layer is white silt loam about 26 inches thick over hard gypsum. Depth to gypsum ranges from 20 to 40 inches.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Tanbark and Sharps soils on knobs, Harvey soils on valley sides, and Gabaldon soils on valley floors. Included areas make up about 25 percent of the total acreage.

Permeability of this Rance soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. The substratum is slightly saline.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly black grama, winterfat, sideoats grama, and alkali sacaton. The unit can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, Bigelow sagebrush, broom snakeweed, and Engelmann pricklypear, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, winterfat, and alkali sacaton. This unit is poorly suited to rangeland improvement practices such as water impoundments because of the moderate depth to gypsum. Livestock grazing should be managed to protect the unit from excessive erosion.

The average annual production of air-dry vegetation on this unit ranges from 950 pounds per acre in favorable years to 550 pounds in unfavorable years.

67—Rance-Tanbark silt loams, 2 to 9 percent slopes. This map unit is on uplands (fig. 7). Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Rance silt loam, 2 to 9 percent slopes, and 20 percent Tanbark silt loam, 2 to 9 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Sharps soils on shale knobs, Tortugas soils on limestone knobs, and Gabaldon soils on valley floors. Included areas make up about 20 percent of the total acreage.

The Rance soil is moderately deep and well drained. It formed in material derived dominantly from gypsum. Typically, the surface layer is pale brown silt loam about 7 inches thick. The next layer is very pale brown loam about 17 inches thick. The substratum is white gypsiferous shale interbedded with gypsum. It is about 6 inches thick over consolidated gypsum.

Permeability of the Rance soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. The substratum is slightly saline.

The Tanbark soil is shallow and well drained. It formed in material derived dominantly from gypsum. Typically, the surface layer is grayish brown silt loam about 4 inches thick. The substratum is white loam about 16 inches thick over gypsum.

Permeability of the Tanbark soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly black grama, winterfat, sideoats grama, and alkali sacaton. The Tanbark soil can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, Bigelow sagebrush, broom snakeweed, and yucca, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, winterfat, and black grama. This unit is poorly suited to rangeland improvement practices such as water impoundments because of the depth to gypsum.

The average annual production of air-dry vegetation on this unit ranges from 950 pounds per acre in favorable years to 300 pounds in unfavorable years.

68—Reflection-Malargo association, moderately sloping. This map unit is on ridges and in swales on piedmonts (fig. 8). Slope is 0 to 15 percent. Areas are irregular in shape and are 500 to 3,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,500 to 5,500 feet. The average annual

Figure 7.—Area of Rance-Tanbark silt loams, 2 to 9 percent slopes.

precipitation is 8 to 11 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 190 to 210 days.

This unit is 55 percent Reflection fine sandy loam, 0 to 15 percent slopes, and 35 percent Malargo fine sandy loam, 1 to 8 percent slopes. The Reflection soil is on broad ridges, and the Malargo soil is in shallow swales.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are gravelly soils along drainageways and nongypsiferous soils in swales. Included areas make up about 10 percent of the total acreage.

The Reflection soil is very deep and well drained. It formed in alluvium derived dominantly from gypsiferous rock. Typically, the surface layer is pale brown fine sandy loam about 3 inches thick. The upper 28 inches of the substratum is pink loam, and the lower part to a depth of 60 inches or more is pink clay loam.

Permeability of the Reflection soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Malargo soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil is brown loam about 15 inches thick. The substratum to a depth of 60 inches or more is brown and dark brown loam.

Permeability of the Malargo soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly bush muhly, plains bristlegrass, black grama, and fourwing saltbush. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in creosotebush, fluffgrass, and broom snakeweed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, bush muhly, and plains bristlegrass. Rangeland improvement practices such as ponds and other earthen water impoundments are poorly

Figure 8.—Area of Reflection-Malargo association, moderately sloping.

suited to the soils in this unit because of the shallow and very shallow depth to highly gypsiferous material. Adequate residue and litter must be maintained on the unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 650 pounds per acre in favorable years to 250 pounds in unfavorable years.

69—Remunda clay loam, gypsum substratum, 3 to 8 percent slopes. This very deep, well drained soil is on valley sides. It formed in alluvium derived dominantly from shale and igneous rocks. Areas are long and narrow and are 25 to 150 acres. The native vegetation is mainly short and mid grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is grayish brown clay loam about 7 inches thick. The upper 35 inches of the subsoil is grayish brown and yellowish brown clay, and the lower 18 inches is yellowish brown gypsiferous clay.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Ruidoso soils on valley floors, Reventon soils on valley sides, Docdee soils on ridges, and a moderately deep soil on upper valley sides. Included areas make up about 30 percent of the total acreage.

Permeability of this Remunda soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and homesite development.

The potential plant community on this unit is mainly blue grama, western wheatgrass, vine-mesquite, and bottlebrush squirreltail. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, ear muhly, Curruth

sagewort, and walkingstick cholla, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of vine-mesquite, western wheatgrass, and bottlebrush squirreltail. Livestock grazing should be managed to protect the soil from erosion.

The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 450 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are slow permeability, shrink-swell potential, and the hazard of erosion. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from the buildings help to prevent structural damage because of shrinking and swelling. Excavations for houses and access roads expose material that is highly susceptible to erosion.

70—Reventon loam, 0 to 3 percent slopes. This very deep, well drained soil is on valley sides. It formed in alluvium derived from mixed sources. Areas are irregular in shape and are 25 to 250 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil is brown clay loam about 29 inches thick. The substratum to a depth of 60 inches or more is light brown loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Dioxice soils in convex areas, Sampson soils in depressional areas, and Deacon soils on valley sides. Included areas make up about 10 percent of the total acreage.

Permeability of this Reventon soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on this unit is mainly sideoats grama, blue grama, galleta, and winterfat. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in broom snakeweed, threeawn, and sand dropseed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama and winterfat. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 1,800 pounds per acre in favorable years to 650 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are moderately slow permeability and shrink-swell potential. The moderately slow permeability limits the operation of septic tank absorption fields. Buildings and roads should be designed to offset the effects of shrinking and swelling.

71—Reventon loam, 3 to 8 percent slopes. This very deep, well drained soil is on valley sides. It formed in alluvium derived from mixed sources. Areas are irregular in shape and are 20 to 250 acres. The native vegetation is mainly short and mid grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is brown clay loam 26 inches thick. The substratum to a depth of 60 inches or more is yellowish brown loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Dioxice soils in convex areas, Sampson soils in depressional areas, and Deacon soils on valley sides. Included areas make up about 10 percent of the total acreage.

Permeability of this Reventon soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on this unit is mainly western wheatgrass, blue grama, bottlebrush squirreltail, and galleta. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, broom snakeweed, walkingstick cholla, and mat muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, bottlebrush squirreltail, and galleta.

The average annual production of air-dry vegetation ranges from 1,800 pounds per acre in favorable years to 650 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are moderately slow permeability and shrink-swell potential. The moderately slow permeability limits the operation of septic tank absorption fields. Buildings and roads should be designed to offset the effects of shrinking and swelling.

72—Reventon-Sampson association, gently sloping. This map unit is on piedmonts and in valleys. Slope is 0 to 5 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 65 percent Reventon loam, 0 to 5 percent slopes, and 15 percent Sampson loam, 0 to 5 percent slopes. The Reventon soil is on piedmonts and valley sides, and the Sampson soil is on valley floors and valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Tortugas soils on limestone knobs, slick spots in sodium-affected areas, Plack soils on narrow ridges, and Dioxice soils on valley sides. Included areas make up about 20 percent of the total acreage.

The Reventon soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown loam about 7 inches thick. The subsoil is brown and strong brown clay loam about 33 inches thick. The substratum to a depth of 60 inches or more is light brown loam.

Permeability of the Reventon soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Sampson soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is dark brown loam about 6 inches thick. The upper 15 inches of the subsoil is dark brown loam, and the lower 26 inches is dark brown clay loam. The substratum to a depth of 60 inches or more is brown loam.

Permeability of the Sampson soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, blue grama, vine-mesquite, and galleta. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, broom snakeweed, walkingstick cholla, and mat muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, vine-mesquite, and galleta. Rangeland seeding is suitable if the rangeland is in poor condition.

The average annual production of air-dry vegetation ranges from 1,800 pounds per acre in favorable years to 650 pounds in unfavorable years.

73—Rock outcrop-Stroupe-Deama association, extremely steep. This map unit is on hills, breaks, and mesa sides (fig. 9). Slope is 30 to 75 percent. Areas are irregular in shape and are 500 to 5,000 acres in size. The native vegetation is mainly pinyon and juniper with an understory of short and mid grasses. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 35 percent Rock outcrop, 25 percent Stroupe very stony loam, 30 to 50 percent slopes, and 25 percent Deama very cobbly loam, 30 to 75 percent slopes. Rock outcrop is on breaks, and the Stroupe and Deama soils are on hills and mesa sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Plack and Tortugas soils on the tops of mesas, Sampson soils on small valley floors, and Penistaja soils in the lower lying areas. Included areas make up about 15 percent of the total acreage.

Rock outcrop consists of areas of exposed limestone and sandstone. Surface runoff is rapid.

The Stroupe soil is moderately deep and well drained. It formed in sediment derived dominantly from sandstone, shale, and igneous rock. Typically, the surface layer is dark brown very stony loam about 4 inches thick. The subsoil is reddish brown very stony clay about 17 inches thick over sandstone.

Permeability of the Stroupe soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Deama soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the soil is dark brown very cobbly loam about 7 inches deep over limestone.

Permeability of the Deama soil is moderate. Effective rooting depth is 7 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, little bluestem, plains lovegrass, and littleseed ricegrass. Areas of the unit on north-facing side slopes can support stands of pinyon and juniper as well as stands of scattered ponderosa pine. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in walkingstick cholla, wavyleaf oak, and threeawn, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the

Figure 9.—Area of Rock outcrop-Stroupe-Deama association, extremely steep, east of Corona, New Mexico.

productivity and reproduction of little bluestem, sideoats grama, and plains lovegrass. This unit is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, mechanical brush management, and water impoundments because of the shallow and very shallow depth to bedrock and steepness of slope. Trails or walkways can be constructed in places to encourage livestock to graze in areas where access is limited.

The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 300 pounds in unfavorable years.

The Stroupe and Deama soils have limited suitability for the production of firewood, fenceposts, Christmas trees, and ornamentals.

74—Romine extremely gravelly loam, 15 to 45 percent slopes. This very deep, well drained soil is on old dissected alluvial plains. It formed in old alluvium derived from mixed sources. Areas are irregular in shape and are 15 to 150 acres in size. The native vegetation is mainly pinyon and alligator juniper with an understory of oak, short grasses, and mid grasses. Elevation is 6,300 to 7,200 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is grayish brown extremely gravelly loam about 9 inches thick. The upper 6 inches of the subsoil is brown very cobbly loam, and the lower 8 inches is light yellowish brown very cobbly clay loam. The substratum to a depth of 60 inches or more is brownish yellow extremely cobbly loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Pena soils near the tops of slopes that have southerly exposures, Dioxice soils in the more gently sloping areas, Manzano soils in small valleys, and Nogal and Hightower soils near the bottom of slopes. Included areas make up about 15 percent of the total acreage.

Permeability of this Romine soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on this unit is mainly sideoats grama, plains lovegrass, little bluestem, and black grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in hairy grama, wavyleaf oak, threeawn, and wolftail, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of plains lovegrass, sideoats grama, and little bluestem. This unit can support scattered pinyon and juniper. Rangeland improvement practices such as fences, pipelines for providing stock water, water impoundments, and mechanical brush management are difficult to apply on the unit because of stoniness and steepness of slope.

The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 400 pounds in unfavorable years.

This unit is poorly suited to homesite development. The main limitations are slope and large stones.

75—Roswell fine sand, hummocky. This very deep, excessively drained soil is on hummocky upland plains. It formed in eolian sand derived from mixed sources. Slope is 1 to 5 percent. Areas are irregular in shape and are 500 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 4,000 to 4,700 feet. The average annual precipitation is 11 to 14 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 180 to 200 days.

Typically, this soil to a depth of 60 inches or more is brown fine sand.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are soils that have a sandy loam subsoil and are in areas between dunes. Included areas make up about 20 percent of the total acreage.

Permeability of this Roswell soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sand bluestem, little bluestem, plains bristlegrass, and sideoats grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in field sandbur, shinnery oak, broom snakeweed, and threeawn, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sand bluestem, plains bristlegrass, and little bluestem. This unit can support scattered oneseed juniper. Adequate residue and litter must be maintained on this unit to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation ranges from 1,800 pounds per acre in favorable years to 1,000 pounds in unfavorable years.

76—Ruidoso clay loam, moist, 0 to 8 percent slopes. This very deep, well drained soil is on the floors and sides of valleys. It formed in alluvium derived from mixed sources. Areas are long and narrow and are 20 to 150 acres. The native vegetation is mainly short and mid grasses. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 17 to 20 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the upper 4 inches of the surface layer is brown clay loam and the lower 8 inches is dark brown clay loam. The upper 10 inches of the subsoil is dark brown clay loam, and the lower 38 inches is brown clay.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Sampson soils near the edges of mapped areas and Paco and Nolten soils on valley sides. Included areas make up about 10 percent of the total acreage.

Permeability of this Ruidoso soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used as homesites and for wildlife habitat.

If this unit is used for homesite development, the main limitations are slow permeability and shrink-swell potential. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from the buildings help to prevent structural damage because of shrinking and swelling.

77—Ruidoso-Tortugas association, moderately sloping. This map unit is on uplands and in valleys. Slope is 0 to 15 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short grasses, mid grasses, pinyon, and juniper. Elevation is 6,000 to 6,900 feet. The average annual precipitation is 13 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 160 to 180 days.

This unit is 40 percent Ruidoso silty clay loam, 0 to 8 percent slopes, and 40 percent Tortugas very cobbly silt loam, 0 to 15 percent slopes. The Ruidoso soil is on the

floors and sides of valleys, and the Tortugas soil is on uplands.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Sampson soils on valley floors and Rock outcrop on ridges. Included areas make up about 20 percent of the total acreage.

The Ruidoso soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is dark brown silty clay loam about 10 inches thick. The upper 35 inches of the subsoil is dark brown and brown clay loam, and the lower 15 inches is brown clay loam.

Permeability of the Ruidoso soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

The Tortugas soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is dark grayish brown very cobbly silt loam, and the lower 6 inches is dark grayish brown very cobbly loam. Limestone is at a depth of 8 inches.

Permeability of the Tortugas soil is moderate. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing, wildlife habitat, and woodland.

The potential plant community on the soil is mainly western wheatgrass, vine-mesquite, blue grama, and silver bluestem. The Ruidoso soil can support scattered pinyon and juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in mat muhly, ring muhly, broom snakeweed, and Carruth sagewort, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass and vine-mesquite.

The average annual production of air-dry vegetation on this soil ranges from 2,000 pounds per acre in favorable years to 700 pounds in unfavorable years.

The potential plant community on the Tortugas soil is mainly sideoats grama, plains lovegrass, little bluestem, and deergrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, wavyleaf oak, oneseed juniper, and green sagewort, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, plains lovegrass, little bluestem, and deergrass. The Tortugas soil has limited suitability for rangeland management practices such as pipelines for providing stock water, fences, water impoundments, and mechanical brush management because of the shallow and very shallow depth to bedrock.

The average annual production of air-dry vegetation on this soil ranges from 1,400 pounds per acre in favorable years to 600 pounds in unfavorable years.

The Tortugas soil has limited suitability for production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

78—Ruidoso Variant clay loam, 0 to 8 percent slopes. This very deep, well drained soil is on valley sides. It formed in alluvium derived from mixed sources. Areas are irregular in shape and are 25 to 200 acres in size. The native vegetation is mainly short and mid grasses (fig. 10). Elevation is 6,000 to 7,500 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is grayish brown clay loam about 2 inches thick. The subsoil to a depth of 60 inches or more is dark brown and brown silty clay.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are soils that have a thinner and lighter colored surface layer than this Ruidoso soil and Sampson soils near the edges of mapped areas. Included areas make up about 10 percent of the total acreage.

Permeability of this Ruidoso soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and homesite development.

The potential plant community on this unit is mainly western wheatgrass, vine-mesquite, blue grama, and alkali sacaton. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in mat muhly, ring muhly, and Carruth sagewort, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, vine-mesquite, and alkali sacaton. This unit receives runoff from adjoining areas, which increases the production and palatability of forage. Consequently, it is often excessively grazed.

The average annual production of air-dry vegetation ranges from 2,000 pounds per acre in favorable years to 700 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are slow permeability and shrink-swell potential. The slow permeability limits the operation of septic tank absorption fields. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from the buildings help to prevent structural damage because of shrinking and swelling.

Figure 10.—Area of Ruidoso Variant clay loam, 0 to 8 percent slopes.

79—Sampson loam, 0 to 5 percent slopes. This very deep, well drained soil is on the floors and sides of valleys. It formed in alluvium derived from mixed sources. Areas are long and narrow and are 150 to 2,000 acres. The native vegetation is mainly short and mid grasses. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

Typically, the surface layer is dark brown loam about 6 inches thick. The upper 15 inches of the subsoil is dark brown loam, and the lower 26 inches is dark brown clay loam. The substratum to a depth of 60 inches or more is brown loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Reventon and Penistaja soils on valley sides and recent gravelly soils near drainageways. Included areas make up about 10 percent of the total acreage.

Permeability of this Sampson soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, vine-mesquite, blue grama, and galleta. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, mat muhly, and broom snakeweed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass and vine-mesquite. This unit receives runoff from adjoining areas, which increases the production and palatability of forage. Consequently, it is often excessively grazed.

The average annual production of air-dry vegetation ranges from 1,800 pounds per acre in favorable years to 900 pounds in unfavorable years.

80—Sampson loam, moist, 0 to 8 percent slopes. This very deep, well drained soil is on the floors and sides of valleys. It formed in alluvium derived from mixed sources. Areas are long and narrow and are 20 to 100 acres. The native vegetation is mainly ponderosa pine and alligator juniper with an understory of mid grasses. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 17 to 22 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the upper 4 inches of the surface layer is dark grayish brown loam and the lower 5 inches is very dark grayish brown clay loam. The subsoil is dark grayish brown and brown clay loam about 33 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Ruidoso soils along drainageways and Paco and Nolten soils on valley sides. Included areas make up about 15 percent of the total acreage.

Permeability of this Sampson soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

Population growth has resulted in increased construction of homes on this unit. The main limitation of the unit for homesite development is the shrink-swell potential. Buildings and roads should be designed to offset the effects of shrinking and swelling.

This unit is suited to ponderosa pine. The site index for ponderosa pine ranges from 77 to 92. Based on a site index of 80, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 5,410 cubic feet or 31,200 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 69 cubic feet or 313 board feet (International rule) per acre. This unit has few limitations for woodland management.

81—Sampson loam, moist, 8 to 15 percent slopes. This very deep, well drained soil is on valley sides. It formed in alluvium derived from mixed sources. Areas are long and narrow and are 15 to 150 acres. The native vegetation is mainly ponderosa pine and alligator juniper with an understory of mid grasses. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 17 to 22 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 100 to 140 days.

Typically, the surface layer is dark grayish brown loam about 8 inches thick. The subsoil is dark grayish brown clay loam about 35 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Ruidoso soils along drainageways and Nolten soils on valley sides. Included areas make up about 15 percent of the total acreage.

Permeability of this Sampson soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as homesites and for wildlife habitat. It can be used as woodland.

Population growth has resulted in increased construction of homes on this unit. The unit is limited for homesite development mainly by slope and shrink-swell potential. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Buildings and roads should be designed to offset the effects of shrinking and swelling.

This unit is suited to ponderosa pine. The site index for ponderosa pine ranges from 77 to 92. Based on a site index of 80, the potential production per acre of merchantable timber from an even-aged, fully stocked stand of trees 100 years old is 5,410 cubic feet or 31,200 board feet (International rule, 1/8-inch kerf). At the culmination of the mean annual increment (CMAI), the production is 69 cubic feet or 313 board feet (International rule) per acre.

This unit has few limitations for woodland management. Conventional methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is wet. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Spoil from excavations is subject to rill and gully erosion and to sloughing.

82—Sharps silt loam, 2 to 5 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from shale and siltstone. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

Typically, the surface layer is reddish brown silt loam about 4 inches thick. The subsoil is red and light red silty

clay loam about 18 inches thick. The substratum is light reddish brown silty clay loam about 8 inches thick over layered shale and siltstone.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Clovis and Witt soils in swales, shallow soils on knobs, Rance soils on uplands, and Gabaldon soils on valley floors. Included areas make up about 25 percent of the total acreage.

Permeability of this Sharps soil is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly blue grama, galleta, winterfat, and bottlebrush squirreltail. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, broom snakeweed, walkingstick cholla, and sand dropseed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of winterfat, galleta, and bottlebrush squirreltail. Livestock grazing should be managed to protect the soil from excessive erosion.

The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 600 pounds in unfavorable years.

83—Sharps-Rock outcrop association, moderately sloping. This map unit is on uplands, ridges, and breaks. Slope is 2 to 15 percent. Areas are irregular in shape and are 300 to 3,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 70 percent Sharps silt loam, 2 to 15 percent slopes, and 15 percent Rock outcrop. The Sharps soil is on uplands, and Rock outcrop is on ridges and breaks.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Witt and Clovis soils in swales, Rance soils on uplands, Gabaldon soils on valley floors, and shallow soils on knobs. Included areas make up about 15 percent of the total acreage.

The Sharps soil is moderately deep and well drained. It formed in material derived dominantly from shale and siltstone. Typically, the surface layer is reddish brown silt loam about 4 inches thick. The subsoil is red and light red silty clay loam about 18 inches thick. The substratum is light reddish brown silty clay loam about 8 inches thick over layered shale and siltstone.

Permeability of the Sharps soil is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

Rock outcrop consists of areas of exposed shale and siltstone. Surface runoff is rapid.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly blue grama, galleta, winterfat, and bottlebrush squirreltail. The unit can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, broom snakeweed, walkingstick cholla, and sand dropseed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of winterfat, galleta, and bottlebrush squirreltail. Livestock grazing should be managed to protect the Sharps soil from excessive erosion.

The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 600 pounds in unfavorable years.

84—Socorro very gravelly loam, 0 to 8 percent slopes. This moderately deep, well drained soil is on old basalt flows. It formed in sediment derived dominantly from basalt. Areas are elongated and are 1,000 to 5,000 acres. The native vegetation is mainly short and mid grasses. Elevation is 5,500 to 6,000 feet. The average annual precipitation is 12 to 15 inches, the average annual air temperature is 48 to 56 degrees F, and the average frost-free period is 150 to 190 days.

Typically, the surface layer is brown very gravelly loam about 7 inches thick. The subsoil is brown very cobbly loam about 8 inches thick. The substratum is pink very gravelly silt loam about 11 inches thick over basalt.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are deeper, more developed soils in swales and Rock outcrop on knobs. Included areas make up about 25 percent of the total acreage.

Permeability of this Socorro soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly black grama, galleta, winterfat, and blue grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in sand dropseed, walkingstick cholla, and yucca, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama and

winterfat. Rangeland improvement practices such as pipelines for providing stock water, water impoundments, and fences are difficult to apply on this unit because basalt cobbles are in the soil profile.

The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 400 pounds in unfavorable years.

85—Stroupe very stony loam, moderately steep. This moderately deep, well drained soil is on hills. It formed in sediment derived dominantly from sandstone and shale. Slope is 8 to 30 percent. Areas are irregular in shape and are 100 to 2,000 acres in size. The native vegetation is mainly pinyon and oneseed juniper with an understory of oak and mid grasses. Elevation is 5,500 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is dark grayish brown very stony loam about 5 inches thick. The upper 6 inches of the subsoil is strong brown very cobbly sandy clay loam, and the lower 9 inches is reddish brown very cobbly sandy clay. The substratum is reddish yellow extremely cobbly sandy clay about 4 inches thick over sandstone.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Rock outcrop on breaks, Oro Grande soils on knolls and ledges, Bernal and Hightower soils on uplands, and Remunda and Paco soils on valley sides. Included areas make up about 30 percent of the total acreage.

Permeability of this Stroupe soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Most areas of this unit are used for livestock grazing. A few areas are used for homesite development.

The potential plant community on this unit is mainly little bluestem, spike muhly, big bluestem, and prairie junegrass. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in wavyleaf oak, Carruth sagewort, and blue grama, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of little bluestem, big bluestem, and prairie junegrass. Rangeland improvement practices such as pipelines for providing stock water, fences, water impoundments, and mechanical brush management are difficult to apply on the unit because of moderate depth to sandstone, stoniness, and steepness of slope.

This unit has limited suitability for the production of pinyon and juniper and for use as firewood, fenceposts, Christmas trees, or ornamentals.

This unit is poorly suited to homesite development. The main limitations are slope, depth to bedrock, shrink-swell potential, large stones, and slow permeability. The moderate depth to bedrock limits the installation of septic tank systems and the construction of streets and dwellings. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Slow permeability limits the operation of septic tank absorption fields.

86—Stroupe bouldery sandy clay loam, extremely steep. This moderately deep, well drained soil is on sandstone breaks (fig. 11). It formed in sediment derived dominantly from sandstone and shale. Slope is 30 to 70 percent. Areas are long and narrow and are 20 to 1,000 acres. The native vegetation is mainly pinyon and oneseed juniper with an understory of oak and mid grasses. Elevation is 5,500 to 7,000 feet. The average annual precipitation is 14 to 18 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 130 to 160 days.

Typically, the surface layer is brown bouldery sandy clay loam about 8 inches thick. The subsoil is light brown very gravelly sandy clay about 11 inches thick. The substratum is light brownish gray gravelly clay about 17 inches thick over sandstone and shale.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are Rock outcrop on breaks, Oro Grande soils on knolls and ledges, Bernal and Hightower soils on uplands, and Remunda and Paco soils on valley sides. Included areas make up about 30 percent of the total acreage.

Permeability of this Stroupe soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for wildlife habitat.

This unit is poorly suited to homesite development. The main limitations are slope, depth to bedrock, slow permeability, shrink-swell potential, and large stones.

87—Stroupe-Witt association, moderately steep. This map unit is on mountainsides and valley sides. Slope is 5 to 30 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly pinyon and juniper with an understory of oak, short grasses, and mid grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 55 percent Stroupe very stony loam, 9 to 30 percent slopes, and 25 percent Witt silt loam, 5 to 9 percent slopes. The Stroupe soil is on mountainsides, and the Witt soil is on valley sides.

Figure 11.—Area of Stroupe bouldery sandy clay loam, extremely steep.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Travessilla soils on tops of ridges and Penistaja soils on valley sides. Included areas make up about 20 percent of the total acreage.

The Stroupe soil is moderately deep and well drained. It formed in sediment derived dominantly from sandstone and shale. Typically, the surface layer is very dark grayish brown very stony loam about 4 inches thick. The subsoil is dark reddish brown very stony clay loam and very stony clay about 17 inches thick. Sandstone is at a depth of 21 inches.

Permeability of the Stroupe soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Witt soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is brown silty clay loam about 27 inches thick. The substratum to a depth of 60 inches or more is reddish brown loam.

Permeability of the Witt soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as woodland, for livestock grazing, and for wildlife habitat.

The potential plant community on the Stroupe soil is mainly sideoats grama, plains lovegrass, littleseed ricegrass, and pinyon. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in blue grama, wolftail, and wavyleaf oak, which normally occur in small amounts in the potential plant community. The soil is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, water impoundments, and mechanical brush management because of stoniness and steepness of slope.

The potential plant community on the Witt soil is mainly western wheatgrass, vine-mesquite, and blue grama. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in ring muhly, mat muhly, and broom snakeweed, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of blue grama, western wheatgrass, and vine-mesquite.

The average annual production of air-dry vegetation on this unit ranges from 1,200 pounds per acre in favorable years to 400 pounds in unfavorable years.

The Stroupe soil has limited suitability for the production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

88—Tanbark-Tortugas association, very steep. This map unit is on hills (fig. 12). Slope is 5 to 50 percent. Areas are irregular in shape and are 100 to 5,000 acres in size. The native vegetation is mainly short grasses, mid grasses, pinyon, and juniper. Elevation is 5,000 to 6,500 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

Figure 12.—Area of Tanbark-Tortugas association, very steep.

This unit is 45 percent Tanbark silt loam, 5 to 50 percent slopes, and 30 percent Tortugas very cobbly loam, 5 to 50 percent slopes.

Included in this unit are areas of other soils and miscellaneous areas that may or may not be present in all mapped areas. These included areas are gypsum and limestone outcrops on breaks and ridges, Rance soils on valley sides, Gabaldon soils on valley floors, and Sharps soils on shale knobs. Included areas make up about 25 percent of the total acreage.

The Tanbark soil is shallow and well drained. It formed in material derived dominantly from gypsum. Typically, the surface layer is grayish brown silt loam about 4 inches thick. The substratum is white loam about 16 inches thick over gypsum.

Permeability of the Tanbark soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

The Tortugas soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the Tortugas soil is brown very cobbly loam about 12 inches deep over limestone.

Permeability of the Tortugas soil is moderate. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

This unit is used for livestock grazing, wildlife habitat, and woodland.

The potential plant community on the Tanbark soil is mainly black grama, winterfat, alkali sacaton, and sideoats grama. The soil can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in Bigelow sagebrush, threeawn, broom snakeweed, and yucca, which normally occur in small amounts in the potential plant community.

The average annual production of air-dry vegetation on this soil ranges from 750 pounds per acre in favorable years to 300 pounds in unfavorable years.

The potential plant community on the Tortugas soil is mainly sideoats grama, New Mexico feathergrass, plains lovegrass, and little bluestem. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, oneseed juniper, and wavyleaf oak, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, sideoats grama, New Mexico feathergrass, and winterfat.

The average annual production of air-dry vegetation on this soil ranges from 1,400 pounds per acre in favorable years to 600 pounds in unfavorable years.

The Tanbark soil is poorly suited to rangeland improvement practices such as water impoundments because of shallow depth to gypsum. The Tortugas soil is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, water impoundments, and mechanical brush management because of the shallow and very shallow depth to limestone and steepness of slope.

The Tortugas soil has limited suitability for the production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

89—Tortugas-Asparas-Rock outcrop association, moderately sloping. This map unit is on uplands, in valleys, and on knobs and breaks. Slope is 0 to 15 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly pinyon, juniper, short grasses, and mid grasses. Elevation is 5,500 to 6,900 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 40 percent Tortugas very cobbly loam, 0 to 15 percent slopes; 25 percent Asparas loam, 0 to 3 percent slopes; and 15 percent Rock outcrop. The Tortugas soil is on uplands, the Asparas soil is on the floors and sides of valleys, and Rock outcrop is on knobs and breaks.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Sampson soils on valley floors, Plack soils on knobs and ridges, and Dioxice soils on valley sides. Included areas make up about 20 percent of the total acreage.

The Tortugas soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the Tortugas soil is dark grayish brown and grayish brown very cobbly loam about 12 inches deep over limestone.

Permeability of the Tortugas soil is moderate. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Asparas soil is very deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the upper 2 inches of the surface layer is grayish brown loam and the lower 5 inches is dark grayish brown clay loam. The upper 17 inches of the subsoil is brown clay loam, and the lower 10 inches is brown loam. The substratum to a depth of 60 inches or more is light brown loam.

Permeability of the Asparas soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Rock outcrop consists of areas of exposed limestone. Surface runoff is rapid.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Tortugas soil is mainly sideoats grama, plains lovegrass, little bluestem, and littleseed ricegrass. The soil is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, water impoundments, and mechanical brush management because of the shallow and very shallow depth to limestone.

The average annual production of air-dry vegetation on this soil ranges from 1,400 pounds per acre in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Asparas soil is mainly western wheatgrass, vine-mesquite, blue grama, and galleta. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, plains lovegrass, and vine-mesquite.

The average annual production of air-dry vegetation ranges from 1,800 pounds per acre in favorable years to 900 pounds in unfavorable years.

The Tortugas soil has limited suitability for the production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

90—Tortugas-Rock outcrop association, moderately sloping. This map unit is on breaks, uplands, and knobs (fig. 13). Slope is 0 to 15 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly pinyon and juniper with an understory of short and mid grasses. Elevation is 6,000 to 6,900 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

Figure 13.—Area of Tortugas-Rock outcrop association, moderately sloping.

Figure 14.—Area of Tortugas very cobbly loam.

This unit is 45 percent Tortugas very cobbly loam, 0 to 15 percent slopes, and 35 percent Rock outcrop. The Tortugas soil is on uplands, and Rock outcrop is on breaks and knobs.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Dioxice soils on valley sides and Asparas soils in swales. Included areas make up about 20 percent of the total acreage.

The Tortugas soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the soil is dark grayish brown very cobbly loam about 13 inches deep over limestone (fig. 14).

Permeability of the Tortugas soil is moderate. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed limestone. Surface runoff is rapid.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, plains lovegrass, little bluestem, and spike muhly. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in oneseed juniper, threeawn, and wavyleaf oak, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of plains lovegrass, sideoats grama, and little bluestem. This unit is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, mechanical brush management, and water impoundments because of the shallow and very shallow depth to limestone.

The average annual production of air-dry vegetation ranges from 1,400 pounds per acre in favorable years to 600 pounds in unfavorable years.

The Tortugas soil has limited suitability for the production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

91—Tortugas-Rock outcrop association, extremely steep. This map unit is on hills, uplands, breaks, and ridges. Slope is 15 to 75 percent. Areas are irregular in shape and are 1,000 to 8,000 acres in size. The native vegetation is mainly pinyon and juniper with an understory of short and mid grasses. Elevation is 6,000 to 6,900 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 60 percent Tortugas very cobbly loam, 15 to 75 percent slopes, and 20 percent Rock outcrop. The Tortugas soil is on hills and uplands, and Rock outcrop is on breaks and ridges.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Stroupe soils in areas where sandstone is present, Pena soils on steep hillsides, and Asparas soils in swales. Included areas make up about 20 percent of the total acreage.

The Tortugas soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the Tortugas soil is dark grayish brown very cobbly loam about 11 inches deep over limestone.

Permeability of the Tortugas soil is moderate. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop consists of areas of exposed limestone. Surface runoff is rapid.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, plains lovegrass, little bluestem, and spike muhly. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in oneseed juniper, threeawn, and wavyleaf oak, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, plains lovegrass, and New Mexico feathergrass. This unit is poorly suited to rangeland improvement practices such as fences, pipelines for providing stock water, water impoundments, and mechanical brush management because of the steepness of slope and the shallow and very shallow depth to limestone.

The average annual production of air-dry vegetation ranges from 1,400 pounds per acre in favorable years to 600 pounds in unfavorable years.

The Tortugas soil has limited suitability for the production of pinyon and juniper for use as firewood, fenceposts, Christmas trees, or ornamentals.

92—Tortugas-Ruidoso-Rock outcrop association, very steep. This map unit is on uplands, in valleys, and on breaks. Slope is 0 to 50 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly pinyon, juniper, short grasses, and mid grasses. Elevation is 6,000 to 6,900 feet. The average annual precipitation is 13 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 160 to 180 days.

This unit is 50 percent Tortugas very cobbly silt loam, 15 to 50 percent slopes; 15 percent Ruidoso silty clay loam, 0 to 8 percent slopes; and 15 percent Rock outcrop. The Tortugas soil is on uplands, the Ruidoso soil is on the floors and sides of valleys, and Rock outcrop is on breaks.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Sampson soils on valley floors and Pena soils on valley sides. Included areas make up about 20 percent of the total acreage.

The Tortugas soil is very shallow and shallow and is well drained. It formed in material derived dominantly from limestone. Typically, the upper 4 inches of the surface layer is dark grayish brown very cobbly silt loam and the lower 6 inches is dark grayish brown very cobbly loam. Limestone is at a depth of 10 inches.

Permeability of the Tortugas soil is moderate. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

The Ruidoso soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is dark brown silty clay loam about 10 inches thick. The upper 35 inches of the subsoil is dark brown and brown clay loam, and the lower 15 inches is brown clay loam.

Permeability of the Ruidoso soil is slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

Rock outcrop consists of areas of exposed limestone. Surface runoff is rapid.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Tortugas soil is mainly sideoats grama, plains lovegrass, little bluestem, and alligator juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in threeawn, wavyleaf oak, oneseed juniper, and green sagewort, which normally occur in

small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of plains lovegrass, sideoats grama, and little bluestem. This soil is poorly suited to rangeland improvement practices such as water impoundments, pipelines for providing stock water, fences, and mechanical brush management because of the shallow and very shallow depth to bedrock and steepness of slope.

The average annual production of air-dry vegetation on this soil ranges from 1,400 pounds per acre in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Ruidoso soil is mainly western wheatgrass, vine-mesquite, blue grama, and silver bluestem. This soil can support scattered pinyon and juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in mat muhly, ring muhly, broom snakeweed, and Carruth sagewort, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass and vine-mesquite.

The average annual production of air-dry vegetation on this soil ranges from 2,000 pounds per acre in favorable years to 700 pounds in unfavorable years.

The Tortugas soil has limited suitability for the production of pinyon and juniper for use of firewood, fenceposts, Christmas trees, or ornamentals.

93—Travessilla-Rock outcrop association, moderately sloping. This map unit is on ridges, hills, and breaks. Slope is 5 to 15 percent. Areas are irregular in shape and are 100 to 1,500 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,400 to 6,400 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 53 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 45 percent Travessilla gravelly fine sandy loam, 5 to 15 percent slopes, and 35 percent Rock outcrop. The Travessilla soil is on ridges, hills, and mesas, and Rock outcrop is on breaks.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Stroupe soils on breaks, Penistaja soils on valley sides, and Harvey soils on uplands. Included areas make up about 20 percent of the total acreage.

The Travessilla soil is very shallow and shallow and is well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is pinkish gray gravelly fine sandy loam about 3 inches thick. The substratum is light brown gravelly fine sandy loam about 4 inches thick over sandstone.

Permeability of the Travessilla soil is moderately rapid. Effective rooting depth is 6 to 20 inches. Available water capacity is very low. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

Rock outcrop consists of areas of exposed sandstone. Surface runoff is rapid.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, black grama, little bluestem, and blue grama. The Travessilla soil can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in sand dropseed, threeawn, broom snakeweed, and ring muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, and black grama. This unit is poorly suited to rangeland improvement practices such as pipelines for providing stock water, fenceposts, and water impoundments because of the shallow and very shallow depth to bedrock. Adequate residue and litter must be maintained on the Travessilla soil to control soil blowing and reduce damage to young plants.

The average annual production of air-dry vegetation on this unit ranges from 1,000 pounds per acre in favorable years to 400 pounds in unfavorable years.

94—Tulargo loam, 0 to 5 percent slopes. This very deep, well drained soil is on piedmonts. It formed in alluvium derived dominantly from gypsiferous material. Areas are irregular in shape and are 20 to 4,600 acres in size. The native vegetation is mainly mid and short grasses. Elevation is 5,300 to 5,500 feet. The average annual precipitation is 11 to 13 inches, the average annual air temperature is 55 to 57 degrees F, and the average frost-free period is 180 to 200 days.

Typically, the upper 4 inches of the surface layer is brown loam and the lower 6 inches is pale brown loam. The upper 8 inches of the subsoil is light yellowish brown loam, and the lower 8 inches is very pale brown loam. The upper 24 inches of the substratum is very pale brown loam, and the lower part to a depth of 60 inches or more is light yellowish brown gravelly loam.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Reventon and Deacon soils in swales, Harvey and Darvey soils on uplands, and Andergeorge soils on gravelly knobs. Included areas make up about 10 percent of the total acreage.

Permeability of this Tulargo soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for homesite development.

Population growth has resulted in increased construction of homes on this unit. The unit has few limitations for homesite development. Buildings and roads should be designed to offset the effects of shrinking and swelling. If this unit is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field.

95—Tulargo-Andergeorge association, gently sloping. This map unit is on piedmonts. Slope is 0 to 8 percent. Areas are irregular in shape and are 150 to 6,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 5,000 to 6,500 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 50 percent Tulargo loam, 0 to 8 percent slopes, and 20 percent Andergeorge gravelly fine sandy loam, 4 to 8 percent slopes.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Gabaldon soils on valley floors, Harvey and Darvey soils on valley sides, and Clovis soils in swales. Included areas make up about 30 percent of the total acreage.

The Tulargo soil is very deep and well drained. It formed in alluvium derived dominantly from gypsiferous material. Typically, the surface layer is yellowish brown loam 15 inches thick. The upper 6 inches of the subsoil is light brown loam, and the lower 19 inches is pink clay loam. The upper 8 inches of the substratum is pink loam, and the lower part to a depth of 60 inches or more is light brown gravelly loam.

Permeability of the Tulargo soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Andergeorge soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the upper 3 inches of the surface layer is pinkish gray gravelly fine sandy loam and the lower 8 inches is light brown very gravelly loam. The upper 10 inches of the substratum is pale brown very gravelly loam, and the lower part to a depth of 60 inches or more is very pale brown very gravelly sandy loam.

Permeability of the Andergeorge soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly black grama, winterfat, blue grama, and sideoats grama. The unit can support scattered oneseed juniper. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in broom snakeweed, threeawn, sand dropseed, and ring muhly, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of black grama, winterfat, and sideoats grama. Rangeland improvement practices such as fences, pipelines for providing stock water, and water impoundments are difficult to apply on the Andergeorge soil because of the gravel in the soil profile. Rangeland improvement practices such as water impoundments are difficult to apply on the Tulargo soil because of the shallow depth to a gypsum layer.

The average annual production of air-dry vegetation on this unit ranges from 1,150 pounds per acre in favorable years to 400 pounds in unfavorable years.

96—Witt-Penistaja association, gently sloping. This map unit is on piedmonts and in valleys (fig. 15). Slope is 0 to 5 percent. Areas are irregular in shape and are 1,000 to 5,000 acres in size. The native vegetation is mainly short and mid grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches, the average annual air temperature is 45 to 56 degrees F, and the average frost-free period is 150 to 190 days.

This unit is 45 percent Witt silt loam, 0 to 5 percent slopes, and 35 percent Penistaja fine sandy loam, 0 to 5 percent slopes. The Witt soil is on the floors and sides of valleys, and the Penistaja soil is on piedmonts and upper valley sides.

Included in this unit are areas of other soils that may or may not be present in all mapped areas. These included areas are Stroupe soils on hills, Clovis and Sharps soils on valley sides, and Sampson soils on valley floors. Included areas make up about 20 percent of the total acreage.

The Witt soil is very deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is brown and light brown silty clay loam about 27 inches thick. The substratum to a depth of 60 inches or more is reddish brown loam.

Permeability of the Witt soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is very high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Penistaja soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 10 inches thick. The subsoil is brown sandy clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is strong brown fine sandy loam.

Permeability of the Penistaja soil is moderate. Effective rooting depth is 60 inches or more. Available water

Figure 15.—Area of Witt-Penistaja association, gently sloping.

capacity is high. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, western wheatgrass, blue grama, and bottlebrush squirreltail. The Penistaja soil can support scattered oneseed juniper and pinyon. As the plant community deteriorates, the desirable forage plants decrease and there is an increase in mat muhly, ring muhly, broom snakeweed, and threeawn, which normally occur in small amounts in the potential plant community. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, and bottlebrush squirreltail. Rangeland seeding is suitable if the rangeland is in poor condition.

The average annual production of air-dry vegetation on this unit ranges from 1,400 pounds per acre in favorable years to 400 pounds in unfavorable years.

prime farmland

The map units in this survey area have not been rated to the criteria for prime farmland. In New Mexico, an

adequate supply of irrigation water of suitable quality is a requirement for rating soils as prime farmland. Most areas of the irrigated cropland in this survey area are small. Some of these irrigated soils, and others in areas where a dependable supply of suitable irrigation water could be developed, may meet the criteria for prime farmland. An onsite investigation is needed to make the determination.

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 as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the 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.

rangeland

By Gregory Haussler, district conservationist, Soil Conservation Service.

Approximately 80 percent of the survey area is rangeland that supports grasses, forbs, and shrubs suitable for grazing. In addition, about 15 percent of the land area is pinyon, juniper, and ponderosa pine woodland that produces grazable understory. Yearlong cow- and calf-operations are the dominant ranch unit, but many cattle and sheep ranches are in the east and north-central parts of the area. Livestock produced on these ranches provides the principal agricultural income in the area.

Management of the grazing to increase the ground cover, accumulate litter, and improve the vigor and reproduction of the more productive grasses and shrubs is highly desirable. Continuous yearlong grazing or grazing every year during the growing season from April through October results in a deteriorated plant community that is generally of reduced value for livestock forage.

A proper degree of grazing use combined with deferred grazing, which varies the seasons of grazing and rest in pastures during successive years, is needed to maintain a healthy, balanced plant community. This will also provide high quality forage throughout the year. Periodic rest during different seasons of the year benefits different plants. Rest in summer encourages the production and reproduction of warm-season grasses such as sideoats grama, black grama, galleta, plains lovegrass, and blue grama. Rest in spring is beneficial to cool-season grasses such as western wheatgrass, New Mexico feathergrass, and bottlebrush squirreltail. Rest in fall and winter benefits shrubs such as fourwing saltbush and winterfat.

Flexibility in livestock and wildlife numbers and in the frequency and intensity of grazing is essential to the success of any grazing program. Effective livestock distribution is most frequently accomplished by the use of fences, livestock water developments, and livestock salting.

Rangeland is land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. In areas that have similar climate and topography, the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on knowledge about the relationship among the soils, vegetation, and water.

The relationship between mapped soils and vegetation was studied during this survey. It is expressed in the section "Detailed soil map units" in terms of the potential natural plant community for the component soils. In the following paragraphs, the potential natural plant community is defined as well as some of the other terms used in the map unit descriptions.

A potential natural plant community is an association of plants that are best adapted to a unique combination of environmental factors. Even on the same soil, these plants vary naturally in their proportions or production from place to place or from year to year. The dominant plant or plants are used to characterize the plant community because of their relative stability where abnormal disturbance or physical site deterioration has not occurred. The grasses, forbs, and shrubs that characterize the potential natural plant community on each major soil are listed by common name in the map units.

Once the plant community has been characterized for each soil, similar plant communities are grouped into range sites. A range site is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from other natural plant communities in kind, amount, or proportion of range plants. Soil properties that have the greatest influence on the productivity of range plants are those that affect the availability of moisture and plant nutrients. Other soil properties, such as soil reaction, salt content, and the presence or absence of a high water table during any period of the year, are also important factors in differentiating range sites. Range site descriptions can be used to identify the proportions of the total annual production of each plant. Information on the range sites in this survey area is available in the local office of the Soil Conservation Service.

The average annual production is also discussed in the detailed map unit descriptions. This is the amount of air-dry vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. The total production that can be used for forage depends upon the kind of grazing animals, the season of use, and other uses that might be made of the resource in addition to grazing. The average annual production includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable and unfavorable years. In a favorable year, the amount and distribution of precipitation received during times of favorable soil and air temperatures make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community in a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is, in this respect, an ecological rating only. It is not in itself a direct value rating for any specific use.

An objective in range management may be to manage grazing so that the plants growing on a site are about the same in kind and amount as those in the potential natural plant community for that site. Such management generally results in the optimum production of forage, conservation of water, and control of erosion. In some situations, however, a range condition somewhat below potential will promote adequate conservation of soil and water while at the same time producing benefits that contribute to the objective of the landowner or landuser.

woodland

By Richard J. Reioux, range conservationist, Soil Conservation Service.

About 1 percent of the survey area, or about 24,000 acres, is ponderosa pine woodland. Most of the woodland is above an elevation of 6,800 feet in the south-central part of the area. In addition to this woodland, much of the area is covered by scattered pinyon and juniper that have a very limited capability to produce pine nuts and for use as fenceposts, firewood, or pulpwood. In areas where the ponderosa pine is on north-facing slopes, Douglas-fir, white fir, and limber pine are interspersed with the ponderosa pine.

Site index can be used to estimate the growth and yield of timber per acre in board-feet. The site index values for ponderosa pine given in the section "Detailed soil map units," were determined from curves developed by Meyer (*3*).

Among the factors to be considered in woodland management are providing protection from fire, insects, and disease; thinning and pruning to improve the quality of the stands; and improvement of the watershed. The concerns of woodland management are briefly discussed in the following paragraphs.

Woody species competition.— Sites that have been disturbed by fire, by cutting, or by other factors are likely to be invaded by brush, undesirable trees, and other plants. Oak brush and alligator juniper are the chief competing plants. Regeneration is less successful on the southwest-facing slopes, where competition from plants is greatest. If seedlings are planted, the competing plants must be controlled.

Equipment limitation.— Management may be hampered by the soil characteristics and topographic features that restrict or prevent the use of equipment. The chief factors that affect the use of equipment on most of the soils are slope and increased susceptibility to erosion if the soils are disturbed. After rainfall, the soils may be too wet and soft to support equipment.

Erosion hazard.— Erosion hazard is rated according to inherent characteristics such as slope and runoff. Careful planning in the construction of roads, skid trails, and

landings is necessary in order to prevent soil loss. Adequate drainage must be provided to control runoff. After logging has been completed, roads must be seeded to reduce runoff. Buffer strips 100 to 300 feet wide should be left undisturbed along all perennial streams. This strip acts as a filter strip that reduces the amount of sediment reaching streams.

windbreaks and environmental plantings

By Gregory Haussler, district conservationist, Soil Conservation Service.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

In some places in the survey area establishing and maintaining field windbreaks, farmstead windbreaks, and environmental plantings may require irrigation for the best results. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

recreation

By William T. Slone, biologist, Soil Conservation Service.

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

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

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

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

wildlife habitat

By William T. Slone, biologist, Soil Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 4, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, 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, orchardgrass, 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 blue grama, sideoats gramma, gilia, Carruth sagewort, tobosa, New Mexico feathergrass, and western wheatgrass.

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 willow, poplar, and cottonwood. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive and autumn-olive.

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 pinyon, juniper, ponderosa pine, and Douglas-fir.

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, oak, algerita, and sumac.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are rushes and sedges.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include Gambel's quail, pheasant, meadowlark, field sparrow, cottontail, 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 elk, wild

turkey, blue grouse, harlequin quail, thrushes, woodpeckers, squirrels, gray fox, mountain lion, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, desert mule deer, scaled quail, meadowlark, and lark bunting.

engineering

By William L. Van Pelt, engineer, Soil Conservation Service.

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

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made

for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 6 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 6 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 6 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, 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 6 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 7 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

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

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

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

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

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

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

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

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

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

soil properties

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

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

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help 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 9 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "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.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

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

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an 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 10 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

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

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

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 erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.
4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.
8. Stony, cobbly, 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 10, 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 11 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

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

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than

that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

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

Cemented pans are cemented or indurated subsurface layers within a depth of 5 feet. Such pans cause difficulty in excavation. Pans are classified as thin or thick. A thin pan is less than 3 inches thick if continously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A thick pan is more than 3 inches thick if continously indurated or more than 18 inches thick if discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

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 (*5*). 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 12, 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 Ustoll (*Ust*, meaning burnt, 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 Haplustolls (*Hapl*, meaning minimal horizonation, plus *ustoll*, the suborder of the Mollisols that have an ustic 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 Haplustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Haplustolls.

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. 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 (*4*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*5*). 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."

Andergeorge series

The soils in the Andergeorge series are classified as Typic Gypsiorthids, loamy-skeletal, gypsic, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on knobs and ridges on piedmonts. Slope is 0 to 8 percent. Elevation is 5,000 to 6,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of an Andergeorge gravelly fine sandy loam in an area of Andergeorge-Darvey-Asparas association, gently sloping, about 8 miles north of

Carrizozo; in the SE1/4 of sec. 20, T. 6 S., R. 11 E.; 0.1 mile south of fork in road on ranch.

A11—0 to 5 inches; brown (10YR 5/3) gravelly fine sandy loam, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; 25 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

A12—5 to 9 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots and common medium roots; 70 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

C1ca—9 to 22 inches; very pale brown (10YR 7/4) very gravelly loam, light yellowish brown (10YR 6/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots and few medium roots; 50 percent gravel; violently effervescent; strongly alkaline; abrupt wavy boundary.

C2cacs—22 to 42 inches; white (10YR 8/2) very gravelly sandy loam, very pale brown (10YR 7/3) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; 50 percent gravel; many gypsum crystals in pockets 6 to 10 inches in diameter; violently effervescent; mildly alkaline; clear wavy boundary.

C3cacs—42 to 60 inches; pink (7.5YR 7/4) extremely gravelly sandy loam, light brown (7.5YR 6/4) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; 70 percent gravel; gypsum crystals hanging from lower sides of gravel; violently effervescent; mildly alkaline.

The solum ranges from 4 to 18 inches in thickness. The particle-size control section is 35 to 75 percent gravel and cobbles.

The A11 horizon has value of 4 to 6 when dry and 3 or 4 when moist, and it has chroma of 2 to 4. The A12 horizon has value of 4 to 6 when dry and 3 to 5 when moist, and it has chroma of 4 or 5.

The C horizon has hue of 5YR to 10YR, value of 6 to 8 when dry and 4 to 7 when moist, and chroma of 2 to 6. Texture of the fine earth fraction is sandy loam or loam.

Arch series

The soils in the Arch series are classified as Ustochreptic Calciorthids, fine-loamy, mixed, thermic. These very deep, well drained soils formed in sediment derived from mixed sources. The soils are on uplands. Slope is 1 to 8 percent. Elevation is 4,000 to 4,700 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 57 to 61 degrees F, and the frost-free period is 180 to 200 days.

Typical pedon of an Arch sandy loam in an area of Blakeney-Arch association, moderately undulating, about 15 miles east of Arabela; in the NW1/4 of sec. 13, T. 8 S., R. 20 E.; 165 yards northwest of steel tank.

A1—0 to 8 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak thin platy structure in the upper part and weak fine subangular blocky structure parting to weak fine granular in the lower part; soft, very friable, nonsticky and nonplastic; common very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

B2ca—8 to 18 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few filaments and threads of calcium carbonate; violently effervescent; moderately alkaline; clear smooth boundary.

C1ca—18 to 39 inches; white (10YR 8/1) loam, very pale brown (10YR 7/3) moist; massive; soft, very friable, slightly sticky and nonplastic; few very fine roots; many hard fine and medium nodules of calcium carbonate; violently effervescent; moderately alkaline; gradual smooth boundary.

C2ca—39 to 60 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many hard medium and large nodules of calcium carbonate; violently effervescent; moderately alkaline.

The calcic horizon is at a depth of 10 to 20 inches.

The A1 horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3.

The B2ca horizon has value of 6 or 7 when dry and 5 or 6 when moist, and it has chroma of 3 or 4. Texture is loam or light clay loam.

The C1ca horizon has value of 7 or 8 when dry and 6 or 7 when moist, and it has chroma of 1 to 3. Texture is loam or light clay loam. The C2ca horizon has hue of 7.5YR or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 to 4.

Asparas series

The soils in the Asparas series are classified as Aridic Argiustolls, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived mainly from limestone. The soils are on the floors and sides of valleys on piedmonts. Slope is 0 to 5 percent. Elevation is 4,500 to 6,900 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 57 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of an Asparas loam in an area of Darvey-Asparas association, gently sloping, about 23 miles north of Arabela; in the NE1/4 of sec. 28, T. 4 S., R. 17 E.; 1.5 miles west of ranch headquarters and 300 feet southwest of stock water pond.

A11—0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; very friable, slightly sticky and slightly plastic; many fine vertical roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

A12—2 to 7 inches; dark grayish brown (10YR 4/2) light clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; friable, sticky and plastic; many fine and very fine vertical roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

B21t—7 to 13 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium angular blocky structure; firm, sticky and plastic; common very fine vertical roots; common moderately thick clay films on faces of peds; strongly effervescent; moderately alkaline; gradual smooth boundary.

B22t—13 to 24 inches; brown (7.5YR 5/2) clay loam, brown (7.5YR 4/2) moist; weak medium angular blocky structure; firm, sticky and plastic; few very fine vertical roots; many moderately thick clay films on faces of peds; strongly effervescent; moderately alkaline; gradual smooth boundary.

B23tca—24 to 34 inches; brown (7.5YR 5/4) heavy loam, brown (7.5YR 4/4) moist; weak medium angular blocky structure; friable, slightly sticky and slightly plastic; few very fine vertical roots; few moderately thick clay films on faces of peds; common soft masses of calcium carbonate less than 1/4 inch in diameter; strongly effervescent; moderately alkaline; clear smooth boundary.

Cca—34 to 60 inches; light brown (7.5YR 6/4) heavy loam, brown (7.5YR 5/4) moist; massive; friable, slightly sticky and slightly plastic; many soft masses and threads of calcium carbonate; strongly effervescent; moderately alkaline.

The solum ranges from 25 to 40 inches in thickness. The mollic epipedon is 10 to 20 inches thick.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. This horizon is noneffervescent or slightly effervescent.

The B2t horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. The upper part of the horizon has value and chroma of 2 or 3 when moist. The horizon is loam or clay loam. Some pedons have concretions, threads, and soft masses of secondary calcium carbonate in the lower part of the horizon.

The Cca horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 5. Texture is loam, light clay loam, or silty clay loam. The calcium carbonate equivalent is 15 to 25 percent in some parts of this horizon.

Bernal series

The soils in the Bernal series are classified as Lithic Argiustolls, loamy, mixed, mesic. These shallow, well drained soils formed in material derived mainly from sandstone. The soils are on ridges and mesas. Slope is 3 to 15 percent. Elevation is 6,300 to 7,000 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of Bernal gravelly loam, 3 to 15 percent slopes; about 0.9 mile northeast of Capitan; in the SE1/4SE1/4 of sec. 3, T. 9 S., R. 14 E.; 300 feet north of ranch road.

A1—0 to 4 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium roots; 15 percent gravel; mildly alkaline; clear smooth boundary.

B2t—4 to 12 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common thin clay films on faces of peds; 15 percent gravel; mildly alkaline; clear smooth boundary.

B3—12 to 17 inches; brown (7.5YR 5/4) gravelly loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine roots; 20 percent gravel; mildly alkaline; abrupt smooth boundary.

R—17 inches; hard sandstone.

The solum ranges from 10 to 20 inches in thickness. Bedrock is at a depth of 10 to 20 inches. The profile is 5 to 25 percent gravel throughout.

The A1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 3 or 4 when dry or moist. Texture of the fine earth fraction is loam or clay loam.

Blakeney series

The soils in the Blakeney series are classified as Ustochreptic Paleorthids, loamy, mixed, thermic, shallow. These shallow, well drained soils formed in alluvium derived mainly from limestone. The soils are on uplands.

Slope is 0 to 5 percent. Elevation is 4,000 to 4,700 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 57 to 61 degrees F, and the frost-free period is 180 to 200 days.

Typical pedon of a Blakeney fine sandy loam in an area of Blakeney-Arch association, moderately undulating, about 12 miles northeast of Arabela; in the NW1/4 of sec. 25, T. 7 S, R. 19 E.; 100 feet south of New Mexico Route 48 at a point one-half mile east of ranch road to north.

A1—0 to 3 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; violently effervescent; moderately alkaline; abrupt smooth boundary.

B2—3 to 13 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; violently effervescent, moderately alkaline; abrupt wavy boundary.

Ccam—13 inches; white (10YR 8/2) indurated caliche.

The depth to the Ccam horizon ranges from 12 to 20 inches but is typically 12 to 15 inches. The solum is fine sandy loam or loam and is 10 to 18 percent clay throughout.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 or 3.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4.

Bluepoint series

The soils in the Bluepoint series are classified as Typic Torripsamments, mixed, thermic. These very deep, somewhat excessively drained soils formed in sediment derived mainly from sandstone. The soils are on dunes on piedmonts. Slope is 0 to 8 percent. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 8 to 11 inches. The average annual air temperature is 57 to 60 degrees F, and the frost-free period is 190 to 210 days.

Typical pedon of a Bluepoint loamy fine sand in an area of Onite-Bluepoint association, hummocky; about 6 miles south of Oscura; 1,000 feet north and 500 feet west of the southeast corner of sec. 35, T. 10 S., R. 8 E.

A1—0 to 4 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; weak medium granular structure; loose, very friable; few fine and medium roots; few very fine and fine pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—4 to 47 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; single grain; loose, very friable; few fine and very fine roots; few fine pores; violently effervescent; strongly alkaline; diffuse wavy boundary.

C2cs—47 to 60 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; single grain; loose, very friable; few fine threads of segregated gypsum; violently effervescent; strongly alkaline.

The solum ranges from 2 to 11 inches in thickness. The control section is 0 to 5 percent coarse fragments.

The A1 horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and 4 to 6 when moist, and chroma of 3 or 4.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 4 to 6. Texture is loamy fine sand or fine sand. Most pedons have few to common very fine to medium soft masses and concretions of gypsum at depth of more than 30 inches.

Clovis series

The soils in the Clovis series are classified as Ustollic Haplargids, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on piedmonts and valley sides. Slope is 0 to 5 percent. Elevation is 4,500 to 6,500 feet. The average annual precipitation is 12 to 16 inches. The average annual air temperature is 57 to 60 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Clovis loam in an area of Clovis-Pastura association, gently sloping; about one-half mile southeast of Ramon; in the NW1/4NE1/4 of sec. 13, T. 1 S., R. 19 E.

A1—0 to 2 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; weak fine platy structure and weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; mildly alkaline; abrupt smooth boundary.

B21t—2 to 7 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common very fine roots; common moderately thick clay films on faces of peds; mildly alkaline; clear smooth boundary.

B22t—7 to 12 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and plastic; common very fine roots; many moderately thick clay films on faces of peds; estimated 5 percent lime

coated gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

B23tca—12 to 16 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few thin clay films on faces of peds; estimated 5 percent lime coated gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—16 to 25 inches; pink (7.5YR 8/4) light clay loam, pink (7.5YR 7/4) moist; massive; hard, firm, sticky and slightly plastic; few very fine roots; 10 to 15 percent lime coated gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

C2ca—25 to 35 inches; pink (7.5YR 8/4) light clay loam, pink (7.5YR 7/4) moist; massive; hard, firm, sticky and slightly plastic; few very fine roots; estimated 5 percent lime coated gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

C3ca—35 to 60 inches; reddish yellow (7.5YR 8/6) clay loam, reddish yellow (7.5YR 7/6) moist; massive; hard, firm, sticky and plastic; strongly effervescent; moderately alkaline.

The solum ranges from 16 to 36 inches in thickness. The depth to the zone of maximum calcium carbonate accumulation is 16 to 36 inches. The A horizon and the upper part of the B horizon commonly are noneffervescent, but in a few pedons they are slightly effervescent.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 3 or 4. Texture is fine sandy loam or loam.

The B2t horizon has hue of 5YR or 7.5YR, and it has value of 4 to 6 when dry and 3 or 4 when moist. It is sandy clay loam or clay loam.

The Cca horizon has value of 6 to 8 and chroma of 3 to 6. Texture is loam or clay loam. The calcium carbonate equivalent ranges from 20 to 60 percent.

Cumulic Haplustolls

Cumulic Haplustolls are deep, well drained soils that formed in alluvium derived mainly from mixed sources. The soils are on valley floors. Slope is 0 to 8 percent. Elevation is 6,300 to 7,100 feet. The average annual precipitation is 16 to 24 inches. The average annual air temperature is 45 to 54 degrees F, and the frost-free period is 100 to 140 days.

Reference pedon of a Cumulic Haplustoll in an area of Cumulic Haplustolls, gently sloping; about 2 miles east of Angus and 100 feet north of the Rio Bonito; in the NE1/4NW1/4 of sec. 13, T. 10 S., R. 13 E.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable; many very fine and fine roots; 20 percent gravel; mildly alkaline; clear smooth boundary.

B2—6 to 28 inches; dark grayish brown (10YR 4/2) very gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable; many very fine and fine roots; 40 percent gravel; mildly alkaline; clear wavy boundary.

C1—28 to 45 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark brown (10YR 3/3) moist; massive; soft, friable; common very fine and fine roots; 50 percent gravel and 5 percent cobbles; mildly alkaline; gradual wavy boundary.

C2—45 to 60 inches; brown (10YR 5/3) extremely gravelly sandy loam, brown (10YR 4/3) moist; massive; soft, very friable; common very fine and fine roots; 50 percent gravel and 20 percent cobbles; mildly alkaline.

Rock fragment content ranges from 0 to 85 percent throughout the profile. The profile is neutral to moderately alkaline. It is commonly stratified. The upper part of the profile has hue of 7.5YR, 10YR, or 2.5Y, value of 3 to 5 when dry and 1 to 3 when moist, and chroma of 2 to 5 when dry and 1 to 3 when moist.

Darvey series

The soils in the Darvey series are classified as Ustollic Calciorthids, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived mainly from limestone. The soils are on piedmonts and valley sides. Slope is 0 to 5 percent. Elevation is 4,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 57 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Darvey loam in an area of Darvey-Asparas association, gently sloping, about 18 miles north of Arabela; in the SE1/4NE1/4 of sec. 29, T. 5 S., R. 17 E.; 1.4 miles southeast of ranch headquarters; 20 feet south of dirt road.

A1—0 to 6 inches; dark brown (10YR 4/3) heavy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, sticky and slightly plastic; many fine random roots and few very fine random roots; strongly effervescent; moderately alkaline; clear smooth boundary.

B21ca—6 to 20 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine random roots; few soft pockets of calcium carbonate less than 1 inch in diameter; strongly effervescent; moderately alkaline; gradual smooth boundary.

B22ca—20 to 31 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; moderate medium

subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine random roots; few soft pockets of calcium carbonate less than 1 inch in diameter; strongly effervescent; moderately alkaline; clear irregular boundary.

C1ca—31 to 38 inches; pink (7.5YR 7/4) heavy loam, light brown (7.5YR 6/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common very fine random roots; many soft pockets of calcium carbonate 4 to 10 inches in diameter; strongly effervescent; moderately alkaline; gradual irregular boundary.

C2ca—38 to 60 inches; light brown (7.5YR 6/4) heavy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic; common soft masses of calcium carbonate; strongly effervescent; moderately alkaline.

The calcic horizon is at a depth of 24 to 32 inches. The part of the profile above the Cca horizon ranges from slightly effervescent to strongly effervescent.

The A1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 or 3. Texture is fine sandy loam or loam.

The B2 horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. Texture is loam or light clay loam. In some pedons the B2 horizon has soft masses of lime.

The Cca horizon has value of 6 to 8 when dry and 5 to 8 when moist. Texture is loam, clay loam, or silty clay loam. Calcium carbonate equivalent is 15 to 50 percent.

Deacon series

The soils in the Deacon series are classified as Aridic Haplustolls, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived mainly from sedimentary rock. The soils are on uplands. Slope is 0 to 8 percent. Elevation is 5,700 to 7,000 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of Deacon loam, 0 to 8 percent slopes; about 1 mile south of Capitan; 300 feet south and 1,000 feet west of the northeast corner of sec. 16, T. 9 S., R. 14 E.

A11—0 to 4 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

A12—4 to 10 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, friable, nonsticky and nonplastic; common fine and very fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

B2—10 to 25 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; few fine and common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Cca—25 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak fine granular structure; loose, very friable, nonsticky and nonplastic; few fine and very fine roots; strongly effervescent; moderately alkaline.

The solum ranges from 20 to 35 inches in thickness.

The A1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry, and chroma of 2 or 3.

The B2 horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. Texture is loam or clay loam.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y.

Deama series

The soils in the Deama series are classified as Lithic Calciustolls, loamy-skeletal, carbonatic, mesic. These very shallow and shallow, well drained soils formed in material derived mainly from limestone. The soils are on hills and mesas. Slope is 0 to 75 percent. Elevation is 4,500 to 6,500 feet. The average annual precipitation is 12 to 16 inches. The average annual air temperature is 45 to 57 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of Deama very cobbly loam, moderately sloping, about 11 miles northeast of Arabela; in the NE1/4NE1/4 of sec. 2, T. 7 S., R. 19 E.; 5 miles north of Pine Lodge road on dirt road leading to ranch headquarters.

A1—0 to 7 inches; brown (10YR 4/3) very cobbly loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium, fine, and very fine roots; 45 percent gravel, cobbles, and stones; undersides of rock fragments have coatings of secondary calcium carbonate as much as 1/4 inch thick; strongly effervescent; moderately alkaline; abrupt irregular boundary.

R—7 inches; limestone with coatings of calcium carbonate as much as 1/8 inch thick.

Limestone is at a depth of 7 to 20 inches. Rock fragment content ranges from 35 to 60 percent throughout the profile. In some pedons the bedrock has a coating of calcium carbonate as much as 1 inch thick.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The calcium carbonate equivalent is 40 to 60 percent.

Dioxice series

The soils in the Dioxice series are classified as Aridic Calciustolls, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on valley sides and in slightly depressional areas. Slope is 0 to 5 percent. Elevation is 5,000 to 7,000 feet. The average annual precipitation is 12 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 190 days.

Typical pedon of a Dioxice loam in an area of Plack-Dioxice association, gently sloping, about 11 miles northwest of Ancho; 0.25 mile south of the northwest corner of sec. 6, T. 3 S., R. 11 E.; 50 feet east of section line fence.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure and moderate fine granular; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; moderately alkaline; clear smooth boundary.

A12—3 to 8 inches; dark grayish brown (10YR 4/2) heavy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

B21—8 to 17 inches; grayish brown (10YR 5/2) light clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few thin clay skins in pores; violently effervescent; strongly alkaline; clear smooth boundary.

B22—17 to 22 inches; brown (10YR 5/3) light clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few thin clay skins in pores; violently effervescent; moderately alkaline; gradual smooth boundary.

B3ca—22 to 27 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

C1ca—27 to 42 inches; pink (7.5YR 8/4) loam, light brown (7.5YR 6/4) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; violently effervescent; strongly alkaline; clear wavy boundary.

C2ca—42 to 60 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; violently effervescent; moderately alkaline.

The solum ranges from 24 to 40 inches in thickness. The profile is 0 to 15 percent rock fragments throughout. The calcic horizon is at a depth of 20 to 30 inches.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 2 or 3.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. Texture is loam, clay loam, or sandy clay loam.

The Cca horizon has hue of 7.5YR or 10YR, value of 5 to 8 when dry and 4 to 8 when moist, and chroma of 2 to 4. Texture is clay loam, loam, or gravelly loam. The calcium carbonate equivalent is 15 to 50 percent.

Docdee series

The soils in the Docdee series are classified as Lithic Haplustolls, loamy-skeletal, mixed, mesic. These very shallow and shallow, well drained soils formed in material derived mainly from andesite and sandstone. The soils are on ridgetops and mountainsides. Slope is 8 to 75 percent. Elevation is 7,000 to 7,500 feet. The average annual precipitation is 18 to 24 inches. The average annual air temperature is 45 to 52 degrees F, and the frost-free period is 100 to 140 days.

Typical pedon of a Docdee very cobbly loam in an area of Monjeau-Docdee complex, 30 to 75 percent slopes, in Ruidoso; along Starlite Drive, in the NW1/4SW1/4 of sec. 22, T. 11 S., R. 13 E.

O1—1 inch to 0; partially decomposed pine needles.

A11—0 to 6 inches; grayish brown (10YR 5/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable; few coarse roots and many very fine, fine, and medium roots; 20 percent gravel, 20 percent cobbles, and 5 percent stones; neutral; clear smooth boundary.

A12—6 to 10 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, friable; few coarse roots and many very fine, fine, and medium roots; 20 percent gravel, 30 percent cobbles, and 5 percent stones; neutral; abrupt smooth boundary.

R—10 inches; sandstone.

Depth to bedrock and the thickness of the solum range from 5 to 20 inches. Rock fragment content ranges from 35 to 60 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 1 to 3.

Ector series

The soils in the Ector series are classified as Lithic Calciustolls, loamy-skeletal, carbonatic, thermic. These very shallow and shallow, well drained soils formed in material derived mainly from limestone. The soils are on hills. Slope is 1 to 50 percent. Elevation is 3,800 to 4,500 feet. The average annual precipitation is 11 to 14 inches. The average annual air temperature is 57 to 61 degrees F, and the frost-free period is 180 to 200 days.

Typical pedon of an Ector cobbly loam in an area of Ector-Rock outcrop association, moderately steep, about 12 miles south of Sunset; in the SW1/4NE1/4 of sec. 29, T. 13 S., R. 19 E.; 1 mile south of ranch headquarters and 150 feet northeast of dirt road.

A11—0 to 2 inches; dark brown (10YR 4/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; 40 percent gravel and cobbles coated with calcium carbonate on the undersides; strongly effervescent; moderately alkaline; clear smooth boundary.

A12—2 to 7 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; few fine and common very fine roots; 45 percent gravel and cobbles coated with calcium carbonate on the undersides; strongly effervescent; moderately alkaline; abrupt irregular boundary.

R—7 inches; limestone with calcium carbonate coatings as much as 1/16 inch thick.

Limestone is at a depth of 4 to 20 inches. The profile is 40 to 60 percent rock fragments throughout. In some pedons the limestone has coatings of calcium carbonate as much as 1/4 inch thick.

The A1 horizon has hue of 7.5YR or 10YR, and it has value of 4 or 5 when dry and 2 or 3 when moist. The calcium carbonate equivalent is 40 to 60 percent.

Gabaldon series

The soils in the Gabaldon series are classified as Cumulic Haplustolls, fine-silty, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on valley floors and stream terraces. Slope is 0 to 3 percent. Elevation is 4,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Gabaldon silt loam in an area of Gabaldon-Riverwash association, nearly level, about 1.5 miles east of Lincoln; in the NE1/4 of sec. 33, T. 9 S., R. 16 E.; 750 feet northeast of Lincoln Cemetery.

A11—0 to 8 inches; brown (7.5YR 4/4) silt loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure and weak fine granular; slightly hard, friable, sticky and slightly plastic; strongly effervescent; moderately alkaline; abrupt smooth boundary.

A12—8 to 21 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure and moderate medium granular; slightly hard, friable, sticky and slightly plastic; strongly effervescent; moderately alkaline; gradual smooth boundary.

B2—21 to 54 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; strongly effervescent; moderately alkaline; diffuse smooth boundary.

Cca—54 to 60 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, sticky and slightly plastic; few fine seams of calcium carbonate; strongly effervescent; moderately alkaline.

The solum ranges from 4 to 60 inches in thickness. The profile ranges from slightly effervescent to violently effervescent.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 to 4 when dry and 2 or 3 when moist.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. Texture is loam, silt loam, silty clay loam, or clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 to 6. Texture is loam, silt loam, silty clay loam, or clay loam.

Gavilan series

The soils in the Gavilan series are classified as Udic Argiustolls, clayey-skeletal, mixed, mesic. These very deep, well drained soils formed in old gravelly alluvium. The soils are on mesas and alluvial terraces. Slope is 0 to 50 percent. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 18 to 24 inches. The average annual air temperature is 45 to 52 degrees F, and the frost-free period is 100 to 145 days.

Typical pedon of Gavilan loam, 0 to 8 percent slopes, about 5 miles north of Ruidoso; 130 yards south of High

Mesa Road and 120 yards east of section line fence, in the SW1/4NW1/4 of sec. 36, T. 10 S., R. 13 E.

A1—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine granular; very hard, very friable, nonsticky and slightly plastic; many fine and very fine roots; 5 percent gravel; neutral; gradual smooth boundary.

B1t—8 to 16 inches; brown (10YR 4/3) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; extremely hard, friable, slightly sticky and slightly plastic; many medium roots and common fine and very fine roots; common thin clay films on faces of peds and in pores; 15 percent gravel; neutral; clear smooth boundary.

B21t—16 to 23 inches; reddish brown (5YR 5/4) very gravelly clay, reddish brown (5YR 4/4) moist; strong medium subangular blocky structure; extremely hard, firm, very sticky and very plastic; common medium, fine, and very fine roots; continuous moderately thick clay films on faces of peds; 45 percent gravel; mildly alkaline; clear wavy boundary.

B22t—23 to 43 inches; yellowish red (5YR 5/6) very gravelly clay, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; extremely hard, firm, very sticky and very plastic; few fine and medium roots; continuous moderately thick clay films on faces of peds; few medium rounded carbonate concretions; 50 percent gravel and 5 percent cobbles; mildly alkaline; abrupt wavy boundary.

Cca—43 to 60 inches; pinkish gray (5YR 7/2) extremely gravelly clay loam, reddish yellow (7.5YR 7/6) moist; massive; very hard, friable, nonsticky and nonplastic; few fine roots; 60 percent gravel, 10 percent cobbles, 5 percent stones; weakly cemented with carbonates; violently effervescent; moderately alkaline.

The solum ranges from 40 to 60 inches in thickness. Soft, powdery lime is at a depth of more than 30 inches. The profile is neutral to moderately alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture is loam, gravelly loam, or very gravelly loam.

The B1t horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 4 or 6. Texture of the fine earth fraction is clay or clay loam.

The C horizon has hue of 5YR or 7.5YR, value of 6 or 7 when dry and 5 to 7 when moist, and chroma of 2 to 6. Texture of the fine earth fraction is clay or clay loam.

Harvey series

The soils in the Harvey series are classified as Ustollic Calciorthids, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived mainly from limestone. The soils are on piedmonts, valley sides, and ridges. Slope is 0 to 5 percent. Elevation is 4,600 to 6,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 57 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Harvey loam in an area of Harvey-Darvey association, loam surface, gently sloping; about 14 miles north of Carrizozo and 1/2 mile west of Red Lake; in the NW1/4NW1/4 of sec. 27, T. 5 S., R. 10 E.

A1—0 to 6 inches; brown (7.5YR 5/2) loam, brown (7.5YR 4/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine and fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

B2—6 to 12 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

C1ca—12 to 17 inches; pinkish gray (7.5YR 7/2) clay loam, light brown (7.5YR 6/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; violently effervescent; moderately alkaline; gradual smooth boundary.

C2ca—17 to 34 inches; pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; violently effervescent; moderately alkaline; gradual smooth boundary.

C3—34 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; massive; hard, friable, nonsticky and nonplastic; few very fine and fine roots; violently effervescent; moderately alkaline.

The calcic horizon is at a depth of 8 to 20 inches.

The A1 horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is fine sandy loam, sandy loam, or loam.

The B horizon, where present, has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 2 to 4. Texture is loam or clay loam.

The Cca horizon has value of 6 to 8 when dry and 5 to 7 when moist. Texture is loam or clay loam. The calcium carbonate equivalent ranges from 19 to 35 percent in the upper part of the horizon.

Hightower series

The soils in the Hightower series are classified as Torriorthentic Haplustolls, fine-loamy, mixed, mesic. These moderately deep, well drained soils formed in residuum and local alluvium derived mainly from andesite, shale, and sandstone. The soils are on uplands and in swales. Slope is 3 to 30 percent. Elevation is 6,300 to 7,500 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of a Hightower loam in an area of Hightower-Oro Grande complex, 3 to 8 percent slopes; about 3 miles north of Angus; 20 feet west of ranch road and 350 feet south of dirt road intersection; in the SW1/4SW1/4 of sec. 34, T. 9 S., R. 14 E.

A11—0 to 3 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure parting to strong very fine granular; soft, very friable, nonsticky and slightly plastic; many fine and very fine roots; 2 percent gravel; moderately alkaline; clear smooth boundary.

A12—3 to 15 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; 2 percent gravel; strongly effervescent; moderately alkaline; many wormcasts; clear smooth boundary.

B2—15 to 25 inches; brown (10YR 5/3) clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; 2 percent gravel; violently effervescent; moderately alkaline; common wormcasts; abrupt smooth boundary.

R—25 inches; andesite.

The solum ranges from 13 to 40 inches in thickness. The depth to bedrock ranges from 20 to 40 inches. The profile is mildly alkaline or moderately alkaline throughout. The control section is 0 to 30 percent rock fragments.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry, and chroma of 2 or 3 when dry or moist.

The B horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 3 or 4 when dry and 2 to 4 when moist. Texture is loam, clay loam, gravelly loam, or gravelly clay loam.

The C horizon, where present, has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6 when dry or moist, and chroma of 3 to 6 when dry or moist. Texture is loam, clay loam, gravelly loam, or gravelly clay loam.

Hightower Variant

The soils in the Hightower Variant are classified as Aridic Ustochrepts, fine-loamy, mixed, mesic. These moderately deep, well drained soils formed in residuum derived mainly from sandstone. The soils are on the tops and sides of ridges. Slope is 3 to 8 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of Hightower Variant sandy loam, 3 to 8 percent slopes, about 5 miles east of Capitan; 520 feet north and 750 feet east of the southwest corner of sec. 17, T. 9 S., R. 15 E.

A11—0 to 2 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; mildly alkaline; clear smooth boundary.

A12—2 to 6 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and fine roots; strongly effervescent; gradual smooth boundary.

B2—6 to 12 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; few thin patchy clay films on faces of peds; strongly effervescent; mildly alkaline; gradual wavy boundary.

B3—12 to 18 inches; very pale brown (10YR 7/4) loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; violently effervescent; mildly alkaline; gradual wavy boundary.

C1—18 to 26 inches; very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; violently effervescent; moderately alkaline; abrupt wavy boundary.

Cr—26 to 45 inches; pale yellow (2.5Y 8/4) loam, pale yellow (2.5Y 7/4) moist; weathered sandstone and shale.

The solum ranges from 8 to 27 inches in thickness. The depth to paralithic contact ranges from 20 to 40 inches. Content of coarse fragments commonly is less than 15 percent throughout the profile.

The A horizon has value of 5 or 6 when dry and 3 or 4 when moist, and it has chroma of 3 or 4.

The B horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 3 to 6. Texture is loam or sandy loam.

The C1 horizon, where present, has hue of 7.5YR or 10YR, value of 6 or 7 when dry and 4 to 6 when moist, and chroma of 4 to 6. Some pedons have a thin Cca horizon.

The bedrock commonly is light gray or pale yellow.

Hogadero series

The soils in the Hogadero series are classified as Aridic Calciustolls, loamy-skeletal, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on remnants of valley floors. Slope is 1 to 8 percent. Elevation is 4,800 to 7,000 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 57 to 61 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Hogadero loam in an area of Hogadero-Pena association, moderately undulating, about 32 miles northeast of Capitan; at the northwest corner of sec. 22, T. 6 S., R. 19 E.; 4 miles southeast of ranch headquarters.

A11—0 to 4 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; estimated 5 percent gravel and cobbles; neutral; clear smooth boundary.

A12—4 to 8 inches; brown (10YR 4/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure and moderate medium granular; slightly hard, friable, sticky and plastic; common fine roots and many very fine roots; estimated 35 percent rounded gravel and cobbles; slightly effervescent; moderately alkaline; clear smooth boundary.

A13—8 to 11 inches; brown (10YR 4/3) heavy gravelly loam, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard, friable, sticky and plastic; many very fine and fine horizontal roots; 35 percent rounded gravel and cobbles; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C1ca—11 to 15 inches; white (10YR 8/1) gravelly loam, very pale brown (10YR 7/3) moist; massive; extremely hard, firm, slightly sticky and slightly plastic; few fine vertical roots in cracks; strongly cemented with lime when dry; 15 percent rounded gravel and cobbles that are thickly coated with lime; strongly effervescent; moderately alkaline; clear smooth boundary.

C2ca—15 to 30 inches; light gray (2.5Y 7/2) very gravelly loam, light gray (10YR 7/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; 55 percent rounded gravel and cobbles that are thickly coated with lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3ca—30 to 60 inches; pale yellow (2.5Y 7/4) extremely gravelly loam, brown (10YR 5/3) moist; massive; slightly sticky and slightly plastic; few fine vertical roots; 65 percent rounded gravel and cobbles that are thickly coated with lime; strongly effervescent; moderately alkaline.

The calcic horizon is at a depth of 10 to 20 inches.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 2 or 3. Texture is loam or gravelly loam. Gravel content ranges from 5 to 35 percent. This horizon ranges from noneffervescent to strongly effervescent.

The C1 horizon has hue of 10YR or 2.5Y, value of 7 or 8, and chroma of 1 to 3. Texture of the fine earth fraction is sandy loam or loam. Content of gravel ranges from 10 to 35 percent. This cemented horizon has a hardness of less than 3 on Mohs scale. The C2 and C3 horizons have hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2 to 4. Texture of the fine earth fraction is sandy loam or loam. Content of gravel ranges from 35 to 65 percent. The calcium carbonate equivalent is more than 15 percent throughout the C horizon.

Kimbrough series

The soils in the Kimbrough series are classified as Petrocalcic Calciustolls, loamy, mixed, thermic, shallow. These very shallow and shallow, well drained soils formed in alluvium derived mainly from limestone. The soils are on uplands. Slope is 0 to 5 percent. Elevation is 4,000 to 4,500 feet. The average annual precipitation is 11 to 14 inches. The average annual air temperature is 57 to 61 degrees F, and the frost-free period is 180 to 200 days.

Typical pedon of a Kimbrough gravelly loam in an area of Ector-Kimbrough association, gently sloping, about 10 miles southeast of Riverside; in the SW1/4SW1/4 of sec. 11, T. 12 S., R. 20 E.; 275 feet west along a ranch road.

A11—0 to 3 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to common fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine horizontal roots; 15 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

A12—3 to 8 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; slightly hard, very friable, slightly sticky and slightly plastic; 25 percent angular caliche fragments; common very fine horizontal roots; strongly

effervescent; moderately alkaline; abrupt smooth boundary.
Ccam—8 inches; white (10YR 8/2) indurated caliche with a hard laminar surface crust about 1/16 inch thick.

Small gravel in the form of desert pavement are concentrated on the surface of some pedons. The depth to the petrocalcic horizon ranges from 4 to 20 inches. Gravel content ranges from 5 to 35 percent throughout the profile. The control section is loam or gravelly loam.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 to 4.

The Ccam horizon ranges from fractured to continuously indurated and has a hard laminar upper crust ranging from 1/16 to 1 inch in thickness.

Lithic Argiustolls

Lithic Argiustolls are very shallow and shallow, well drained soils that formed in material derived mainly from igneous rock. The soils are on uplands. Slope is 30 to 80 percent. Elevation is 6,000 to 7,200 feet. The average annual precipitation is 8 to 11 inches. The average annual air temperature is 59 degrees F, and the frost-free period is 190 to 210 days.

Typical pedon of Lithic Argiustolls in an area of Lithic Argiustolls-Rock outcrop association, extremely steep; about 6 miles south of Carrizozo; 2,500 feet west and 450 feet south of the northeast corner of sec. 3, T. 9 S., R. 10 E.

A1—0 to 2 inches; brown (10YR 5/3) extremely cobbly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; 45 percent cobbles and 25 percent gravel; slightly effervescent; mildly alkaline; clear smooth boundary.
B21t—2 to 11 inches; brown (10YR 5/3) extremely cobbly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common moderately thick clay films on faces of peds; 45 percent cobbles and 20 percent gravel; slightly effervescent; mildly alkaline; clear wavy boundary.
B22t—11 to 17 inches; pale brown (10YR 6/3) extremely cobbly loam, brown (10YR 4/3) moist; weak moderate subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few thin clay films on faces of peds; 50 percent cobbles and 20 percent gravel; slightly effervescent; mildly alkaline; abrupt wavy boundary.
R—17 inches; igneous rock.

Depth to bedrock ranges from 7 to 20 inches. The control section is 45 to 70 percent rock fragments.

The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3.

The B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 3 or 4. Texture of the fine earth fraction is loam, clay loam, or silt loam.

Some pedons have a thin C horizon.

Lozier series

The soils in the Lozier series are classified as Lithic Calciorthids, loamy-skeletal, carbonatic, thermic. These very shallow and shallow, well drained soils formed in eolian sand and in material derived mainly from limestone. The soils are on hills. Slope is 15 to 75 percent. Elevation is 4,800 to 6,000 feet. The average annual precipitation is 8 to 11 inches. The average annual air temperature is 57 to 60 degrees F, and the frost-free period is 190 to 210 days.

Typical pedon of Lozier very gravelly loam, very steep, about 12 miles northwest of Carrizozo; in the NE1/4 of sec. 6, T. 7 S., R. 9 E., 40 feet west of ranch road.

A11—0 to 5 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; 60 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.
A12—5 to 13 inches; pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; 60 percent gravel and 5 percent cobbles; violently effervescent; moderately alkaline; abrupt smooth boundary.
R—13 inches; limestone.

Limestone is at a depth of 4 to 16 inches. Content of rock fragments in the profile ranges from 35 to 80 percent, of which 15 to 60 percent is gravel, 0 to 40 percent is cobbles, and 2 to 20 percent is stones.

The A horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 5 when dry or moist.

Malargo series

The soils in the Malargo series are classified as Typic Gypsiorthids, fine-loamy, gypsic, thermic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are in swales and interdunal areas on piedmonts. Slope is 0 to 8 percent. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 8 to 11 inches. The average annual air temperature is 57 to 60 degrees F, and the frost-free period is 190 to 210 days.

Typical pedon of a Malargo loam in an area of Malargo-Bluepoint association, hummocky, about 1 mile south of Oscura; 2,000 feet south and 500 feet east of the northwest corner of sec. 1, T. 10 S., R. 8 E.

A1—0 to 4 inches; light brown (7.5YR 6/4) loam, dark brown (7.5YR 4/4) moist; weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine pores; 5 percent gravel; violently effervescent; moderately alkaline; 30 percent desert pavement; clear smooth boundary.

B1cs—4 to 11 inches; pink (7.5YR 7/4) loam, brown (7.5YR 5/4) moist; weak very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine pores; few fine masses of gypsum; 2 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

B2cs—11 to 25 inches; light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4) moist; strong fine and very fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; 5 percent gravel; violently effervescent; few ped faces are coated with gypsum; moderately alkaline; clear smooth boundary.

C1cs—25 to 49 inches; reddish pink (5YR 7/6) loam, yellowish red (5YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine and fine pores; 3 percent gravel; strongly effervescent; many medium threads and filaments of gypsum; few spherical masses of strongly cemented gypsum; weakly cemented; moderately alkaline; gradual smooth boundary.

C2cs—49 to 61 inches; pink (7.5YR 8/4) fine sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; few very fine pores; 5 percent gravel; slightly effervescent; many medium threads and filaments of gypsum; strongly alkaline.

The gypsic horizon is at a depth of 7 to 25 inches. The control section is 0 to 15 percent rock fragments.

The A1 horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. Texture is loam or fine sandy loam.

The B horizon has hue of 5YR or 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 4 to 6. Texture is loam, silt loam, or fine sandy loam. This horizon is strongly effervescent or violently effervescent. It has concretions, soft masses, or threads of gypsum.

The C horizon has hue of 5YR to 10YR, value of 5 to 8, and chroma of 2 to 4. Texture is sandy loam, fine sandy loam, or loam. This horizon is slightly effervescent to violently effervescent. Gypsum is in the form of crystals. Sand and gravel are at a depth of 50 to 70 inches in most pedons.

Manzano series

The soils in the Manzano series are classified as Cumulic Haplustolls, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on the floors and sides of valleys. Slope is 0 to 3 percent. Elevation is 6,000 to 6,900 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of Manzano loam, 0 to 3 percent slopes, about 3 miles north of Angus; 20 feet west of road and 300 feet south of section line; in the NE1/4NW1/4 of sec. 34, T. 9 S., R. 14 E.

A11—0 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; weak signs of stratification; neutral; clear smooth boundary.

A12—7 to 24 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; many wormcasts; neutral; gradual smooth boundary.

B2—24 to 35 inches; brown (10YR 4/3) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; many wormcasts; mildly alkaline; gradual smooth boundary.

B3—35 to 48 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; weakly effervescent; mildly alkaline; clear smooth boundary.

C—48 to 60 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; weakly effervescent; stratified.

The solum ranges from 40 to 60 inches in thickness.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist. Texture is silty clay loam, silt loam, clay loam, or loam.

The C horizon has hue of 7.5YR or 10YR, and it has value and chroma of 3 or 4 when moist. Texture is loam, clay loam, or silty clay loam.

Mokiak series

The soils in the Mokiak series are classified as Aridic Argiustolls, loamy-skeletal, mixed, mesic. These moderately deep, well drained soils formed in material derived mainly from igneous rock. The soils are on mountainsides. Slope is 5 to 70 percent. Elevation is 5,700 to 7,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Mokiak stony loam in an area of Mokiak-Stroupe-Rock outcrop association, very steep, about 10 miles north of Ancho; 100 yards north of middle cattle guard on road to Tecolote Peak; in the SW1/4NE1/4 of sec. 4, T. 3 S., R. 12 E.

A1—0 to 9 inches; brown (7.5YR 4/2) stony loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots and few medium roots; 15 percent stones and 20 percent gravel; mildly alkaline; clear smooth boundary.

B21t—9 to 16 inches; brown (7.5YR 5/4) very gravelly clay loam, brown (7.5YR 4/4) moist; strong fine angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common thick clay films on faces of peds and in pores; 60 percent gravel; mildly alkaline; clear wavy boundary.

B22t—16 to 24 inches; brown (7.5YR 5/4) extremely gravelly clay loam, brown (7.5YR 4/4) moist; strong fine angular blocky structure; hard, friable, slightly sticky and slightly plastic; 80 percent gravel; few fine and medium roots; common thick clay films on faces of peds; mildly alkaline; clear wavy boundary.

R—24 inches; weathering acid igneous rock.

The solum ranges from 20 to 35 inches in thickness. The mollic epipedon ranges from 9 to 14 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. The profile is 35 to 80 percent rock fragments throughout.

The A1 and B1 horizons, where present, have hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 4 or 5.

Monjeau series

The soils in the Monjeau series are classified as Udic Argiustolls, fine, mixed, mesic. These moderately deep, well drained soils formed in material derived mainly from andesite, sandstone, siltstone, or shale. The soils are on ridgetops and mountainsides. Slope is 8 to 75 percent. Elevation is 7,000 to 7,500 feet. The average annual precipitation is 18 to 24 inches. The average annual air temperature is 45 to 52 degrees F, and the frost-free period is 100 to 140 days.

Typical pedon of a Monjeau loam in an area of Monjeau-Docdee complex, 30 to 75 percent slopes; about 1 mile west of Ruidoso; in the N1/2NE1/4 of sec. 29, T. 11 S., R. 13 E.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; slightly hard, very friable, slightly sticky and plastic; many very fine, few fine, and common medium roots; neutral; abrupt smooth boundary.

B21t—2 to 8 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium and fine angular blocky structure; hard, very friable, very sticky and very plastic; many very fine and medium roots; common thin clay films on faces of peds and lining pores; neutral; abrupt wavy boundary.

B22t—8 to 16 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; moderate coarse angular blocky structure parting to moderate medium angular blocky; hard, friable, very sticky and very plastic; common fine and medium roots; many thin clay films on faces of peds and lining pores; neutral; clear wavy boundary.

C1—16 to 32 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; rock structure; hard, very friable, very sticky and very plastic; common fine and medium roots; neutral; gradual wavy boundary.

C2r—32 to 60 inches; partially weathered andesite.

The solum ranges from 10 to 20 inches in thickness. Paralithic contact is at a depth of 20 to 40 inches.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 1 to 3 when dry and 1 or 2 when moist. The horizon is neutral or mildly alkaline.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 2 to 5 when moist, and chroma of 2 to 6 when dry or moist. Texture is clay loam or clay. The horizon is slightly acid or neutral.

The C1 horizon has hue of 7.5YR or 10YR, value of 5 to 8 when dry and 4 to 7 when moist, and chroma of 1 to 8 when dry or moist.

Nogal series

The soils in the Nogal series are classified as Typic Haplustalfs, fine, mixed, mesic. These moderately deep, well drained soils formed in material derived mainly from shale. The soils are on uplands. Slope is 8 to 30 percent. Elevation is 6,000 to 7,500 feet. The average annual precipitation is 14 to 18 inches. The average

annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of a Nogal very cobbly sandy clay loam in an area of Nogal-Rock outcrop complex, moderately steep, about 2 miles southwest of Capitan; 700 feet east and 200 feet south of northwest corner of the SW1/4 of sec. 18, T. 9 S., R. 14 E.

A1—0 to 2 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark brown (10YR 3/3) moist; strong very fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine and very fine roots; 35 percent cobbles and 25 percent gravel; mildly alkaline; abrupt smooth boundary.

B21t—2 to 6 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong fine subangular blocky structure; hard, friable, very sticky and very plastic; many very fine, fine, and medium roots; many moderately thick clay films on faces of peds and in pores; 10 percent gravel; mildly alkaline; clear smooth boundary.

B22t—6 to 14 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 5/6) moist; strong medium subangular blocky structure; very hard, firm, sticky and very plastic; many medium and few coarse and fine roots; continuous thick clay films on faces of peds; mildly alkaline; gradual smooth boundary.

B23t—14 to 22 inches; brownish yellow (10YR 6/6) clay, yellowish brown (10YR 5/6) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; common medium and coarse and few fine roots; continuous thick clay films on faces of peds; mildly alkaline; gradual smooth boundary.

B3tca—22 to 31 inches; yellow (10YR 7/6) clay, yellowish brown (10YR 5/6) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few medium and coarse roots; many moderately thick clay films on faces of peds; common medium rounded soft masses of carbonates; weakly effervescent; moderately alkaline; abrupt smooth boundary.

C1—31 to 40 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few medium roots; 10 percent shale gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C2r—40 inches; gray and yellowish brown gypsiferous shale.

The solum ranges from 16 to 40 inches in thickness. Paralithic contact is at a depth of 20 to 40 inches. The profile is mildly alkaline or moderately alkaline throughout and has a calcium carbonate equivalent of 1 to 15 percent. The control section is 0 to 30 percent rock fragments.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry, and chroma of 2 or 3 when dry and 2 to 4 when moist. Texture is sandy clay loam or very cobbly sandy clay loam.

The B horizon has hue of 5YR, 10YR, 7.5YR, or 2.5Y, value of 3 to 7 when dry and 3 to 5 when moist, and chroma of 4 to 6 when dry and 3 to 6 when moist. Texture is clay, sandy clay, gravelly clay, or gravelly sandy clay.

The C horizon has a wide range of color.

Nolten series

The soils in the Nolten series are classified as Udic Argiustolls, fine, mixed, mesic. These moderately deep, well drained soils formed in material derived mainly from andesite, sandstone, siltstone, and shale. The soils are on uplands. Slope is 8 to 30 percent. Elevation is 7,000 to 7,500 feet. The average annual precipitation is 17 to 25 inches. The average annual air temperature is 45 to 52 degrees F, and the frost-free period is 100 to 140 days.

Typical pedon of Nolten loam, 15 to 30 percent slopes, about 1 mile west of Ruidoso; in the NW1/4 of sec. 29, T. 11 S., R. 13 E., at the end of Westbury Road.

O1—0 to 1 inch; partially decomposed pine needles.

A1—1 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; many fine and very fine roots; neutral; clear smooth boundary.

B1t—4 to 8 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong very fine and fine blocky structure; hard, friable, sticky and plastic; common fine and few medium roots; very few thin clay films on faces of peds; neutral; clear smooth boundary.

B21t—8 to 15 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong medium angular blocky structure parting to strong fine blocky; hard, friable, very sticky and very plastic; many fine and common very fine roots; many thin clay films on faces of peds and lining pores; common pressure faces; neutral; gradual smooth boundary.

B22t—15 to 21 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong coarse blocky structure; hard, firm, very sticky and very plastic; many medium and common fine roots; many thin clay films on faces of peds and lining pores; common pressure faces; neutral; diffuse smooth boundary.

C1—21 to 39 inches; brownish yellow (10YR 6/8) clay loam, yellowish brown (10YR 5/4) moist; rock structure; many fine, common medium, and few coarse roots; neutral; diffuse smooth boundary.

C2r—39 to 60 inches; very pale brown (10YR 8/4) partially weathered andesite; neutral.

The solum ranges from 20 to 40 inches in thickness. Paralithic contact is at a depth of 20 to 40 inches.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 1 to 3 when dry and 1 or 2 when moist. It is 0 to 15 percent rock fragments. This horizon is neutral or mildly alkaline.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 2 to 4 when moist, and chroma of 2 to 6 when dry and 2 or 4 when moist. Texture is clay loam or clay. This horizon is slightly acid or neutral.

The C horizon has hue of 7.5YR or 10YR, value of 6 to 8 when dry and 5 to 7 when moist, and chroma of 2 to 8 when dry or moist. Texture is clay loam or clay. The horizon is 0 to 10 percent rock fragments. It is slightly acid or neutral.

Onite series

The soils in the Onite series are classified as Typic Haplargids, coarse-loamy, mixed, thermic. These very deep, well drained soils formed in sediment derived from mixed sources. The soils are in interdunal areas on piedmonts. Slope is 1 to 8 percent. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 8 to 11 inches. The average annual air temperature is 57 to 60 degrees F, and the frost-free period is 190 to 210 days.

Typical pedon of an Onite loamy fine sand in an area of Onite-Bluepoint association, hummocky, about 6 miles south of Oscura; 2,200 feet north of the southwest corner of sec. 36, T. 10 S., R. 9 E.

A1—0 to 7 inches; reddish yellow (7.5YR 6/6) loamy fine sand, strong brown (7.5YR 4/6) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; few very fine pores; slightly effervescent; mildly alkaline; clear smooth boundary.

B21t—7 to 14 inches; reddish yellow (7.5YR 6/6) fine sandy loam, strong brown (7.5YR 4/6) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and nonplastic; few medium and very fine roots; few fine and medium pores; common thin clay films bridging sand grains; strongly effervescent; mildly alkaline; clear wavy boundary.

B22t—14 to 28 inches; reddish yellow (7.5YR 6/6) fine sandy loam, strong brown (7.5YR 4/6) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and nonplastic; few very fine roots; few fine pores; common thin clay films bridging sand grains; strongly effervescent; mildly alkaline; clear wavy boundary.

B23t—28 to 34 inches; reddish yellow (7.5YR 6/6) sandy loam, strong brown (7.5YR 4/6) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few fine and very fine roots; few fine pores; few thin clay films bridging sand grains; slightly effervescent; mildly alkaline; clear wavy boundary.

C—34 to 60 inches; reddish yellow (7.5YR 6/6) sandy loam, strong brown (7.5YR 4/6) moist; massive; soft, very friable, slightly sticky and nonplastic; few fine and very fine roots; few very fine pores; slightly effervescent; mildly alkaline.

Some pedons have a small amount of gypsum below a depth of 25 inches.

The A1 horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 4 to 6.

The B2t horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry, and chroma of 4 to 6. Texture is fine sandy loam or sandy loam.

The C horizon has hue of 5YR or 7.5YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 4 to 6.

Oro Grande series

The soils in the Oro Grande series are classified as Lithic Haplustolls, loamy-skeletal, mixed, mesic. These very shallow and shallow, well drained soils formed in material derived mainly from sandstone and acid igneous rock. The soils are on hills and ridges and in swales. Slope is 3 to 50 percent. Elevation is 6,300 to 7,500 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of Oro Grande very cobbly clay loam, moderately steep, about 2 miles northwest of Capitan; 200 feet east and 100 feet south of the northwest corner of the SW1/4NE1/4 of sec. 6, T. 9 S., R. 14 E.

A1—0 to 8 inches; dark grayish brown (10YR 4/3) very cobbly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, sticky and plastic; many very fine, fine, and medium roots; 25 percent gravel, 30 percent cobbles, and 5 percent stones; mildly alkaline; clear wavy boundary.

C—8 to 17 inches; yellowish brown (10YR 5/4) extremely cobbly clay loam, dark yellowish brown (10YR 4/4) moist; rock structure; slightly hard, friable, sticky and plastic; few fine and medium roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

R—17 inches; andesite.

The depth to bedrock ranges from 7 to 20 inches. The particle size control section is 35 to 80 percent gravel and cobbles.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture of the fine earth fraction is loam or clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 2 to 4 when moist, and chroma of 2 to 4. Texture of the fine earth fraction is loam or clay loam.

Paco series

The soils in the Paco series are classified as Udic Argiustolls, fine, mixed, mesic. These deep, well drained soils formed in residuum and local alluvium derived mainly from andesite. The soils are in upland valleys and on toe slopes. Slope is 3 to 30 percent. Elevation is 6,200 to 7,500 feet. The average annual precipitation is 17 to 25 inches. The average annual air temperature is 45 to 52 degrees F, and the frost-free period is 100 to 145 days.

Typical pedon of Paco loam, dry, 8 to 15 percent slopes, about 6 miles southwest of Capitan; in the NE1/4SE1/4 of sec. 29, T. 9 S., R. 13 E; about 340 feet north and 90 feet east of the southwest corner.

A1—0 to 7 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many fine and very fine roots; slightly acid; clear smooth boundary.

B1t—7 to 12 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium, fine, and very fine roots; common thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

B21t—12 to 27 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; few medium, fine, and very fine roots; many moderately thick clay films on faces of peds and in pores; neutral; gradual smooth boundary.

B22t—27 to 42 inches; strong brown (7.5YR 5/6) clay, strong brown (7.5YR 4/6) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, friable, very sticky and very plastic; few medium, fine, and very fine roots; continuous moderately thick clay films on faces of peds; mildly alkaline; clear wavy boundary.

B23t—42 to 49 inches; strong brown (7.5YR 5/6) clay, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, friable, very sticky and very plastic; few fine and very fine roots; continuous moderately thick clay films on faces of peds; mildly alkaline; clear wavy boundary.

Cr—49 inches; partially decomposed andesite.

The solum ranges from 40 to 60 inches in thickness. Paralithic contact is at a depth of 40 to 60 inches. The profile is slightly acid to moderately alkaline throughout.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist.

The B1t horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 to 4 when moist, and chroma of 2 to 4 when dry or moist. Texture is clay loam or clay.

The B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 3 to 6 when dry or moist. Texture of the fine earth fraction is clay loam or clay.

Pajara series

The soils in the Pajara series are classified as Calciorthidic Paleustolls, clayey-skeletal, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on dissected piedmonts. Slope is 5 to 15 percent. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Pajara extremely cobbly loam in an area of Pajara-Witt association, moderately sloping, about 13 miles southwest of Corona; in the SW1/4 of sec. 15, T. 2 S., R 11 E.; along Transwestern gas pipeline.

A1—0 to 4 inches; brown (7.5YR 4/2) extremely cobbly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; many fine and very fine roots; 35 percent cobbles and 35 percent gravel; slightly effervescent; mildly alkaline; clear smooth boundary.

B2t—4 to 14 inches; reddish brown (5YR 5/3) extremely cobbly sandy clay, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots; many thick clay films; 35 percent cobbles and 35 percent gravel; slightly effervescent; mildly alkaline; clear smooth boundary.

C1ca—14 to 17 inches; pinkish white (7.5YR 8/2) extremely cobbly loam, pinkish gray (7.5YR 6/2) moist; massive; weakly cemented; very hard, firm, nonsticky and nonplastic; few very fine roots; 35 percent cobbles and 35 percent gravel; violently effervescent; mildly alkaline; clear smooth boundary.

C2ca—17 to 32 inches; pinkish gray (7.5YR 7/2) extremely cobbly loam, pinkish gray (7.5YR 6/2) moist; massive; slightly hard, friable, slightly sticky and nonplastic; 35 percent cobbles and 35 percent gravel; violently effervescent; moderately alkaline; abrupt wavy boundary.

C3ca—32 to 60 inches; white (10YR 8/1) extremely cobbly loam, white (10YR 8/1) moist; massive; very hard, friable, nonsticky and nonplastic; 35 percent cobbles and 35 percent gravel; violently effervescent; strongly alkaline.

The solum ranges from 12 to 20 inches in thickness. The calcic horizon is at a depth of 12 to 20 inches. The A and B horizons are 40 to 75 percent rock fragments, and the C horizon is 10 to 70 percent.

The A1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. This horizon is noneffervescent or slightly effervescent.

The B2t horizon has value of 4 or 5 when dry, and it has chroma of 4 to 6. Texture of the fine earth fraction is sandy clay or clay.

The Cca horizon has hue of 7.5YR or 10YR, value of 7 or 8 when dry and 6 to 8 when moist, and chroma of 1 to 4.

Partri series

The soils in the Partri series are classified as Aridic Argiustolls, fine, mixed, mesic. These very deep, well drained soils formed in alluvium derived mainly from limestone. The soils are in valleys. Slope is 0 to 5 percent. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 50 to 57 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Partri loam in an area of Pastura-Partri association, gently sloping, about 28 miles southeast of Corona; 0.5 mile east and 210 feet north of the southwest corner of sec. 4, T. 2 S., R. 17 E.

A1—0 to 4 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak thin platy structure and weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; few very fine tubular pores; moderately alkaline; clear smooth boundary.

B21t—4 to 10 inches; brown (7.5YR 4/2) heavy clay loam, dark brown (7.5YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and slightly plastic; many very fine roots; few fine and very fine tubular pores; moderately alkaline; clear smooth boundary.

B22tca—10 to 18 inches; brown (7.5YR 4/4) heavy silty clay loam, dark brown (7.5YR 3/4) moist; strong coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common very fine roots; few very fine tubular pores; few round lime concretions; slightly effervescent; moderately alkaline; clear smooth boundary.

B3ca—18 to 22 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure and moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; few rounded lime concretions; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C1ca—22 to 31 inches; pink (7.5YR 8/4) light clay loam, light brown (7.5YR 6/4) moist; massive; very hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; many soft masses of lime and few small rounded lime concretions; strongly effervescent; moderately alkaline; clear wavy boundary.

C2ca—31 to 60 inches; pink (7.5YR 7/4) loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; many soft masses of lime and few small rounded lime concretions; strongly effervescent; moderately alkaline.

The solum ranges from 20 to 30 inches in thickness. The depth to the calcic horizon ranges from 20 to 30 inches. The mollic epipedon ranges from 8 to 16 inches in thickness.

The A1 horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 2 or 3 when moist. This horizon is noneffervescent in most pedons, but it is slightly effervescent in some pedons. Reaction is mildly alkaline or moderately alkaline.

The upper part of the B2t horizon has hue of 5YR, 7.5YR, or 10YR, and it has chroma of 2 or 3 when moist. The lower part of the B2t horizon has value of 3 to 5, and it has chroma of 2 to 4 when moist. It is clay loam, silty clay loam, or clay. The upper part of the B2t horizon is noneffervescent to moderately effervescent, and the lower part is moderately effervescent or strongly effervescent. Calcium carbonate is in the lower part of the B2t horizon in some pedons.

The Cca horizon has hue of 5YR to 10YR, value of 6 to 8, and chroma of 2 to 8. Texture is loam or light clay loam. The calcium carbonate equivalent is 15 to 40 percent in the upper part of the Cca horizon and typically decreases with depth. The calcium carbonate is in the form of concretions, soft masses, and threads.

Pastura series

The soils in the Pastura series are classified as Ustollic Paleorthids, loamy, mixed, mesic, shallow. These very shallow and shallow, well drained soils formed in alluvium derived mainly from limestone. The soils are on uplands. Slope is 0 to 15 percent. Elevation is 4,500 to 6,500 feet. The average annual precipitation is 12 to 17

inches. The average annual air temperature is 45 to 57 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of Pastura loam, gently sloping, about 2 miles southeast of Ramon; in the SE1/4SE1/4 of sec. 22, T. 1 S., R. 19 E.

A11—0 to 2 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

A12—2 to 7 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; 10 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

C1ca—7 to 13 inches; brown (7.5YR 5/4) gravelly clay loam, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; 30 percent gravel, most of which is coated with calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.

C2cam—13 inches; white (10YR 8/2) indurated caliche.

The depth to the petrocalcic horizon ranges from 5 to 20 inches but typically is 5 to 15 inches. The particle size control section is 5 to 35 percent gravel.

The A1 horizon has value of 4 or 5 when dry and 3 to 5 when moist. Texture of the fine earth fraction is sandy loam or loam.

The Cca horizon has value of 4 or 5 when dry and 4 to 6 when moist, and it has chroma of 2 to 4. The calcium carbonate equivalent ranges from 5 to 25 percent.

Patos series

The soils in the Patos series are classified as Typic Haplustalfs, clayey-skeletal, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on piedmonts. Slope is 1 to 50 percent. Elevation is 5,500 to 7,000 feet. The average annual precipitation is 12 to 18 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 160 to 180 days.

Typical pedon of Patos stony loam, gently sloping, about 8 miles east of Encinoso; in the SW1/4NW1/4 of sec. 26, T. 7 S., R. 16 E.; 200 feet east of road entering Lincoln National Forest and 50 feet north.

A1—0 to 4 inches; dark brown (7.5YR 4/2) stony loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; 20 percent stones; mildly alkaline; clear smooth boundary.

B1—4 to 7 inches; reddish brown (5YR 4/4) stony clay loam, reddish brown (5YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; 20 percent stones; mildly alkaline; clear smooth boundary.

B2t—7 to 30 inches; reddish brown (5YR 4/4) very stony clay, reddish brown (5YR 4/4) moist; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, friable, sticky and plastic; common fine and coarse roots; many thick clay films on ped faces; 25 percent stones and 15 percent cobbles; mildly alkaline; clear wavy boundary.

B3ca—30 to 40 inches; brown (7.5YR 5/4) extremely stony clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; common coarse and few fine roots; 70 percent stones; violently effervescent; common medium nodules of calcium carbonate and coatings of calcium carbonate on undersides of stones; moderately alkaline; clear wavy boundary.

Cca—40 to 63 inches; pink (7.5YR 8/4) extremely stony clay loam, pink (7.5YR 7/4) moist; massive; slightly hard, friable, sticky and nonplastic; few fine roots; 55 percent stones and 15 percent cobbles; violently effervescent; 15 to 30 percent calcium carbonate equivalent; moderately alkaline.

The solum is 20 to 40 inches thick. Depth to free carbonates ranges from 20 to 40 inches. The control section is 35 to 65 percent stones and cobbles.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. It is stony loam or bouldery loam.

The B1 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is 15 to 50 percent rock fragments.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is clay or clay loam and is 35 to 75 percent cobbles and stones. The Bca horizon has carbonates in the form of soft masses, nodules, or deposits on rock fragments.

The Cca horizon is calcic. It has hue of 5YR or 7.5YR, value of 6 to 8, and chroma of 1 to 4.

Pena series

The soils in the Pena series are classified as Aridic Calciustolls, loamy-skeletal, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on side slopes and remnants of valley floors. Slope is 0 to 30 percent. Elevation is 4,800 to 7,000 feet. The average annual precipitation is 12 to 18 inches. The average annual air

temperature is 45 to 56 degrees F, and the frost-free period is 130 to 190 days.

Typical pedon of a Pena gravelly loam in an area of Hogadero-Pena association, moderately undulating, about 17 miles north of Arabela; 0.35 mile southeast of gravel pit that is 1.4 miles south of ranch headquarters; in the SW1/4NW1/4 of sec. 32, T. 5 S., R. 17 E.

A11—0 to 7 inches; brown (10YR 5/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure and moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine random roots; 15 percent cobbles and water-rounded igneous gravel; strongly effervescent; moderately alkaline; gradual smooth boundary.

A12—7 to 14 inches; brown (10YR 5/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; many very fine and common fine random roots; 15 percent cobbles and water-rounded igneous gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—14 to 18 inches; white (10YR 8/1) gravelly loam, very pale brown (10YR 7/3) moist; massive; very hard, friable, sticky and plastic; common very fine random roots; estimated 20 percent cobbles and water-rounded igneous gravel; strongly effervescent; moderately alkaline; diffuse smooth boundary.

C2ca—18 to 29 inches; light gray (10YR 7/2) very gravelly loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable, sticky and plastic; common very fine random roots; estimated 45 percent cobbles and water-rounded igneous gravel; strongly effervescent; moderately alkaline; diffuse smooth boundary.

C3ca—29 to 60 inches; pink (7.5YR 7/4) very gravelly loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, sticky and plastic; common very fine random roots; estimated 45 percent cobbles and water-rounded igneous gravel; strongly effervescent; moderately alkaline.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3.

The Cca horizon has hue of 7.5YR or 10YR, value of 6 to 8 when dry and 5 to 8 when moist, and chroma of 1 to 4. Texture is gravelly loam or very gravelly loam with an average gravel content of 40 to 55 percent or is very cobbly loam or extremely cobbly loam with an average cobble content of 40 to 70 percent. The calcium carbonate equivalent ranges from 15 to 40 percent.

Penapon series

The soils in the Penapon series are classified as Typic Calciustolls, loamy-skeletal, mixed, mesic. These very deep, well drained soils formed in alluvium and colluvium derived mainly from limestone. The soils are on mountainsides and alluvial fans. Slope is 8 to 75 percent. Elevation is 6,000 to 7,500 feet. The average annual precipitaion is 18 to 24 inches. The average annual air temperature is 45 to 52 degrees F, and the frost-free period is 100 to 140 days.

Typical pedon of a Penapon very cobbly loam in an area of Penapon-Tortugas very cobbly loams, extremely steep, in Ruidoso; 200 feet east from end of Dipaolo Drive; in the SW1/4SW1/4 of sec. 25, T. 11 S., R. 13 E.

A1—0 to 11 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark brown (10YR 2/2) moist; strong fine granular structure; soft, very friable; many very fine, fine, medium, and coarse roots; many wormcasts; 30 percent cobbles, 20 percent gravel, and 5 percent stones; strongly effervescent; mildly alkaline; clear smooth boundary.

C1ca—11 to 21 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many wormcasts; 15 percent cobbles and 45 percent gravel; carbonate deposits on bottoms of rock fragments; violently effervescent; moderately alkaline; clear smooth boundary.

C2ca—21 to 48 inches; very pale brown (10YR 7/3) very gravelly loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many medium roots and few fine and very fine roots; 10 percent cobbles and 50 percent gravel; many fine and medium soft masses and nodules of lime; violently effervescent; moderately alkaline; clear smooth boundary.

C3ca—48 to 60 inches; very pale brown (10YR 7/4) extremely gravelly loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few medium, fine, and very fine roots; 10 percent cobbles and 60 percent gravel; many large soft masses and nodules of lime; violently effervescent; moderately alkaline.

The mollic epipedon ranges from 10 to 20 inches in thickness.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist. It is strongly effervescent to violently effervescent.

The C horizon has hue of 7.5YR or 10YR, value of 6 to 8 when dry and 4 to 7 when moist, and chroma of 2 to 4 when dry or moist. It is very gravelly to extremely

gravelly or cobbly to extremely cobbly loam or clay loam. The calcium carbonate equivalent is 15 to 40 percent.

Penistaja series

The soils in the Penistaja series are classified as Ustollic Haplargids, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived mainly from sandstone. The soils are on piedmonts and valley sides. Slope is 0 to 5 percent. Elevation is 5,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 57 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Penistaja fine sandy loam in an area of Penistaja-Travessilla association, gently sloping, about 13 miles east of Corona; 0.4 mile southeast of the northwest corner of sec. 16, T. 1 S., R. 15 E.

A1—0 to 2 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; mildly alkaline; abrupt smooth boundary.

B1—2 to 8 inches; brown (7.5YR 4/4) fine sandy loam, brown (7.5YR 4/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; mildly alkaline; clear smooth boundary.

B21t—8 to 25 inches; brown (7.5YR 4/4) sandy clay loam, brown (7.5YR 4/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

B22t—25 to 38 inches; strong brown (7.5YR 5/6) sandy clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common thin clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Cca—38 to 60 inches; pink (7.5YR 7/4) fine sandy loam, brown (7.5YR 5/4) moist; weak fine granular structure and weak fine subangular blocky; soft, very friable, nonsticky and nonplastic; violently effervescent; moderately alkaline.

The solum is 20 to 40 inches thick. Typically, it is noneffervescent above the C horizon, but a few pedons are slightly effervescent in the B2t horizon. The calcium carbonate equivalent within 40 inches of the surface is less than 15 percent. The solum is less than 5 percent gravel.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. Texture is fine sandy loam or sandy loam. The upper 7 inches of the horizon is less than 1 percent organic matter.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry, and chroma of 4 to 6. It is typically sandy clay loam, but in some pedons it is clay loam.

The Cca horizon has hue of 5YR or 7.5YR.

Plack series

The soils in the Plack series are classified as Petrocalcic Calciustolls, loamy, mixed, mesic, shallow. These shallow, well drained soils formed in alluvium derived from mixed sources. The soils are on uplands and remnants of old landforms. Slope is 0 to 15 percent. Elevation is 5,000 to 7,000 feet. The average annual precipitation is 12 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 190 days.

Typical pedon of a Plack loam in an area of Plack-Dioxice association, gently sloping, about 6 miles east of Encinoso; in sec. 21, T. 7 S., R. 16 E.; 0.65 mile southeast from New Mexico Highway 48, proceed on ranch road to intersection with another ranch road, then 0.85 mile south and 30 feet west into area of rangeland.

A11—0 to 2 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak very fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; 5 percent gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.

A12—2 to 11 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine roots; 2 percent gravel; strongly effervescent; moderately alkaline; abrupt irregular boundary.

Ccam—11 to 23 inches; white (N 8/0) indurated caliche.

The depth to the petrocalcic horizon ranges from 4 to 20 inches.

The A1 horizon has value of 3 to 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. Texture of the fine earth fraction is fine sandy loam or loam. The horizon is 5 to 15 percent rock fragments. Some pedons have visible secondary calcium carbonate in the lower part of the A1 horizon.

The Ccam horizon has value of 7 or 8 when moist and chroma of 0 to 2. The indurated laminar crust ranges from 1/16 to 1/2 inch in thickness.

Purcella series

The soils in the Purcella series are classified as Aridic Argiustolls, loamy-skeletal, mixed, mesic. These very

deep, well drained soils formed in alluvium derived from mixed sources. The soils are on piedmonts. Slope is 0 to 5 percent. Elevation is 5,500 to 7,000 feet. The average annual precipitation is 16 to 18 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 160 to 180 days.

Typical pedon of a Purcella loam in an area of Purcella-Riverwash association, gently sloping, about 6 miles east of Encinoso; 500 feet south and 300 feet east of the northwest corner of sec. 28, T. 7 S., R. 16 E.

A1—0 to 12 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; mildly alkaline; abrupt wavy boundary.

B1t—12 to 22 inches; brown (7.5YR 5/4) cobbly loam, dark brown (7.5YR 4/2) moist; moderate coarse prismatic structure; hard, friable, slightly sticky and nonplastic; common very fine roots; few thin clay films on faces of peds; 25 percent cobbles and 5 percent gravel; mildly alkaline; clear smooth boundary.

B2t—22 to 43 inches; brown (7.5YR 5/4) extremely cobbly clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and slightly plastic; few very fine roots; many thick clay films in pores and on faces of peds; 35 percent cobbles and 30 percent gravel; mildly alkaline; clear wavy boundary.

Cca—43 to 60 inches; pink (7.5YR 8/4) extremely cobbly clay loam, pink (7.5YR 7/4) moist; massive; slightly hard, very friable, sticky and slightly plastic; 40 percent cobbles and 25 percent gravel; lime coatings on rock fragments and many secondary carbonates; violently effervescent; mildly alkaline.

The solum is 25 to 50 inches thick. The calcic horizon is at a depth of 36 to 48 inches. The control section is 35 to 65 percent coarse fragments.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. It is 0 to 15 percent rock fragments.

The B1 horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. Texture of the fine earth fraction is loam or clay loam. Rock fragment content ranges from 0 to 35 percent. The B2t horizon has hue of 5YR or 7.5YR, and it has value and chroma of 4 to 6. Texture of the fine earth fraction is loam or clay loam.

The Cca horizon has hue of 7.5YR or 10YR, value of 7 or 8, and chroma of 1 to 4.

Rance series

The soils in the Rance series are classified as Ustic Torriorthents, fine-silty, gypsic, mesic. These moderately deep, well drained soils formed in material derived mainly from weathered gypsum. The soils are on uplands. Slope is 2 to 9 percent. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Rance silt loam in an area of Rance-Tanbark silt loams, 2 to 9 percent slopes, about 1.5 miles south of Ancho; 0.2 mile northeast of the southwest corner of sec. 36, T. 4 S., R. 11 E.

A1—0 to 7 inches; pale brown (10YR 6/3) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, friable, sticky and slightly plastic; many fine and very fine roots; violently effervescent; mildly alkaline; abrupt irregular boundary.

AC—7 to 24 inches; very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; violently effervescent; moderately alkaline; clear irregular boundary.

Cr—24 to 30 inches; white (2.5Y 8/2) gypsiferous shale interbedded with gypsum; moderately alkaline; gradual irregular boundary.

R—30 inches; consolidated gypsum.

The depth to paralithic contact ranges from 20 to 40 inches.

The A1 horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 7 when dry or moist, and chroma of 2 to 4.

The AC horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 7 or 8 when dry and 6 or 7 when moist, and chroma of 2 to 4. Texture is loam or silt loam.

The Cr horizon has hue of 10YR or 2.5Y, and it has value of 7 or 8 when dry and 6 or 7 when moist.

Reflection series

The soils in the Reflection series are classified as Typic Gypsiorthids, fine-loamy, gypsic, thermic. These very deep, well drained soils formed in alluvium derived mainly from gypsiferous rock. The soils are on broad ridges. Slope is 0 to 15 percent. Elevation is 4,500 to 5,500 feet. The average annual precipitation is 8 to 11 inches. The average annual air temperature is 57 to 60 degrees F, and the frost-free period is 190 to 210 days.

Typical pedon of a Reflection fine sandy loam in an area of Reflection-Malargo association, moderately sloping, about 3 miles south of Oscura; 1,250 feet north and 1,150 feet east of the southwest corner of sec. 13, T. 10 S., R. 9 E.

A1—0 to 3 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; loose, very friable, nonsticky and nonplastic; few very fine roots and pores; slightly effervescent; strongly alkaline; abrupt smooth boundary.

C1cs—3 to 14 inches; pink (7.5YR 8/4) loam, pink (7.5YR 7/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; few very fine pores; entire mass contains disseminated gypsum; slightly effervescent; moderately alkaline; gradual smooth boundary.

C2cacs—14 to 31 inches; pink (5YR 8/4) loam, light reddish brown (5YR 6/4) moist, weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; few very fine pores; common medium irregularly shaped soft masses of lime and gypsum; slightly effervescent; moderately alkaline; clear smooth boundary.

C3cacs—31 to 60 inches; pink (5YR 7/4) clay loam, reddish brown (5YR 5/4) moist; massive; slightly hard; friable, slightly sticky and plastic; common medium irregularly shaped soft masses of lime; many fine irregularly shaped soft masses of gypsum and disseminated gypsum; slightly effervescent; strongly alkaline.

The solum ranges from 0 to 10 inches in thickness. The gypsic horizon is at a depth of 3 to 10 inches. The control section is 0 to 15 percent rock fragments. Some pedons have a slightly cemented to strongly cemented gypsic horizon. Some pedons do not have a Cca horizon.

The A1 horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 3 to 5.

The Ccs horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 to 8, and chroma of 1 to 4. Texture is silt loam, loam, or clay loam. Fine sand or loamy fine sand is in the lower part of this horizon in some pedons.

Remunda series

The soils in the Remunda series are classified as Aridic Argiustolls, fine, mixed, mesic. These very deep, well drained soils formed in alluvium derived mainly from shale and igneous rock. The soils are on valley sides. Slope is 3 to 8 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of Remunda clay loam, gypsum substratum, 3 to 8 percent slopes, about 2 miles northwest of Capitan; 350 feet west of the southeast corner of the NE1/4 of sec. 6, T. 9 S., R. 14 E.; 75 feet north of intersection, on east side of the road.

A1—0 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine and very fine roots; neutral; clear smooth boundary.

B21t—7 to 16 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; continuous moderately thick clay films on faces of peds and in pores; neutral; clear smooth boundary.

B22t—16 to 42 inches; yellowish brown (10YR 5/4) clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; common fine and very fine roots; many moderately thick clay films on faces of peds and in pores; slightly effervescent; mildly alkaline; clear smooth boundary.

B3cacs—42 to 60 inches; yellowish brown (10YR 5/6) clay, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few fine and very fine roots; few thin clay films on faces of peds; strongly effervescent; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist.

The B horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 to 5 when moist, and chroma of 4 to 6 when dry and 3 to 5 when moist.

Reventon series

The soils in the Reventon series are classified as Typic Argiustolls, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on piedmonts and valley sides. Slope is 0 to 8 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 12 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 190 days.

Typical pedon of a Reventon loam in an area of Reventon-Sampson association, gently sloping, about 3 miles south of Corona; 275 feet north and 25 feet east of the southwest corner of sec. 20, T. 1 S., R. 13 E.

A1—0 to 7 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure that is moderate thin platy in the upper inch; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; mildly alkaline; clear smooth boundary.

B21t—7 to 16 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; continuous thin clay films on faces of peds and in pores; slightly effervescent; mildly alkaline; clear smooth boundary.

B22t—16 to 25 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; continuous thick clay films on faces of peds and in pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

B23tca—25 to 40 inches; strong brown (7.5YR 5/6) clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few thick partial clay films on the vertical faces of peds; violently effervescent; many fine and very fine mycelia of lime in old root channels; mildly alkaline; gradual smooth boundary.

C—40 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; violently effervescent; many krotovinas 2 to 10 inches in diameter; mildly alkaline.

The mollic epipedon is 8 to 20 inches thick and includes the upper part of the argillic horizon. The thickness of the solum typically is 30 to 40 inches but ranges from 23 to 60 inches.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3.

The B2t horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6 when dry and 2 or 3 when moist, and chroma of 2 to 6. Texture is clay loam, loam, silty clay loam, or silt loam. The B2tca horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 7, and chroma of 2 to 6. The calcium carbonate equivalent is less than 15 percent. It is in the form of small mycelia and soft masses.

The C horizon is loam, silt loam, or clay loam. Krotovinas are common below a depth of 40 inches.

Romine series

The soils in the Romine series are classified as Typic Argiustolls, loamy-skeletal, mixed, mesic. These very deep, well drained soils formed in old alluvium derived from mixed rock sources. The soils are on old dissected alluvial plains. Slope is 15 to 45 percent. Elevation is 6,300 to 7,200 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of Romine extremely gravelly loam, 15 to 45 percent slopes, about 4 miles southeast of Capitan; in an unsectionalized area of Fort Stanton Experimental Range; about 3/4 mile northwest of Fort Stanton Hospital and Training School.

A1—0 to 9 inches; grayish brown (10YR 5/2) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; 55 percent gravel and 20 percent cobbles on the surface; 45 percent coarse fragments in the horizon; mildly alkaline; clear smooth boundary.

B21t—9 to 15 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few thin clay films on faces of peds; 60 percent coarse fragments; mildly alkaline; clear smooth boundary.

B22t—15 to 23 inches; light yellowish brown (10YR 6/4) very cobbly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine roots; common thin clay films on faces of peds; 50 percent coarse fragments; slightly effervescent; mildly alkaline; clear wavy boundary.

C1ca—23 to 39 inches; brownish yellow (10YR 6/6) extremely cobbly loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few thin filaments of segregated lime; 85 percent coarse fragments; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2ca—39 to 60 inches; brownish yellow (10YR 6/6) extremely cobbly loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few thin filaments of segregated lime; 65 percent coarse fragments; strongly effervescent; moderately alkaline.

The solum ranges from 20 to 30 inches in thickness. Content of gravel and cobbles ranges from 35 to 85 percent throughout the profile.

The A horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3 when dry or moist.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 2 to 4 when moist, and chroma of 2 to 4 when dry or moist. Texture of the fine earth fraction is loam or clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 4 to 6 when dry or moist.

Roswell series

The soils in the Roswell series are classified as Ustic Torripsamments, mixed, thermic. These very deep, excessively drained soils formed in eolian sand derived from mixed sources. The soils are on hummocky upland plains. Slope is 1 to 5 percent. Elevation is 4,000 to 4,700 feet. The average annual precipitation is 11 to 14 inches. The average annual air temperature is 57 to 60 degrees F, and the frost-free period is 180 to 200 days.

Typical pedon of Roswell fine sand, hummocky, about 12 miles east of Arabela; in the NW1/4 of sec. 8, T. 8 S., R. 19 E., 1.5 miles west and .5 mile north of windmill on dirt road, and 100 feet east of road.

A1—0 to 2 inches; brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/2) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; mildly alkaline; abrupt smooth boundary.

C1—2 to 13 inches; brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; mildly alkaline; gradual smooth boundary.

C2—13 to 60 inches; brown (7.5YR 5/4) fine sand, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, few fine, and few coarse roots; mildly alkaline.

The depth to calcareous material ranges from 50 inches to more than 60 inches.

The A1 horizon in some pedons is covered by a relatively recent layer of eolian sand as much as 15 inches thick. The horizon has hue of 7.5YR or 10YR.

The C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

Ruidoso series

The soils in the Ruidoso series are classified as Pachic Argiustolls, fine, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on the floors and sides of valleys. Slope is 0 to 8 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 17 to 20 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 100 to 180 days.

Typical pedon of a Ruidoso silty clay loam in an area of Ruidoso-Tortugas association, moderately sloping, about 8 miles southeast of Glencoe; in the NW1/4SE1/4 of sec. 31, T. 11 S., R. 16 E.; about 0.25 mile east of dirt tank.

A11—0 to 3 inches; dark brown (10YR 3/3) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium angular blocky structure; hard, friable, sticky and plastic; many fine and many very fine roots; neutral; clear smooth boundary.

A12—3 to 10 inches; dark brown (10YR 3/3) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure parting to moderate fine granular; hard, friable, sticky and plastic; common fine and common very fine roots; neutral; clear smooth boundary.

B21t—10 to 25 inches; dark brown (10YR 3/3) heavy clay loam, very dark grayish brown (10YR 3/2) moist; strong fine angular blocky structure; very hard, friable, very sticky and plastic; few very fine roots; common thin clay films on faces of peds; neutral; gradual smooth boundary.

B22t—25 to 45 inches; brown (10YR 4/3) heavy clay loam, very dark grayish brown (10YR 3/2) moist; strong medium angular blocky structure; very hard, friable, very sticky and plastic; few very fine roots; many moderately thick clay films on faces of peds; neutral; gradual smooth boundary.

B23t—45 to 60 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; strong medium angular blocky structure; hard, friable, sticky and plastic; many thin clay films on faces of peds; slightly effervescent; mildly alkaline.

The solum is more than 40 inches thick. The mollic epipedon is from 20 to 40 inches thick. The solum is neutral to moderately alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist. It is silty clay loam or clay loam.

The B21t horizon has hue of 7.5YR or 10YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist. It is clay loam or clay. The B22t and B23t horizons have hue of 5YR, 7.5YR, or 10YR, value of 3 to 5 when dry and 2 to 4 when moist, and chroma of 2 to 4 when dry or moist. They are clay loam or clay.

Ruidoso Variant

The Ruidoso Variant soils are classified as Pachic Argiustolls, fine, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed rock sources. The soils are on valley sides. Slope is 0 to 8 percent. Elevation is 6,000 to 7,500 feet. The average annual precipitation is 14 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 160 days.

Typical pedon of Ruidoso Variant clay loam, 0 to 8 percent slopes, about 1.5 miles south of Capitan; in the NW1/4SE1/4 of sec. 15, T. 9 S., R. 14 E.

A1—0 to 2 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate thin platy structure; soft, friable, sticky and plastic; many very fine and fine roots and few medium roots; strongly effervescent; mildly alkaline; abrupt smooth boundary.

B21t—2 to 13 inches; dark brown (10YR 3/3) silty clay, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; hard, firm, very sticky and very plastic; many very fine roots and common fine roots; many moderately thick clay films on faces of peds and in pores; strongly effervescent; mildly alkaline; clear smooth boundary.

B22t—13 to 20 inches; brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, very sticky and very plastic; common very fine and few fine roots; many moderately thick clay films on faces of peds and in pores; strongly effervescent; mildly alkaline; clear smooth boundary.
B23t—20 to 32 inches; brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, very sticky and very plastic; few very fine and fine roots; many moderately thick clay films on faces of peds and in pores; strongly effervescent; mildly alkaline; clear smooth boundary.
B3t—32 to 60 inches; brown (10YR 5/3) silty clay, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, firm, very sticky and very plastic; common moderately thick clay films on faces of peds and in pores; slightly effervescent; mildly alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3 when dry or moist.

The B2t horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 to 4 when moist, and chroma of 2 or 3 when dry or moist. Texture is silty clay or clay.

Sampson series

The soils in the Sampson series are classified as Pachic Argiustolls, fine-loamy, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on the floors and sides of valleys. Slope is 0 to 5 percent. Elevation is 5,500 to 7,000 feet. The average annual precipitation is 16 to 22 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 100 to 190 days.

Typical pedon of Sampson loam, 0 to 5 percent slopes, about 6 miles northeast of Encinoso on ranch; in the SE1/4 of sec. 30, T. 6 S., R. 16 E.; 0.1 mile north of windmill.

A1—0 to 6 inches; dark brown (10YR 3/3) loam, very dark brown (10YR 2/2) moist; weak fine granular structure and weak very fine subangular blocky; friable, slightly sticky and slightly plastic; common fine roots; neutral; clear smooth boundary.
B21t—6 to 21 inches; dark brown (10YR 3/3) heavy loam, very dark brown (10YR 2/2) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common moderately thick clay films on faces of peds and in pores; slightly effervescent; mildly alkaline; clear smooth boundary.
B22t—21 to 47 inches; dark brown (10YR 3/3) clay loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; continuous moderately thick clay films on faces of peds; strongly effervescent; mildly alkaline; clear smooth boundary.
C—47 to 60 inches; brown (7.5YR 5/4) light loam, brown (7.5YR 4/4) moist; weak very fine granular structure; soft, friable, nonsticky and nonplastic; slightly effervescent; mildly alkaline.

The mollic epipedon ranges from 20 to 50 inches in thickness. Secondary calcium carbonate typically is at a depth of more than 40 inches.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Rock fragment content is less than 15 percent, and it is typically less than 2 percent.

The B2t horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 to 4. Texture is loam, clay loam, or silty clay loam. Some pedons have a B horizon that extends to a depth of more than 6 feet.

Sharps series

The soils in the Sharps series are classified as Ustollic Haplargids, fine-silty, mixed, mesic. These moderately deep, well drained soils formed in material derived mainly from shale and siltstone. The soils are on uplands. Slope is 2 to 15 percent. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Sharps silt loam in an area of Sharps-Rock outcrop association, moderately sloping, about 3 miles northwest of Ancho; 0.35 mile northeast of the southwest corner of sec. 11, T. 4 S., R. 11 E.

A1—0 to 4 inches; reddish brown (5YR 5/4) silt loam, reddish brown (5YR 4/4) moist; moderate fine platy structure in the upper inch and moderate fine granular below; soft, very friable, slightly sticky and nonplastic; many fine and very fine roots; mildly alkaline; clear smooth boundary.
B1—4 to 8 inches; red (2.5YR 5/6) silty clay loam, dark red (2.5YR 3/6) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; few thin clay films on faces of peds; moderately alkaline; clear smooth boundary.
B2t—8 to 18 inches; red (2.5YR 5/6) silty clay loam, dark red (2.5YR 3/6) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine roots; common moderately thick clay films on faces of peds and in pores; violently effervescent; moderately alkaline; gradual smooth boundary.

B3ca—18 to 22 inches; light red (2.5YR 6/6) silty clay loam, red (2.5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; few thin clay films on faces of peds; lime coatings on peds and some soft nodules of calcium carbonate; violently effervescent; moderately alkaline; clear smooth boundary.

C1ca—22 to 30 inches; light reddish brown (5YR 6/4) silty clay loam, red (2.5YR 4/6) moist; massive; slightly hard, friable, sticky and plastic; few fine roots; lime coatings on peds and some soft nodules of calcium carbonate; violently effervescent; moderately alkaline; abrupt smooth boundary.

C2r—30 to 36 inches; layered shale and siltstone.

The solum ranges from 12 to 30 inches in thickness. A paralithic contact is at a depth of 20 to 40 inches. The control section is 0 to 10 percent rock fragments.

The A1 horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 2 to 6.

Some pedons do not have a B1 horizon. The B2t horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 2 to 6. Texture is loam, silty clay loam, or clay loam.

The C horizon has hue of 2.5YR or 5YR, value of 6 to 8 when dry and 4 to 7 when moist, and chroma of 4 to 6 when dry or moist.

Socorro series

The soils in the Socorro series are classified as Ustollic Calciorthids, loamy-skeletal, carbonatic, mesic. These moderately deep, well drained soils formed in sediment derived mainly from basalt. The soils are on basalt flows. Slope is 0 to 8 percent. Elevation is 5,500 to 6,000 feet. The average annual precipitation is 12 to 15 inches. The average annual air temperature is 48 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of Socorro very gravelly loam, 0 to 8 percent slopes, about 14 miles northwest of Carrizozo; in the NE1/4 of sec. 2, T. 6 S., R. 9 E.; 2,100 feet west of ranch headquarters.

A1—0 to 7 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots and few medium roots; 40 percent gravel and 5 percent cobbles; fine irregularly shaped soft masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

B2ca—7 to 15 inches; brown (7.5YR 5/4) very cobbly loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; 20 percent gravel and 30 percent cobbles; lime segregated into irregularly shaped soft masses; violently effervescent; moderately alkaline; clear wavy boundary.

Cca—15 to 26 inches; pink (7.5YR 8/4) very gravelly silt loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; 40 percent gravel and 5 percent cobbles; disseminated lime; moderately alkaline; violently effervescent; abrupt wavy boundary.

R—26 inches; vesicular basalt coated with carbonates up to 1/8 inch thick.

Basalt is at a depth of 20 to 40 inches. The solum ranges from 10 to 30 inches in thickness. The control section is 35 to 80 percent rock fragments.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is 35 to 65 percent rock fragments, of which 25 to 45 percent is basalt gravel and 10 to 35 percent is basalt cobbles.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 3 to 5. Texture of the fine earth fraction is loam or silt loam. The horizon is 35 to 70 percent rock fragments, of which 25 to 45 percent is basalt gravel, 20 to 35 percent is basalt cobbles, and 5 to 15 percent is basalt stones. The calcium carbonate equivalent is 35 to 50 percent.

The Cca horizon has hue of 7.5YR or 10YR, value of 6 to 8 when dry and 4 to 7 when moist, and chroma of 3 to 5. Texture of the fine earth fraction is loam, silt loam, or clay loam. The horizon is 50 to 70 percent rock fragments, of which 30 to 40 percent is basalt gravel, 10 to 15 percent is basalt cobbles, and 10 to 15 percent is basalt stones. The calcium carbonate equivalent is 40 to 60 percent.

Stroupe series

The soils in the Stroupe series are classified as Aridic Argiustolls, clayey-skeletal, mixed, mesic. These moderately deep, well drained soils formed in sediment derived mainly from sandstone, shale, and igneous rock. The soils are on hills, mesas, and mountainsides. Slope is 8 to 70 percent. Elevation is 5,500 to 7,500 feet. The average annual precipitation is 12 to 18 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 130 to 190 days.

Typical pedon of a Stroupe very cobbly loam in an area of Stroupe-Witt association, moderately steep, about 12 miles south of Corona; in the NE1/4 of sec. 10, T. 3 S., R. 13 E.; 0.25 mile south and 150 feet west of old homestead.

A1—0 to 3 inches; brown (7.5YR 4/2) very cobbly loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; 40 percent cobbles and 15 percent stones; mildly alkaline; clear smooth boundary.

B1t—3 to 8 inches; brown (7.5YR 4/2) very cobbly clay loam, dark brown (7.5YR 3/4) moist; strong fine subangular blocky structure; very hard, firm, sticky and plastic; many fine and very fine roots and common medium roots; many moderately thick clay films on faces of peds and in pores; 40 percent cobbles and 15 percent stones; mildly alkaline; clear smooth boundary.

B21t—8 to 22 inches; yellowish red (5YR 5/6) very cobbly clay, yellowish red (5YR 4/6) moist; strong medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine and medium roots and few coarse roots; continuous thick clay films on faces of peds; 40 percent cobbles and 15 percent stones; mildly alkaline; clear smooth boundary.

B22tca—22 to 26 inches; yellowish red (5YR 5/6) very cobbly clay, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine, medium, and coarse roots; many moderately thick clay films on faces of peds and in pores; 40 percent cobbles and 15 percent stones; common medium soft masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cca—26 to 30 inches; pink (5YR 7/3) extremely cobbly clay loam, light reddish brown (5YR 6/4) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few medium and coarse roots; 60 percent cobbles and 15 percent stones; violently effervescent; moderately alkaline; abrupt smooth boundary.

R—30 inches; rhyolite.

Rhyolite is at a depth of 20 to 40 inches. The mollic epipedon ranges from 7 to 10 inches in thickness. The profile averages 35 to 70 percent rock fragments, and the control section 40 to 60 percent. Some pedons do not have secondary calcium carbonate in the lower part of the profile. The calcium carbonate equivalent is less than 12 percent.

The A1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture of the fine earth fraction is loam or sandy clay loam.

The B2t horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 4 to 6. The fine earth fraction is clay loam, sandy clay, or clay.

Some pedons do not have a C horizon.

Tanbark series

The soils in the Tanbark series are classified as Ustic Torriorthents, loamy, gypsic, mesic, shallow. These shallow, well drained soils formed in material derived mainly from gypsum. The soils are on uplands. Slope is 2 to 50 percent. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Tanbark silt loam in an area of Rance-Tanbark silt loams, 2 to 9 percent slopes, about 9 miles northwest of Ancho; 400 feet south of the northwest corner of sec. 7, T. 3 S., R. 11 E.; along the fence line.

A1—0 to 4 inches; grayish brown (10YR 5/2) silt loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

C1—4 to 20 inches; white (10YR 8/2) heavy loam, very pale brown (10YR 7/3) moist; massive; soft, very friable, sticky and nonplastic; common fine and very fine roots and few medium roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C2r—20 to 26 inches; white (N 8/0) layered and partially weathered gypsum.

Depth to massive or crystalline gypsum ranges from 10 to 20 inches.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 3 or 4.

The C1 horizon has hue of 7.5YR or 10YR, value of 7 or 8 when dry and 6 to 8 when moist, and chroma of 2 to 4. Texture is silt loam, silty clay loam, or loam.

Tortugas series

The soils in the Tortugas series are classified as Lithic Haplustolls, loamy-skeletal, carbonatic, mesic. These very shallow and shallow, well drained soils formed in material derived mainly from limestone. The soils are on mountainsides, hills, and other uplands. Slope is 0 to 75 percent. Elevation is 5,000 to 7,500 feet. The average annual precipitation is 16 to 24 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 100 to 190 days.

Typical pedon of a Tortugas very cobbly loam in an area of Tortugas-Asparas-Rock outcrop association, moderately sloping, about 2 miles southwest of Corona; 0.3 mile northwest of the southeast corner of sec. 12, T. 1 S., R. 12 E.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) very cobbly loam, dark brown (10YR 3/3) moist;

moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; 55 percent coarse fragments; slightly effervescent; moderately alkaline; clear smooth boundary.

A12—3 to 7 inches; dark grayish brown (10YR 4/2) very cobbly loam, dark brown (10YR 3/3) moist; weak moderate subangular blocky structure parting to moderate fine granular; slightly hard, very friable, nonsticky and nonplastic; many fine and very fine roots and common medium roots; 60 percent coarse fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

A13—7 to 12 inches; grayish brown (10YR 5/2) very cobbly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; many fine and very fine roots and common medium roots; 60 percent coarse fragments; violently effervescent; carbonates on bottom of cobbles; moderately alkaline; abrupt smooth boundary.

R—12 inches; limestone.

Limestone is at a depth of 6 to 20 inches. The profile is 35 to 60 percent cobbles throughout.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture of the fine earth fraction is loam or silt loam. The upper part of this horizon is noneffervescent or slightly effervescent.

A C horizon is present is some pedons.

Travessilla series

The soils in the Travessilla series are classified as Lithic Ustic Torriorthents, loamy, mixed (calcareous), mesic. These very shallow and shallow, well drained soils formed in material derived mainly from sandstone. The soils are on upland ridges, hills, and mesas. Slope is 2 to 15 percent. Elevation is 5,400 to 6,800 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Travessilla gravelly fine sandy loam in an area of Travessilla-Rock outcrop association, moderately sloping, about 16 miles north of Carrizozo; 600 feet northwest of the southeast corner of sec. 11, T. 5 S., R. 10 E.

A1—0 to 3 inches; pinkish gray (7.5YR 6/2) gravelly fine sandy loam, dark brown (7.5YR 4/2) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; 20 percent gravel; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—3 to 7 inches; light brown (7.5YR 6/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine and very fine roots; 30 percent gravel; violently effervescent; moderately alkaline; clear irregular boundary.

R—7 inches; fractured sandstone.

Sandstone is at a depth of 7 to 20 inches. The profile is 10 to 35 percent gravel.

The A and C horizons have hue of 7.5YR or 10YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. The fine earth fraction is fine sandy loam or sandy loam.

Tulargo series

The soils in the Tulargo series are classified as Typic Gypsiorthids, fine-loamy, gypsic, mesic. These very deep, well drained soils formed in alluvium derived mainly from gypsiferous material. The soils are on piedmonts. Slope is 0 to 8 percent. Elevation is 5,000 to 6,500 feet. The average annual precipitation is 11 to 16 inches. The average annual air temperature is 45 to 57 degrees F, and the frost-free period is 150 to 200 days.

Typical pedon of a Tulargo loam in an area of Tulargo-Andergeorge association, gently sloping, about 4 miles south of Carrizozo; 2,300 feet north of the southwest corner of sec. 24, T. 8 S., R. 10 E.

A11—0 to 6 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 3/4) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine roots; 5 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

A12—6 to 15 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; 5 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

B21—15 to 21 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; 10 percent gravel; slightly effervescent; moderately alkaline; abrupt smooth boundary.

B22csca—21 to 40 inches; pink (7.5YR 8/4) clay loam, light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many medium irregular masses and threads of gypsum and calcium carbonate; 10 percent gravel; violently effervescent; moderately alkaline; clear wavy boundary.

C1cs—40 to 48 inches; pink (7.5YR 7/4) loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine crystals of gypsum; 12 percent gravel;

violently effervescent; moderately alkaline; clear wavy boundary.

C2—48 to 60 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 30 percent gravel; violently effervescent; moderately alkaline.

The solum ranges from 19 to 40 inches in thickness. The depth to the gypsic horizon ranges from 14 to 24 inches. The control section is 5 to 15 percent rock fragments. Sand and gravel or gravelly and cobbly soils are at a depth of 40 to 70 inches in most pedons.

The A1 horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 to 4.

The B2 horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 3 to 6. Texture is loam or clay loam. The B2csca horizon has hue of 7.5YR or 10YR, value of 6 to 8 when dry and 5 to 7 when moist, and chroma of 2 to 4. Texture is loam or clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 8 when dry, and chroma of 2 to 4. Texture of the fine earth fraction is loam or clay loam. The C horizon is slightly effervescent to violently effervescent. It is 10 to 30 percent rock fragments.

Witt series

The soils in the Witt series are classified as Ustollic Haplargids, fine-silty, mixed, mesic. These very deep, well drained soils formed in alluvium derived from mixed sources. The soils are on the floors and sides of valleys. Slope is 0 to 9 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 12 to 17 inches. The average annual air temperature is 45 to 56 degrees F, and the frost-free period is 150 to 190 days.

Typical pedon of a Witt silt loam in an area of Witt-Penistaja association, gently sloping, about 14 miles southwest of Corona; in the SW1/4 of sec. 30, T. 1 S., R. 11 E.; 700 feet east of wooden cattle guard and 100 feet southeast of ranch road.

A1—0 to 7 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 4/2) moist; moderate medium subangular blocky structure; soft, friable, sticky and plastic; many fine and very fine roots; mildly alkaline; gradual smooth boundary.

B21t—7 to 16 inches; brown (7.5YR 5/2) silty clay loam, dark brown (7.5YR 4/2) moist; moderate medium angular blocky structure; extremely hard, firm, sticky and plastic; many fine and very fine roots; common moderately thick clay films on faces of peds; slightly effervescent; mildly alkaline; diffuse smooth boundary.

B22t—16 to 34 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; moderate medium angular blocky structure; extremely hard, firm, sticky and plastic; common fine and very fine roots; common moderately thick clay films on faces of peds; strongly effervescent; moderately alkaline; clear smooth boundary.

Cca—34 to 60 inches; pink (5YR 7/3) loam, reddish brown (5YR 5/3) moist; massive; very hard, friable, sticky and slightly plastic; few fine and very fine roots; violently effervescent; estimated 25 percent calcium carbonate equivalent; moderately alkaline.

The solum ranges from 30 to 45 inches in thickness. The calcic horizon is at a depth of more than 30 inches.

The A horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 to 4.

The B2t horizon has hue of 5YR or 7.5YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is loam, silty clay loam, or clay loam.

The Cca horizon has hue of 5YR or 7.5YR, value of 5 to 8 when dry and 3 to 6 when moist, and chroma of 2 to 4. The calcium carbonate equivalent ranges from 15 to 40 percent, but typically is less than 25 percent. Texture is loam, silt loam, or silty clay loam.

formation of the soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation.

Soil is a collection of natural bodies occupying the earth's surface. Soil is capable of supporting plants and has properties that are the result of the integrated effects of climate and living matter acting on parent material conditioned by topography over a period of time. The characteristics of the soil at a given location are determined by the physical and chemical properties and mineralogical composition of its parent material, the climatic conditions under which the soil material has accumulated or been deposited, the plant and animal life on and in the soil, the topography, and the length of time. These factors are extremely complex. The effect of any one factor is hard to isolate and identify, but the interractions are important to the nature of the soil. It is convenient, however, to discuss these factors separately and to indicate some of their probable effects on soil formation. These factors are discussed in the following pages.

time

In relation to the other soil forming factors, time is very important. The length of time that climate and plants and animals act on a given parent material in an area of specific topography determines the degree of development.

Roswell and Bluepoint soils are young. They have not developed any clear horizons other than a surface horizon. Onite, Deacon, Hightower, and Socorro soils have existed long enough to allow some movement of clay and carbonates and to develop a weakly expressed B horizon or a calcic horizon, or both.

Reventon, Asparas, Sampson, and Ruidoso soils have very strongly developed horizons. These soils have developed either a thick, well expressed argillic horizon or a very thick surface layer that is high in content of organic matter, or both.

Some soils develop horizons more rapidly than others because of the nature of the parent material. A gypsic horizon can form more rapidly than a calcic horizon when all factors except parent material are equal. Very few factors remain constant, so they all must be considered when determining the formation and resulting morphology of any specific soil.

parent material

The soils in this survey area formed in materials derived from many sources ranging from igneous and sedimentary rock to very recent alluvial and eolian sediment. Because the physical and chemical composition of these materials is highly variable, the nature of the parent materials had a strong effect on the kind of soil that developed and, more importantly, on the rate at which development took place. The nature of these parent materials affected or determined the texture, structure, consistency, color, erodibility, and natural fertility of the soils that formed in them.

The main parent materials of the soils in this area are residuum, alluvium, and eolian material. These materials are briefly described in the following paragraphs.

Residuum is material produced by the physical and chemical weathering and breakdown of parent rock. This material has not moved. Travessilla soils, which formed in residuum derived from sandstone, have different properties than do the Lozier soils, which formed in residuum derived from limestone. These differences are a result of the different physical and chemical composition of the parent rock. Other soils that formed in residuum are the Deama and Ector soils, which formed in residuum derived from limestone, and the Rance soils, which formed in residuum derived from gypsum.

Alluvium is sediment that has been moved by water. It includes sand, gravel, clay, silt, and mixtures of these. The kinds of alluvium and their location depend largely upon the carrying capacity of the streams that deposited them. The Gabaldon and Manzano soils formed in geologically recent, moderately fine textured alluvium. These soils have undergone change since the parent sediment was deposited, so they have developed a weakly expressed B horizon. The Sampson soils formed in the same kind of material, but they are very old and have a strongly expressed Bt horizon and a thick A horizon containing much organic matter. The Romine and Gavilan soils formed in gravelly alluvium deposited by ancient fast-flowing rivers.

Eolian material is wind-deposited sand or silt. This material may have been the surface of another soil, but it became parent material upon erosion and redeposition. The Socorro soils are the most common and most extensive soils that have formed in this material. These

soils formed in material deposited on an old lava flow. The Bluepoint, Roswell, and Onite soils formed in recent eolian material. The Roswell and Bluepoint soils have developed only a very thin A horizon. In the Onite soils, some clay has moved downward in the profile, forming a B horizon. This indicates that these soils have been in place much longer than the other sandy soils.

climate

Climate has a significant influence on the kinds of soil that form and the manner in which they form in different geographic areas. In this survey area, temperature, precipitation, and the wind play important roles in forming soils. When all other factors are equal, variations in climate determine the degree and nature of weathering and soil formation.

Temperature affects the rate of decomposition of parent material, the rate of biological activity, and the rate of chemical change within both the organic and inorganic materials. When the air temperature is low, the soil temperature is correspondingly low. Under this condition plants and animals reduce their activity. This is also true of the chemical processes that take place within the parent material and soil. Precipitation affects the rate of leaching of soil particles and bases, the rate of biological activity, and the amount of material moved within the soil. It also influences the type of vegetation present, which in turn also modifies the soil. Wind dries and cools the soil. It also adds dust, which contains materials such as calcium carbonate and gypsum. Wind can slow chemical reactions and biological activity by its cooling effect, thus slowing soil formation. It also acts as an erosive agent and forms dunes.

Climate can be either directly or indirectly responsible for variations in soil depth, soil color as a result of chemical change resulting in iron staining, and chemical composition as a result of added calcium carbonate, gypsum, or soil material that is blown in.

The difference between the Ector and Lozier soils is primarily a result of climate. They both are in warm areas and formed in material derived from limestone, but because the Ector soils receive more moisture, they have developed a darker colored surface layer that is high in content of organic matter. This is a result of rainfall affecting vegetation, which in turn modifies the soil. More grass grows on the Ector soils, and the added moisture aids in the biological breakdown and retention of this material in the soil. Since these soils also receive more moisture, it is difficult to identify a specific soil that characteristically is modified by temperature alone.

Wind shaped sand into the coppice dunes on which the Roswell and Bluepoint soils formed. Soil blowing is common, and much surface soil is lost each year. Soil blowing in one place leads to deposition in another, as is evidenced by the carbonate recharge when dust particles are deposited on and partially leached into soils downwind. The depth to which this carbonate is moved in the soil depends upon the amount of precipitation received.

topography

The two basic parts of topography are slope and aspect. The slope of an area regulates the amount of surface drainage and infiltration when all other factors are the same. Otherwise, its effect depends on or is interrelated with the texture of the soil, the type and density of vegetation present, and the climate. As the slope increases, the potential for erosion increases. The Gabaldon soils, for example, commonly are gullied where slope is 2 to 3 percent but are not eroded where slope is 0 to 1 percent. As the slope decreases, soil formation processes generally increase because of the greater infiltration and percolation of water through the soil and a more rapid buildup of soil material through alluvial activity. Manzano soils are deep, but they are still relatively young because they continue to receive soil additions. Steep soils tend to be thin because soil material is eroded away at the rate of development or somewhat slower. The Deama, Lozier, and Ector soils are examples of such steep soils, whereas downslope soils such as the Harvey, Pena, and Asparas soils are deep and well developed.

Aspect is the direction that the slope faces. It affects the available heat present for soil development and the amount of available moisture, although these properties also depend upon other factors. If all other factors are constant, a north-facing slope is cooler than a south-facing slope. This is especially evident near transition zones of temperature and rainfall regimes.

plant and animal life

Plant and animal life includes fungi, bacteria, earthworms, insects, rodents, vegetation, mammals, and man. The type of plants growing on a parent material determines to a large extent the amount of organic matter that will eventually be in the soil. Also, the vegetation may regulate certain chemical reactions in the soil and the type of micro-organisms that are present. The Gabaldon and Sampson soils formed under short and mid grasses and have a relatively high content of organic matter, while soils that formed predominantly under shrubs do not have so much organic matter. The micro-organisms present in these soils are similar, but their numbers are different. The Gavilan and Nolten soils formed under coniferous trees with an understory of grass. The micro-organisms in these soils differ from those in soils that formed under grass because the soils under trees tend to be less alkaline. This in turn alters the chemical reactions in the soil so that bases are removed much more rapidly.

Insects, rodents, and larger mammals physically mix the soil, and in extreme cases they may completely alter or change the soil from one kind to another. Man alters soils or parent material by adding fertilizer, organic matter, and excess water, and by mechanically manipulating it. Some areas of the Gabaldon soils have a manmade surface horizon 30 to 40 inches thick that is high in content of organic matter and nitrates.

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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.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3.5
Low	3.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10
Very high	More than 10

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

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.

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.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, 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.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coppice dune. A small mound of stabilized soil material around desert shrubs.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature; for example, fire that exposes the surface.

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.

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.

Fine textured soil. Sandy clay, silty clay, and clay.

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.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

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.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.
C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.
R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling

or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

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.

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.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to

permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

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

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.

Pitting (in tables). Pits caused by melting ground ice. They form on the soil after plant cover is removed.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

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 condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redbed (geology). Sedimentary strata largely of Permian and Triassic age, that are predominantly red in color. Redbeds contain few fossils.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs 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.

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 (in tables). 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.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 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.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

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."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded 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.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1909-60 at Corona, Lincoln County, N. Mex.]

Month	Temperature		Precipitation	
	Average daily maximum	Average daily minimum	Average monthly total	Average number of days with 0.10 inch or more
	°F	°F	In	
January----	46	22	0.84	2
February---	50	25	0.80	2
March------	56	29	0.82	2
April------	64	36	1.04	3
May--------	73	44	1.37	4
June-------	83	52	1.27	4
July-------	84	55	2.59	7
August-----	82	54	2.78	7
September--	77	49	2.01	3
October----	68	39	1.09	4
November---	56	28	0.56	1
December---	47	23	0.70	1
Year-----	66	38	15.87	40

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Andergeorge-Darvey-Asparas association, gently sloping	10,192	0.4
2	Bernal gravelly loam, 3 to 15 percent slopes	2,129	0.1
3	Blakeney-Arch association, moderately undulating	13,790	0.6
4	Clovis-Harvey association, gently sloping	10,891	0.4
5	Clovis-Harvey association, loam surface, gently sloping	15,987	0.7
6	Clovis-Pastura association, gently sloping	23,893	1.0
7	Cumulic Haplustolls, gently sloping	2,987	0.1
8	Darvey-Asparas association, gently sloping	114,189	4.7
9	Darvey-Pastura association, gently sloping	112,607	4.6
10	Deacon loam, 0 to 8 percent slopes	2,684	0.1
11	Deama very cobbly loam, moderately sloping	192,541	7.9
12	Deama-Pastura association, moderately undulating	36,274	1.5
13	Deama-Pastura association, moderately sloping	262,985	10.7
14	Deama-Rock outcrop association, very steep	271,945	11.1
15	Dioxice loam, 2 to 5 percent slopes	680	*
16	Ector-Kimbrough association, gently sloping	33,640	1.4
17	Ector-Rock outcrop association, moderately sloping	56,745	2.3
18	Ector-Rock outcrop association, moderately steep	46,200	1.9
19	Gabaldon silt loam, 0 to 2 percent slopes	31,269	1.3
20	Gabaldon-Riverwash association, nearly level	9,486	0.4
21	Gavilan loam, 0 to 8 percent slopes	1,462	0.1
22	Gavilan gravelly loam, 15 to 30 percent slopes	454	*
23	Gavilan very gravelly loam, 30 to 50 percent slopes	1,298	0.1
24	Harvey-Darvey association, gently sloping	6,061	0.2
25	Harvey-Darvey association, loam surface, gently sloping	28,985	1.2
26	Hightower loam, 3 to 8 percent slopes	1,260	0.1
27	Hightower-Oro Grande complex, 3 to 8 percent slopes	226	*
28	Hightower-Oro Grande complex, moderately steep	8,527	0.3
29	Hightower Variant sandy loam, 3 to 8 percent slopes	1,008	*
30	Hogadero-Pena association, moderately undulating	54,721	2.2
31	Lava flows	33,024	1.3
32	Lithic Argiustolls-Rock outcrop association, extremely steep	23,716	1.0
33	Lozier very gravelly loam, very steep	21,783	0.9
34	Malargo-Bluepoint association, hummocky	20,116	0.8
35	Manzano loam, 0 to 3 percent slopes	3,579	0.1
36	Mokiak-Rock outcrop association, extremely steep	17,129	0.7
37	Mokiak-Stroupe-Rock outcrop association, very steep	21,433	0.9
38	Monjeau-Docdee complex, 8 to 15 percent slopes	341	*
39	Monjeau-Docdee complex, 15 to 30 percent slopes	4,676	0.2
40	Monjeau-Docdee complex, 30 to 75 percent slopes	5,709	0.2
41	Nogal sandy clay loam, 8 to 15 percent slopes	983	*
42	Nogal-Rock outcrop complex, moderately steep	3,063	0.1
43	Nolten loam, 8 to 15 percent slopes	1,903	0.1
44	Nolten loam, 15 to 30 percent slopes	1,437	0.1
45	Onite-Bluepoint association, hummocky	9,574	0.4
46	Oro Grande very cobbly clay loam, moderately steep	2,596	0.1
47	Oro Grande very cobbly clay loam, very steep	680	*
48	Paco loam, 15 to 30 percent slopes	567	*
49	Paco loam, dry, 3 to 8 percent slopes	1,811	0.1
50	Paco loam, dry, 8 to 15 percent slopes	1,966	0.1
51	Paco-Penapon complex, moderately sloping	983	*
52	Pajara-Witt association, moderately sloping	5,007	0.2
53	Pastura loam, gently sloping	137,553	5.6
54	Pastura-Harvey association, moderately rolling	43,477	1.8
55	Pastura-Partri association, gently sloping	13,879	0.6
56	Patos stony loam, gently sloping	2,372	0.1
57	Patos bouldery loam, moderately steep	9,926	0.4
58	Pena-Dioxice complex, moderately sloping	2,937	0.1
59	Pena-Hogadero association, hilly	21,520	0.9
60	Penapon-Tortugas very cobbly loams, extremely steep	2,496	0.1
61	Penistaja-Travessilla association, gently sloping	84,674	3.5
62	Plack-Dioxice loams, 0 to 8 percent slopes	668	*
63	Plack-Dioxice association, gently sloping	46,376	1.9
64	Plack-Penistaja association, gently sloping	13,879	0.6
65	Purcella-Riverwash association, gently sloping	15,284	0.6
66	Rance silt loam, 2 to 5 percent slopes	3,865	0.2
67	Rance-Tanbark silt loams, 2 to 9 percent slopes	26,967	1.1
68	Reflection-Malargo association, moderately sloping	17,744	0.7
69	Remunda clay loam, gypsum substratum, 3 to 8 percent slopes	4,650	0.2
70	Reventon loam, 0 to 3 percent slopes	567	*

See footnote at end of table.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
71	Reventon loam, 3 to 8 percent slopes	2,937	0.1
72	Reventon-Sampson association, gently sloping	54,984	2.2
73	Rock outcrop-Stroupe-Deama association, extremely steep	26,176	1.1
74	Romine extremely gravelly loam, 15 to 45 percent slopes	5,521	0.2
75	Roswell fine sand, hummocky	3,250	0.1
76	Ruidoso clay loam, moist, 0 to 8 percent slopes	1,046	0.1
77	Ruidoso-Tortugas association, moderately sloping	10,541	0.4
78	Ruidoso Variant clay loam, 0 to 8 percent slopes	2,383	0.1
79	Sampson loam, 0 to 5 percent slopes	14,587	0.6
80	Sampson loam, moist, 0 to 8 percent slopes	1,298	0.1
81	Sampson loam, moist, 8 to 15 percent slopes	341	*
82	Sharps silt loam, 2 to 5 percent slopes	13,879	0.6
83	Sharps-Rock outcrop association, moderately sloping	13,088	0.5
84	Socorro very gravelly loam, 0 to 8 percent slopes	6,588	0.3
85	Stroupe very stony loam, moderately steep	1,059	0.1
86	Stroupe bouldery sandy clay loam, extremely steep	3,390	0.1
87	Stroupe-Witt association, moderately steep	23,102	0.9
88	Tanbark-Tortugas association, very steep	20,379	0.8
89	Tortugas-Asparas-Rock outcrop association, moderately sloping	46,819	1.9
90	Tortugas-Rock outcrop association, moderately sloping	43,973	1.8
91	Tortugas-Rock outcrop association, extremely steep	77,741	3.2
92	Tortugas-Ruidoso-Rock outcrop association, very steep	5,007	0.2
93	Travessilla-Rock outcrop association, moderately sloping	10,228	0.4
94	Tulargo loam, 0 to 5 percent slopes	5,117	0.2
95	Tulargo-Andergeorge association, gently sloping	48,045	2.0
96	Witt-Penistaja association, gently sloping	21,257	0.9
	Total	2,448,762	100.0

* Less than 0.1 percent.

TABLE 3.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1*:					
Andergeorge	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
Darvey	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
Asparas	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
2 Bernal	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: thin layer.
3*:					
Blakeney	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Moderate: dusty.	Severe: thin layer.
Arch	Slight	Slight	Moderate: slope.	Slight	Slight.
4*:					
Clovis	Slight	Slight	Moderate: slope.	Slight	Slight.
Harvey	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
5*:					
Clovis	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
Harvey	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
6*:					
Clovis	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: erodes easily.	Severe: thin layer.
7. Cumulic Haplustolls					
8*:					
Darvey	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
Asparas	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
9*:					
Darvey	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: erodes easily.	Severe: thin layer.
10--- Deacon	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.	Slight.
11--- Deama	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones, thin layer.
12*:					
Deama	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, small stones.	Moderate: large stones.	Severe: large stones, thin layer.
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: erodes easily.	Severe: thin layer.
13*:					
Deama	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones, thin layer.
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: erodes easily.	Severe: thin layer.
14*:					
Deama	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, thin layer.
Rock outcrop.					
15--- Dioxice	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
16*:					
Ector	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: large stones, small stones.	Slight	Severe: small stones, thin layer.
Kimbrough	Severe: cemented pan.	Severe: cemented pan.	Severe: small stones, cemented pan.	Slight	Severe: thin layer.
17*:					
Ector	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: large stones, slope, small stones.	Slight	Severe: small stones, thin layer.
Rock outcrop.					

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
18*:					
Ector	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, slope, thin layer.
Rock outcrop.					
19--- Gabaldon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Severe: erodes easily.	Severe: flooding.
20*:					
Gabaldon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Severe: erodes easily.	Severe: flooding.
Riverwash.					
21--- Gavilan	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: droughty.
22--- Gavilan	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: erodes easily.	Moderate: small stones, droughty.
23--- Gavilan	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones.
24*:					
Harvey	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
Darvey	Slight	Slight	Moderate: slope.	Slight	Slight.
25*:					
Harvey	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
Darvey	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
26--- Hightower	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.	Moderate: thin layer.
27*:					
Hightower	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.	Moderate: thin layer.
Oro Grande	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Slight	Severe: small stones, thin layer.
28*:					
Hightower	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
28*: Oro Grande	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: small stones, slope, thin layer.
29--- Hightower Variant	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight	Moderate: thin layer.
30*: Hogadero	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: large stones, droughty.
Pena	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
31*. Lava flows					
32*: Lithic Argiustolls.					
Rock outcrop.					
33--- Lozier	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones, slope, depth to rock.	Severe: slope, small stones.	Severe: small stones, slope, thin layer.
34*: Malargo	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
Bluepoint	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
35--- Manzano	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
36*: Mokiak	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.					
37*: Mokiak.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Stroupe	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
Rock outcrop.					
38*: Monjeau	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
38*:					
Docdee	Severe: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: small stones, large stones.
39*:					
Monjeau	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Docdee	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: small stones, large stones, slope.
40*:					
Monjeau	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Docdee	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
41--- Nogal	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope, thin layer.
42*:					
Nogal	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: small stones, large stones, slope.
Rock outcrop.					
43--- Nolten	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
44--- Nolten	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
45*:					
Onite	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Bluepoint	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
46--- Oro Grande	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Severe: large stones.	Severe: large stones, slope, thin layer.
47--- Oro Grande	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, thin layer.
48--- Paco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
49--- Paco	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
50--Paco	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
51*:					
Paco	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Penapon	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
52*:					
Pajara	Severe: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: small stones, large stones.
Witt	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
53--Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: erodes easily.	Severe: thin layer.
54*:					
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: slope, cemented pan.	Slight	Severe: thin layer.
Harvey	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
55*:					
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: erodes easily.	Severe: thin layer.
Partri	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
56--Patos	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, large stones.	Moderate: large stones.	Severe: large stones.
57--Patos	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Severe: large stones, slope.
58*:					
Pena	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
Dioxice	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
59*:					
Pena	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
59*:					
Hogadero	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones, droughty.
60*:					
Penapon	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
Tortugas	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Severe: slope.	Severe: slope, thin layer.
61*:					
Penistaja	Slight	Slight	Moderate: slope.	Slight	Slight.
Travessilla	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Severe: thin layer.
62*, 63*:					
Plack	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Severe: thin layer.
Dioxice	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
64*:					
Plack	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Severe: thin layer.
Penistaja	Slight	Slight	Moderate: slope.	Slight	Slight.
65*:					
Purcella	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: erodes easily.	Slight.
Riverwash.					
66 Rance	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Moderate: slope, depth to rock, dusty.	Severe: erodes easily.	Moderate: excess salt, thin layer.
67*:					
Rance	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Moderate: slope, depth to rock, dusty.	Severe: erodes easily.	Moderate: excess salt, thin layer.
Tanbark	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: erodes easily.	Severe: thin layer.
68*:					
Reflection	Slight	Slight	Severe: slope.	Severe: erodes easily.	Slight.
Malargo	Slight	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
69---------- Remunda	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
70---------- Reventon	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
71---------- Reventon	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
72*: Reventon----------	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
Sampson----------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
73*: Rock outcrop.					
Stroupe----------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
Deama----------	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, thin layer.
74---------- Romine	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
75---------- Roswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
76---------- Ruidoso	Slight----------	Slight----------	Moderate: slope.	Severe: erodes easily.	Slight.
77*: Ruidoso----------	Slight----------	Slight----------	Moderate: slope.	Severe: erodes easily.	Slight.
Tortugas----------	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope.	Moderate: large stones.	Severe: thin layer.
78---------- Ruidoso Variant	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
79, 80---------- Sampson	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
81---------- Sampson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
82---------- Sharps	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly, depth to rock.	Slight----------	Moderate: thin layer.
83*: Sharps----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
83*: Rock outcrop.					
84--- Socorro	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones, large stones.
85--- Stroupe	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: large stones.	Severe: large stones, slope.
86--- Stroupe	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
87*: Stroupe---	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: large stones.	Severe: large stones, slope.
Witt---	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.	Slight.
88*: Tanbark---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Tortugas---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Severe: slope.	Severe: slope, thin layer.
89*: Tortugas---	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope.	Moderate: large stones.	Severe: thin layer.
Asparas---	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
Rock outcrop.					
90*: Tortugas---	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope.	Moderate: large stones.	Severe: thin layer.
Rock outcrop.					
91*: Tortugas---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
92*: Tortugas---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Severe: slope.	Severe: slope, thin layer.
Ruidoso---	Slight---	Slight---	Moderate: slope.	Severe: erodes easily.	Slight.
Rock outcrop.					

See footnote at end of table.

TABLE 3.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
93*:					
Travessilla	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: thin layer.
Rock outcrop.					
94 Tulargo	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
95*:					
Tulargo	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
Andergeorge	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty.
96*:					
Witt	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
Penistaja	Slight	Slight	Moderate: slope.	Slight	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 4.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1*:												
Andergeorge	Poor	Fair	Poor	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Darvey	Poor	Poor	Fair	---	---	Fair	---	---	Fair	---	---	Fair.
Asparas	Poor	Fair	Fair	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
2--- Bernal	Very poor.	Very poor.	Fair	---	Poor	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
3*:												
Blakeney	Poor	Poor	Fair	---	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Arch	Very poor.	Very poor.	Fair	---	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
4*, 5*:												
Clovis	Poor	Poor	Fair	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.
Harvey	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
6*:												
Clovis	Poor	Poor	Fair	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.
Pastura	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
7. Cumulic Haplustolls												
8*:												
Darvey	Poor	Poor	Fair	---	---	Fair	---	---	Fair	---	---	Fair.
Asparas	Poor	Fair	Fair	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
9*:												
Darvey	Poor	Poor	Fair	---	---	Fair	---	---	Fair	---	---	Fair.
Pastura	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
10--- Deacon	Fair	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
11--- Deama	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor.
12*, 13*:												
Deama	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor.
Pastura	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.

See footnote at end of table.

TABLE 4.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
14*:												
Deama	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor.
Rock outcrop.												
15---------- Dioxice	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
16*:												
Ector	Very poor.	Very poor.	Fair	---	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Kimbrough	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
17*, 18*:												
Ector	Very poor.	Very poor.	Fair	---	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.												
19---------- Gabaldon	Poor	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
20*:												
Gabaldon	Poor	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Riverwash.												
21---------- Gavilan	Fair	Good	Good	---	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
22, 23---------- Gavilan	Very poor.	Very poor.	Good	---	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	---
24*, 25*:												
Harvey	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
Darvey	Poor	Poor	Fair	---	---	Fair	---	---	Fair	---	---	Fair.
26---------- Hightower	Poor	Fair	Fair	---	Good	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
27*:												
Hightower	Poor	Fair	Fair	---	Good	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Oro Grande	Very poor.	Very poor.	Fair	---	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
28*:												
Hightower	Very poor.	Very poor.	Fair	---	Good	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Oro Grande	Very poor.	Very poor.	Fair	---	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
29---------- Hightower Variant	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
30*:												
Hogadero	Poor	Poor	Fair	---	---	Fair	---	---	Poor	---	---	Fair.

See footnote at end of table.

TABLE 4.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
30*:												
Pena	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
31*.												
Lava flows												
32*:												
Lithic Argiustolls.												
Rock outcrop.												
33	Very	Very	Poor	---	Very	Poor	Very	Very	Poor	---	Very	Poor.
Lozier	poor.	poor.			poor.		poor.	poor.			poor.	
34*:												
Malargo	Very poor.	Very poor.	Poor	---	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
Bluepoint	---	---	Poor	---	---	Poor	---	---	---	---	---	Poor.
35	Poor	Fair	Good	---	---	Fair	Fair	Fair	Fair	---	Fair	Fair.
Manzano												
36*:												
Mokiak	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.												
37*:												
Mokiak	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Stroupe	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.												
38*:												
Monjeau	Poor	Poor	Good	---	Good	Poor	Very poor.	Very poor.	Fair	Good	Very poor.	---
Docdee	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
39*, 40*:												
Monjeau	Very poor.	Very poor.	Good	---	Good	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Docdee	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
41	Poor	Fair	Fair	---	Good	Poor	Very poor.	Very poor.	Fair	Good	Very poor.	---
Nogal												
42*:												
Nogal	Very poor.	Very poor.	Fair	---	Good	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Rock outcrop.												
43	Poor	Poor	Good	---	Good	Poor	Very poor.	Very poor.	Fair	Good	Very poor.	---
Nolten												

See footnote at end of table.

TABLE 4.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
44---------- Nolten	Very poor.	Very poor.	Good	---	Good	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	---
45*:												
Onite----------	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Bluepoint----------	---	---	Poor	---	---	Poor	---	---	---	---	---	Poor.
46, 47---------- Oro Grande	Very poor.	Very poor.	Fair	---	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
48---------- Paco	Very poor.	Very poor.	Good	---	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	---
49, 50---------- Paco	Poor	Fair	Good	---	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
51*:												
Paco----------	Poor	Fair	Good	---	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Penapon----------	Very poor.	Very poor.	Good	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
52*:												
Pajara----------	Poor	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Witt----------	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
53---------- Pastura	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
54*:												
Pastura----------	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Harvey----------	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
55*:												
Pastura----------	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Partri----------	Poor	Fair	Poor	---	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
56, 57---------- Patos	Very poor.	Very poor.	Fair	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
58*:												
Pena----------	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Dioxice----------	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
59*:												
Pena----------	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Hogadero----------	Poor	Poor	Fair	---	---	Fair	---	---	Poor	---	---	Fair.

See footnote at end of table.

TABLE 4.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
60*:												
Penapon	Very poor.	Very poor.	Good	---	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Tortugas	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair.
61*:												
Penistaja	Poor	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Travessilla	Very poor.	Very poor.	Poor	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
62*, 63*:												
Plack	Very poor.	Very poor.	Poor	---	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
Dioxice.												
64*:												
Plack	Very poor.	Very poor.	Poor	---	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
Penistaja.												
65*:												
Purcella	Poor	Fair	Fair	---	Good	Fair	Poor	Very poor.	Fair	Good	Very poor.	---
Riverwash.												
66 Rance	Very poor.	Poor	Fair	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
67*:												
Rance	Very poor.	Poor	Fair	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Tanbark	Very poor.	Very poor.	Fair	---	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
68*:												
Reflection	Very poor.	Very poor.	Poor	---	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
Malargo	Very poor.	Very poor.	Poor	---	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
69 Remunda	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Fair	---	Poor	Poor.
70, 71 Reventon	Poor	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Poor	Fair.
72*:												
Reventon	Poor	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Poor	Fair.
Sampson	Fair	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
73*:												
Rock outcrop.												
Stroupe	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.

See footnote at end of table.

TABLE 4.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
73*:												
Deama	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor.
74---- Romine	Very poor.	Very poor.	Fair	---	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	---
75---- Roswell	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
76---- Ruidoso	Poor	Fair	Fair	---	---	Fair	---	---	Fair	---	---	Fair.
77*:												
Ruidoso	Poor	Fair	Fair	---	---	Fair	---	---	Fair	---	---	Fair.
Tortugas	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair.
78---- Ruidoso Variant	Poor	Fair	Good	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
79, 80, 81---- Sampson	Fair	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
82---- Sharps	Fair	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
83*:												
Sharps	Fair	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Rock outcrop.												
84---- Socorro	Poor	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
85, 86---- Stroupe	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
87*:												
Stroupe	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Witt	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
88*:												
Tanbark	Very poor.	Very poor.	Fair	---	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Tortugas	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair.
89*:												
Tortugas	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair.
Asparas	Poor	Fair	Fair	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Rock outcrop.												
90*, 91*:												
Tortugas	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair.

See footnote at end of table.

TABLE 4.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
90*, 91*: Rock outcrop.												
92*: Tortugas	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair.
Ruidoso	Poor	Fair	Fair	---	---	Fair	---	---	Fair	---	---	Fair.
Rock outcrop.												
93*: Travessilla	Very poor.	Very poor.	Poor	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Rock outcrop.												
94--- Tulargo	Very poor.	Very poor.	Fair	---	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
95*: Tulargo	Very poor.	Very poor.	Fair	---	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Andergeorge	Poor	Fair	Poor	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
96*: Witt	Poor	Fair	Fair	---	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Penistaja	Poor	Fair	Fair	---	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1*:						
Andergeorge	Slight	Slight	Slight	Slight	Slight	Moderate: small stones, droughty.
Darvey	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Asparas	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
2---------- Bernal	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
3*:						
Blakeney	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Severe: thin layer.
Arch	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
4*, 5*:						
Clovis	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Harvey	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
6*:						
Clovis	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.
7. Cumulic Haplustolls						
8*:						
Darvey	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Asparas	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
9*:						
Darvey	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.
10---------- Deacon	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
11---------- Deama	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, thin layer.
12*, 13*: Deama----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, thin layer.
Pastura----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.
14*: Deama----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, thin layer.
Rock outcrop.						
15---------- Dioxice	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
16*: Ector----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer.
Kimbrough--------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.
17*: Ector----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer.
Rock outcrop.						
18*: Ector----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, thin layer.
Rock outcrop.						
19---------- Gabaldon	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
20*: Gabaldon---------	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Riverwash.						
21---------- Gavilan	Moderate: too clayey, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, slope, large stones.	Moderate: frost action, shrink-swell.	Moderate: droughty.
22---------- Gavilan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: small stones, droughty.
23---------- Gavilan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones.
24*, 25*: Harvey----------	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
24*, 25*: Darvey	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
26 Hightower	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, frost action.	Moderate: thin layer.
27*: Hightower	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, frost action.	Moderate: thin layer.
Oro Grande	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer.
28*: Hightower	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Oro Grande	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, thin layer.
29 Hightower Variant	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Moderate: thin layer.
30*: Hogadero	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: large stones, droughty.
Pena	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: frost action, large stones.	Moderate: small stones, droughty.
31*. Lava flows						
32*: Lithic Argiustolls.						
Rock outcrop.						
33 Lozier	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, thin layer.
34*: Malargo	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
Bluepoint	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
35 Manzaro	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
36*:						
Mokiak	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.						
37*:						
Mokiak	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Stroupe	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
Rock outcrop.						
38*:						
Monjeau	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
Docdee	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: small stones, large stones.
39*, 40*:						
Monjeau	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Docdee	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, large stones, slope.
41 Nogal	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
42*:						
Nogal	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: small stones, large stones, slope.
Rock outcrop.						
43 Nolten	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
44 Nolten	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
45*:						
Onite	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Bluepoint	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
46, 47---------- Oro Grande	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: large stones, slope, thin layer.
48---------- Paco	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
49---------- Paco	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
50---------- Paco	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
51*:						
Paco----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Penapon----------	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones.
52*:						
Pajara----------	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: small stones, large stones.
Witt----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
53---------- Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.
54*:						
Pastura----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.
Harvey----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
55*:						
Pastura----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: thin layer.
Partri----------	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
56---------- Patos	Severe: large stones.	Severe: shrink-swell, large stones.	Severe: large stones.	Severe: shrink-swell, large stones.	Severe: low strength, shrink-swell.	Severe: large stones.
57---------- Patos	Severe: large stones, slope.	Severe: shrink-swell, slope, large stones.	Severe: slope, large stones.	Severe: shrink-swell, slope, large stones.	Severe: low strength, slope, shrink-swell.	Severe: large stones, slope.
58*:						
Pena----------	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: small stones, droughty, slope.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
58*:						
Dioxice	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
59*:						
Pena	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hogadero	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones, droughty.
60*:						
Penapon	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Tortugas	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
61*:						
Penistaja	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
Travessilla	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
62*, 63*:						
Plack	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: slope, cemented pan.	Moderate: cemented pan.	Severe: thin layer.
Dioxice	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
64*:						
Plack	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Severe: thin layer.
Penistaja	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
65*:						
Purcella	Moderate: large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: frost action, shrink-swell, large stones.	Slight.
Riverwash.						
66 Rance	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Slight	Moderate: low strength.	Moderate: excess salt, thin layer.
67*:						
Rance	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength.	Moderate: excess salt, thin layer.
Tanbark	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
68*:						
Reflection	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
68*: Malargo	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
69--- Remunda	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
70--- Reventon	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action, shrink-swell.	Slight.
71--- Reventon	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action, shrink-swell.	Slight.
72*: Reventon	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action, shrink-swell.	Slight.
Sampson	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.
73*: Rock outcrop.						
Stroupe	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
Deama	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, thin layer.
74--- Romine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
75--- Roswell	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
76--- Ruidoso	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
77*: Ruidoso	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Tortugas	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
78--- Ruidoso Variant	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
79--- Sampson	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
80---------- Sampson	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
81---------- Sampson	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
82---------- Sharps	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Moderate: thin layer.
83*: Sharps----------	Moderate: slope, depth to rock.	Moderate: slope, shrink-swell.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
Rock outcrop.						
84---------- Socorro	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: large stones.	Severe: large stones.	Severe: small stones, large stones.
85, 86---------- Stroupe	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
87*: Stroupe----------	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
Witt----------	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
88*: Tanbark----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Tortugas---------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
89*: Tortugas---------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thir layer.
Asparas----------	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Rock outcrop.						
90*: Tortugas---------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
Rock outcrop.						
91*: Tortugas---------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						

See footnote at end of table.

TABLE 5.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
92*:						
Tortugas	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Ruidoso	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Rock outcrop.						
93*:						
Travessilla	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
Rock outcrop.						
94---------- Tulargo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
95*:						
Tulargo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
Andergeorge	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: small stones, droughty.
96*:						
Witt	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Penistaja	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "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
1*:					
Andergeorge	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Darvey	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Asparas	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
2 Bernal	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
3*:					
Blakeney	Severe: cemented pan.	Severe: cemented pan, seepage.	Moderate: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
Arch	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
4*, 5*:					
Clovis	Slight	Severe: seepage.	Slight	Slight	Good.
Harvey	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
6*:					
Clovis	Slight	Severe: seepage.	Slight	Slight	Good.
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
7. Cumulic Haplustolls					
8*:					
Darvey	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Asparas	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
9*:					
Darvey	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
10 Deacon	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
11---------- Deama	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, large stones.
12*: Deama----------	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, large stones.
Pastura----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
13*: Deama----------	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, large stones.
Pastura----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
14*: Deama----------	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Rock outcrop.					
15---------- Dioxice	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
16*: Ector----------	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim.
Kimbrough----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
17*: Ector----------	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim.
Rock outcrop.					
18*: Ector----------	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
19---------- Gabaldon	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
20*: Gabaldon----------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Riverwash.					

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21--Gavilan	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, small stones.
22--Gavilan	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, small stones, slope.
23--Gavilan	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, large stones.	Severe: slope.	Poor: too clayey, small stones, slope.
24*, 25*:					
Harvey	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Darvey	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
26--Hightower	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
27*:					
Hightower	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Oro Grande	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, small stones.
28*:					
Hightower	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Oro Grande	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
29--Hightower Variant	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
30*:					
Hogadero	Severe: poor filter.	Moderate: seepage, slope.	Severe: seepage.	Slight	Poor: small stones.
Pena	Moderate: percs slowly, large stones.	Moderate: seepage, slope, large stones.	Severe: large stones.	Slight	Poor: large stones.
31*. Lava flows					
32*: Lithic Argiustolls.					
Rock outcrop.					
33--Lozier	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
34*:					
Malargo	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Bluepoint	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Slight	Fair: too sandy.
35--- Manzano	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey.
36*:					
Mokiak	Severe: depth to rock, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
37*:					
Mokiak	Severe: depth to rock, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Stroupe	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, large stones.
Rock outcrop.					
38*:					
Monjeau	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Docdee	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim.
39*, 40*:					
Monjeau	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Docdee	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
41--- Nogal	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
42*:					
Nogal	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
43---------- Nolten	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
44---------- Nolten	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
45*: Onite----------	Severe: poor filter.	Severe: seepage.	Slight----------	Slight----------	Fair: small stones.
Bluepoint----------	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Slight----------	Fair: too sandy.
46, 47---------- Oro Grande	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
48---------- Paco	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
49---------- Paco	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
50---------- Paco	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
51*: Paco----------	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Penapon----------	Moderate: percs slowly, slope, large stones.	Severe: slope.	Moderate: slope, too clayey, large stones.	Moderate: slope.	Poor: small stones.
52*: Pajara----------	Moderate: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: large stones.	Moderate: slope.	Poor: small stones.
Witt----------	Severe: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
53---------- Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
54*: Pastura----------	Severe: cemented pan.	Severe: cemented pan, slope.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
Harvey----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
55*:					
Pastura	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
Partri	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Poor: small stones.
56	Severe: percs slowly, large stones.	Severe: large stones.	Severe: large stones.	Slight	Poor: large stones.
Patos					
57	Severe: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.
Patos					
58*:					
Pena	Moderate: percs slowly, slope, large stones.	Severe: slope.	Severe: large stones.	Moderate: slope.	Poor: large stones.
Dioxice	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
59*:					
Pena	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.
Hogadero	Severe: poor filter.	Moderate: seepage, slope.	Severe: seepage.	Slight	Poor: small stones.
60*:					
Penapon	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: seepage, slope.	Poor: small stones, slope.
Tortugas	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
61*:					
Penistaja	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Travessilla	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
62*, 63*:					
Plack	Severe: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
Dioxice	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
64*:					
Plack	Severe: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Poor: area reclaim.
Penistaja	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
65*:					
Purcella	Severe: percs slowly.	Moderate: seepage, slope.	Severe: large stones.	Slight	Poor: small stones.
Riverwash.					
66--- Rance	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
67*:					
Rance	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Tanbark	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
68*:					
Reflection	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Malargo	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
69--- Remunda	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
70--- Reventon	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
71--- Reventon	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
72*:					
Reventon	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Sampson	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
73*:					
Rock outcrop.					
Stroupe	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, large stones.
Deama	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
74--- Romine	Severe: slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
75--- Roswell	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
76--- Ruidoso	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
77*:					
Ruidoso	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Tortugas	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
78 Ruidoso Variant	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
79, 80 Sampson	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
81 Sampson	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
82 Sharps	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: area reclaim.
83*:					
Sharps	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: area reclaim.
Rock outcrop.					
84 Socorro	Severe: depth to rock, large stones.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage, large stones.	Severe: depth to rock, seepage.	Poor: area reclaim, seepage, small stones.
85, 86 Stroupe	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, large stones.
87*:					
Stroupe	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, large stones.
Witt	Severe: percs slowly.	Severe: slope.	Slight	Slight	Good.
88*:					
Tanbark	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Tortugas	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
89*:					
Tortugas	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Asparas	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Rock outcrop.					

See footnote at end of table.

TABLE 6.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
90*:					
Tortugas	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Rock outcrop.					
91*:					
Tortugas	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
92*:					
Tortugas	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Ruidoso	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Rock outcrop.					
93*:					
Travessilla	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Rock outcrop.					
94 Tulargo	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
95*:					
Tulargo	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Andergeorge	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
96*:					
Witt	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Penistaja	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1*:				
Andergeorge	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Darvey	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Asparas	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
2 Bernal	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
3*:				
Blakeney	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Arch	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
4*, 5*:				
Clovis	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Harvey	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
6*:				
Clovis	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Pastura	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
7. Cumulic Haplustolls				
8*:				
Darvey	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Asparas	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
9*:				
Darvey	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Pastura	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
10 Deacon	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11--- Deama	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones.
12*, 13*: Deama---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones.
Pastura---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
14*: Deama---	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
Rock outcrop.				
15--- Dioxice	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
16*: Ector---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Kimbrough---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
17*: Ector---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Rock outcrop.				
18*: Ector---	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
19--- Gabaldon	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
20*: Gabaldon---	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Riverwash.				
21--- Gavilan	Fair: large stones, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
22--- Gavilan	Fair: large stones, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
23--Gavilan	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
24*, 25*:				
Harvey	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Darvey	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
26--Hightower	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
27*:				
Hightower	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Oro Grande	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
28*:				
Hightower	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Oro Grande	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
29--Hightower Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
30*:				
Hogadero	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
Pena	Fair: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
31*. Lava flows				
32*: Lithic Argiustolls.				
Rock outcrop.				
33--Lozier	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
34*:				
Malargo	Good	Probable	Probable	Fair: small stones.
Bluepoint	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
35---------- Manzano	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
36*: Mokiak----------	Poor: area reclaim, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Rock outcrop.				
37*: Mokiak----------	Poor: area reclaim, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Stroupe----------	Poor: area reclaim, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Rock outcrop.				
38*: Monjeau----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Docdee----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
39*: Monjeau----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Docdee----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
40*: Monjeau----------	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Docdee----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
41---------- Nogal	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
42*: Nogal----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
43---------- Nolten	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
44--Nolten	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
45*:				
Onite	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Bluepoint	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
46--Oro Grande	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, large stones, slope.
47--Oro Grande	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, large stones, slope.
48--Paco	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
49, 50--Paco	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
51*:				
Paco	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Penapon	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
52*:				
Pajara	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Witt	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
53--Pastura	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
54*:				
Pastura	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Harvey	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
55*:				
Pastura	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Partri	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
56--Patos	Poor: low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
57--Patos	Poor: low strength, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
58*:				
Pena	Fair: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
Dioxice	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
59*:				
Pena	Fair: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
Hogadero	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
60*:				
Penapon	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, area reclaim, slope.
Tortugas	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
61*:				
Penistaja	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Travessilla	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
62*, 63*:				
Plack	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Dioxice	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
64*:				
Plack	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Penistaja	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
65*:				
Purcella	Fair: large stones, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Riverwash.				

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
66--- Rance	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, excess salt, thin layer.
67*: Rance---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, excess salt, thin layer.
Tanbark---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
68*: Reflection---	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Malargo---	Good---	Probable---	Probable---	Fair: small stones.
69--- Remunda	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
70, 71--- Reventon	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
72*: Reventon---	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Sampson---	Good---	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
73*: Rock outcrop.				
Stroupe---	Poor: area reclaim, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Deama---	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
74--- Romine	Poor: slope.	Improbable: small stones.	Probable---	Poor: small stones, area reclaim, slope.
75--- Roswell	Good---	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
76--- Ruidoso	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
77*: Ruidoso---	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Tortugas---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
78---------- Ruidoso Variant	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
79, 80---------- Sampson	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
81---------- Sampson	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
82---------- Sharps	Poor: low strength, thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Moderate: thin layer, area reclaim.
83*:				
Sharps----------	Poor: low strength, thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Moderate: slope, thin layer, area reclaim.
Rock outcrop.				
84---------- Socorro	Poor: area reclaim, large stones.	Improbable: small stones, large stones.	Improbable: large stones.	Poor: small stones.
85, 86---------- Stroupe	Poor: area reclaim, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
87*:				
Stroupe----------	Poor: area reclaim, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Witt----------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
88*:				
Tanbark----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Tortugas----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
89*:				
Tortugas----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Asparas----------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Rock outcrop.				
90*:				
Tortugas----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Rock outcrop.				

See footnote at end of table.

TABLE 7.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
91*:				
Tortugas	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
92*:				
Tortugas	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Ruidoso	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Rock outcrop.				
93*:				
Travessilla	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Rock outcrop.				
94 Tulargo	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
95*:				
Tulargo	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Andergeorge	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
96*:				
Witt	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Penistaja	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1*:						
Andergeorge	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Favorable	Droughty.
Darvey	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Asparas	Moderate: seepage.	Severe: thin layer.	Deep to water	Favorable	Favorable	Favorable.
2--- Bernal	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
3*:						
Blakeney	Severe: seepage, cemented pan.	Severe: thin layer.	Deep to water	Droughty, soil blowing, cemented pan.	Cemented pan, soil blowing.	Droughty, cemented pan, rooting depth.
Arch	Severe: seepage.	Severe: piping.	Deep to water	Slope	Erodes easily, soil blowing.	Erodes easily.
4*:						
Clovis	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
Harvey	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing	Erodes easily, soil blowing.	Erodes easily.
5*:						
Clovis	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Harvey	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
6*:						
Clovis	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Pastura	Severe: cemented pan.	Severe: piping.	Deep to water	Cemented pan, slope.	Cemented pan, erodes easily.	Erodes easily, cemented pan.
7. Cumulic Haplustolls						
8*:						
Darvey	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Asparas	Moderate: seepage.	Severe: thin layer.	Deep to water	Favorable	Favorable	Favorable.
9*:						
Darvey	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Pastura	Severe: cemented pan.	Severe: piping.	Deep to water	Cemented pan, slope.	Cemented pan, erodes easily.	Erodes easily, cemented pan.
10--- Deacon	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
11---------- Deama	Severe: depth to rock.	Severe: large stones.	Deep to water	Large stones, depth to rock, slope.	Large stones, depth to rock.	Large stones, depth to rock.
12*, 13*: Deama----------	Severe: depth to rock.	Severe: large stones.	Deep to water	Large stones, depth to rock, slope.	Large stones, depth to rock.	Large stones, depth to rock.
Pastura----------	Severe: cemented pan.	Severe: piping.	Deep to water	Cemented pan, slope.	Cemented pan, erodes easily.	Erodes easily, cemented pan.
14*: Deama----------	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.						
15---------- Dioxice	Moderate: slope.	Severe: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
16*: Ector----------	Severe: depth to rock.	Severe: thin layer, large stones.	Deep to water	Large stones, depth to rock, slope.	Large stones, depth to rock.	Large stones, depth to rock.
Kimbrough--------	Severe: cemented pan.	Severe: thin layer.	Deep to water	Cemented pan---	Cemented pan---	Cemented pan.
17*: Ector----------	Severe: depth to rock.	Severe: thin layer, large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.						
18*: Ector----------	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.						
19---------- Gabaldon	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
20*: Gabaldon---------	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
Riverwash.						
21---------- Gavilan	Moderate: slope.	Moderate: large stones.	Deep to water	Large stones, droughty, percs slowly.	Large stones, erodes easily.	Large stones, erodes easily.
22---------- Gavilan	Severe: slope.	Moderate: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
23---------- Gavilan	Severe: slope.	Moderate: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones.	Large stones, slope.
24*: Harvey----------	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing---	Erodes easily, soil blowing.	Erodes easily.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
24*:						
Darvey	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing	Erodes easily, soil blowing.	Erodes easily.
25*:						
Harvey	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Darvey	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
26--- Hightower	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
27*:						
Hightower	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Oro Grande	Severe: depth to rock.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty.
28*:						
Hightower	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Oro Grande	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
29--- Hightower Variant	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily, soil blowing.	Erodes easily, depth to rock.
30*:						
Hogadero	Moderate: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope, erodes easily.	Erodes easily	Erodes easily, droughty.
Pena	Moderate: seepage, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Large stones	Large stones.
31*. Lava flows						
32*: Lithic Argiustolls. Rock outcrop.						
33--- Lozier	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
34*:						
Malargo	Severe: seepage.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Bluepoint	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
35---------- Manzano	Slight---------	Severe: piping.	Deep to water	Flooding-------	Favorable------	Favorable.
36*: Mokiak----------	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
37*: Mokiak----------	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Stroupe----------	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
38*, 39*, 40*: Monjeau----------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Docdee----------	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
41---------- Nogal	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
42*: Nogal----------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Rock outcrop.						
43, 44---------- Nolten	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
45*: Onite----------	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing---	Droughty.
Bluepoint--------	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
46, 47---------- Oro Grande	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
48---------- Paco	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
49---------- Paco	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
50---------- Paco	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
51*:						
Paco	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Penapon	Severe: slope.	Moderate: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
52*:						
Pajara	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones.	Large stones, slope, droughty.
Witt	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
53--- Pastura	Severe: cemented pan.	Severe: piping.	Deep to water	Cemented pan, slope.	Cemented pan, erodes easily.	Erodes easily, cemented pan.
54*:						
Pastura	Severe: cemented pan.	Severe: piping.	Deep to water	Soil blowing, cemented pan, slope.	Cemented pan, erodes easily.	Erodes easily, cemented pan.
Harvey	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing---	Erodes easily, soil blowing.	Erodes easily.
55*:						
Pastura	Severe: cemented pan.	Severe: piping.	Deep to water	Cemented pan---	Cemented pan, erodes easily.	Erodes easily, cemented pan.
Partri	Slight---	Moderate: piping.	Deep to water	Percs slowly, erodes easily.	Large stones, erodes easily.	Erodes easily, percs slowly.
56--- Patos	Moderate: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.	Large stones---	Large stones, droughty.
57--- Patos	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones.	Large stones, slope, droughty.
58*:						
Pena	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope.
Dioxice	Moderate: slope.	Severe: piping.	Deep to water	Slope---	Erodes easily	Erodes easily.
59*:						
Pena	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope.
Hogadero	Moderate: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Favorable---	Droughty.
60*:						
Penapon	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Tortugas	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
61*:						
Penistaja	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing	Favorable.
Travessilla	Severe: depth to rock.	Severe: thin layer.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock	Depth to rock.
62*, 63*:						
Plack	Severe: cemented pan.	Severe: thin layer.	Deep to water	Cemented pan, slope.	Cemented pan	Cemented pan.
Dioxice	Slight	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
64*:						
Plack	Severe: cemented pan.	Severe: thin layer.	Deep to water	Soil blowing, cemented pan.	Cemented pan, soil blowing.	Cemented pan.
Penistaja	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
65*:						
Purcella	Moderate: seepage.	Severe: piping.	Deep to water	Large stones, erodes easily.	Large stones, erodes easily.	Large stones, erodes easily.
Riverwash.						
66---------- Rance	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Excess salt, erodes easily.
67*:						
Rance	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Excess salt, erodes easily.
Tanbark	Severe: depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
68*:						
Reflection	Moderate: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
Malargo	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
69---------- Remunda	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
70---------- Reventon	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
71---------- Reventon	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
72*:						
Reventon	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Sampson	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
73*:						
Rock outcrop.						

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
73*:						
Stroupe	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Deama	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
74--- Romine	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
75--- Roswell	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
76--- Ruidoso	Moderate: slope.	Slight	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
77*:						
Ruidoso	Moderate: slope.	Slight	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Tortugas	Severe: depth to rock.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty.
78--- Ruidoso Variant	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
79--- Sampson	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
80--- Sampson	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
81--- Sampson	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
82--- Sharps	Moderate: seepage, depth to rock, slope.	Severe: piping.	Depth to rock, slope.	Depth to rock, slope.	Depth to rock	Favorable.
83*:						
Sharps	Severe: slope.	Severe: piping.	Slope, depth to rock.	Depth to rock, slope.	Depth to rock, slope.	Slope.
Rock outcrop.						
84--- Socorro	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
85, 86--- Stroupe	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
87*:						
Stroupe	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Witt	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
88*:						
Tanbark	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Tortugas	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
89*:						
Tortugas	Severe: depth to rock.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty.
Asparas	Moderate: seepage.	Severe: thin layer.	Deep to water	Favorable	Favorable	Favorable.
Rock outcrop.						
90*:						
Tortugas	Severe: depth to rock.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty.
Rock outcrop.						
91*:						
Tortugas	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
92*:						
Tortugas	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Ruidoso	Moderate: slope.	Slight	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Rock outcrop.						
93*:						
Travessilla	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.						
94 Tulargo	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
95*:						
Tulargo	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Andergeorge	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Favorable	Droughty.
96*:						
Witt	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Penistaja	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--ENGINEERING INDEX PROPERTIES

[The symbol > means more than. Absence of an entry indicates that data were not estimated]

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	
1*:											
Andergeorge	0-5	Gravelly fine sandy loam.	SM, SM-SC, GM, GM-GC	A-1, A-2	0	60-70	50-60	35-50	20-35	20-30	NP-10
	5-22	Extremely gravelly loam, very gravelly loam.	GM, GM-GC, SM, SM-SC	A-2, A-4	0-15	45-70	35-60	30-55	25-40	20-30	NP-10
	22-60	Very gravelly loam, extremely gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-50	20-40	15-35	10-25	20-30	NP-10
Darvey	0-6	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	6-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-80	25-40	5-20
Asparas	0-2	Loam	CL, CL-ML	A-4, A-6	0	100	100	80-90	55-75	20-30	5-15
	2-24	Clay loam, loam	CL	A-6	0	100	100	80-90	60-80	30-40	10-20
	24-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	80-90	55-80	20-30	5-15
2 Bernal	0-4	Gravelly loam	GM-GC, SM-SC, CL-ML	A-4	0	65-80	60-75	40-65	35-60	20-25	5-10
	4-17	Gravelly loam, gravelly clay loam, clay loam.	GM-GC, GC, SM-SC, SC	A-4, A-6	0	65-95	60-90	45-70	40-65	20-30	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
3*:											
Blakeney	0-13	Fine sandy loam	SM, ML,	A-4, A-2	0-5	75-95	70-95	60-85	30-55	20-30	NP-5
	13	Indurated	---	---	---	---	---	---	---	---	---
Arch	0-8	Sandy loam	SM	A-4	0	100	100	65-80	35-50	20-25	NP-5
	8-39	Loam, clay loam	ML, CL-ML	A-4	0	100	100	85-95	60-80	25-35	5-10
	39-60	Sandy loam	SM	A-2, A-4	0	100	100	60-70	30-40	20-25	NP-5
4*:											
Clovis	0-4	Fine sandy loam	SM, ML	A-4	0	100	100	70-90	40-60	---	NP
	4-34	Sandy clay loam, clay loam, loam.	CL	A-6	0	100	100	90-100	50-85	25-40	10-20
	34-60	Loam, clay loam	CL-ML, ML	A-4	0	100	100	90-100	50-75	20-30	NP-10
Harvey	0-5	Fine sandy loam	SM, ML	A-4, A-2	0	80-100	80-100	55-90	30-60	20-30	NP-5
	5-60	Clay loam, loam	CL-ML, CL, SC, SM-SC	A-4, A-6	0	80-100	80-100	70-100	35-80	25-40	5-15
5*:											
Clovis	0-2	Loam	ML	A-4	0	100	100	90-100	60-85	25-30	NP-5
	2-60	Sandy clay loam, clay loam, loam.	CL	A-6	0	100	100	90-100	50-85	25-40	10-20
Harvey	0-4	Loam	CL-ML, ML	A-4	0	80-100	80-100	70-100	50-80	25-35	5-10
	4-60	Clay loam, loam	CL-ML, CL, SC, SM-SC	A-4, A-6	0	80-100	80-100	70-100	35-80	25-40	5-15
6*:											
Clovis	0-2	Loam	ML	A-4	0	100	100	90-100	60-85	25-30	NP-5
	2-60	Sandy clay loam, clay loam, loam.	CL	A-6	0	100	100	90-100	50-85	25-40	10-20

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
6*:											
Pastura	0-2	Loam	CL-ML, CL	A-4, A-6	0-10	90-100	85-100	70-90	50-70	25-35	5-15
	2-13	Loam, clay loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0	75-95	65-90	60-80	50-70	25-35	5-15
	13	Indurated	---	---	---	---	---	---	---	---	---
7. Cumulic Haplustolls											
8*:											
Darvey	0-6	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	6-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-80	25-40	5-20
Asparas	0-2	Loam	CL, CL-ML	A-4, A-6	0	100	100	80-90	55-75	20-30	5-15
	2-24	Clay loam, loam	CL	A-6	0	100	100	80-90	60-80	30-40	10-20
	24-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	80-90	55-80	20-30	5-15
9*:											
Darvey	0-4	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	4-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-80	25-40	5-20
Pastura	0-2	Loam	CL-ML, CL	A-4, A-6	0-10	90-100	85-100	70-90	50-70	25-35	5-15
	2-13	Loam, clay loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0	75-95	65-90	60-80	50-70	25-35	5-15
	13	Indurated	---	---	---	---	---	---	---	---	---
10	0-10	Loam	ML, CL-ML	A-4	0	80-100	80-100	75-95	50-65	20-30	NP-10
Deacon	10-60	Loam, clay loam	CL	A-6	0-15	80-100	75-100	75-95	50-85	25-35	10-20
11	0-6	Very cobbly loam	GM, ML, SM	A-4	35-50	60-80	55-75	50-70	40-60	25-30	NP-5
Deama	6	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
12*, 13*:											
Deama	0-6	Very cobbly loam	GM, ML, SM	A-4	35-50	60-80	55-75	50-70	40-60	25-30	NP-5
	6	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pastura	0-2	Loam	CL-ML, CL	A-4, A-6	0-10	90-100	85-100	70-90	50-70	25-35	5-15
	2-13	Loam, clay loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0	75-95	65-90	60-80	50-70	25-35	5-15
	13	Indurated	---	---	---	---	---	---	---	---	---
14*:											
Deama	0-6	Very cobbly loam	GM, ML, SM	A-4	35-50	60-80	55-75	50-70	40-60	25-30	NP-5
	6	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
15	0-11	Loam	CL	A-6	0	95-100	90-100	80-100	70-85	30-40	10-15
Dioxice	11-34	Loam, clay loam, sandy clay loam.	ML, CL A-7	A-4, A-6,	0	95-100	90-100	85-100	60-85	30-45	5-20
	34-60	Loam, clay loam, gravelly loam.	ML, CL	A-4, A-6, A-7	0-15	65-100	60-100	55-100	50-85	30-45	5-20

See footnote at end of table.

TABLE 9.--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	
16*:											
Ector	0-7	Very cobbly loam	GC, CL, SC	A-2, A-6	25-50	45-80	40-75	35-70	20-60	25-35	10-15
	7	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kimbrough	0-8	Gravelly loam	GM, ML, CL-ML, GM-GC	A-2, A-4	0-10	55-80	50-75	40-70	30-55	20-30	NP-10
	8	Indurated	---	---	---	---	---	---	---	---	---
17*, 18*:											
Ector	0-7	Very cobbly loam	GC, CL, SC	A-2, A-6	25-50	45-80	40-75	35-70	20-60	25-35	10-15
	7	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
19	0-4	Silt loam	ML, CL-ML	A-4	0	100	95-100	80-95	60-80	25-35	5-10
Gabaldon	4-60	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	75-90	25-40	5-15
20*:											
Gabaldon	0-8	Silt loam	ML, CL-ML	A-4	0	100	95-100	80-95	60-80	25-35	5-10
	8-60	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	75-90	25-40	5-15
Riverwash.											
21	0-8	Loam	CL-ML, ML	A-4	0	95-100	85-100	60-80	55-75	20-30	NP-10
Gavilan	8-16	Gravelly clay loam, cobbly clay loam.	SM-SC, SC	A-4, A-6	0-15	75-85	65-75	45-55	40-50	25-35	5-15
	16-43	Very cobbly clay, very gravelly clay, very cobbly clay loam.	GC, SC	A-2	15-45	35-70	25-60	20-50	15-35	30-55	15-30
	43-60	Very gravelly clay loam, very cobbly clay loam, extremely gravelly clay loam.	GM-GC, GC, SC, SM-SC	A-2	15-45	35-70	25-60	15-45	15-35	25-30	5-15
22	0-6	Gravelly loam	SM-SC, SM, CL-ML, ML	A-2, A-4	0	75-100	50-75	35-60	30-60	20-30	NP-10
Gavilan	6-60	Very cobbly clay, very gravelly clay, very cobbly clay loam.	GC, SC	A-2	15-45	35-70	25-60	20-50	15-35	30-55	15-30
23	0-18	Very gravelly loam.	GM-GC, SM-SC, SM, GM	A-2, A-4, A-1	0-10	40-85	25-50	20-45	20-40	20-30	NP-10
Gavilan	18-60	Very cobbly clay, very gravelly clay, very cobbly clay loam.	GC, SC	A-2	15-45	35-70	25-60	20-50	15-35	30-55	15-30
24*:											
Harvey	0-4	Fine sandy loam	SM, ML	A-4, A-2	0	80-100	80-100	55-90	30-60	20-30	NP-5
	4-60	Clay loam, loam	CL-ML, CL, SC, SM-SC	A-4, A-6	0	80-100	80-100	70-100	35-80	25-40	5-15

See footnote at end of table.

TABLE 9.--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	
24*:											
Darvey	0-6	Fine sandy loam	SM	A-4	0	100	100	70-85	40-50	20-25	NP-5
	6-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-80	25-40	5-20
25*:											
Harvey	0-6	Loam	CL-ML, ML	A-4	0	80-100	80-100	70-100	50-80	25-35	5-10
	6-60	Clay loam, loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0	80-100	80-100	70-100	35-80	25-40	5-15
Darvey	0-6	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	6-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-80	25-40	5-20
26	0-3	Loam	ML	A-4	0	80-95	75-90	55-80	50-75	20-25	NP-5
Hightower	3-22	Loam, clay loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0	80-95	70-90	55-85	50-80	20-30	5-15
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
27*:											
Hightower	0-3	Loam	ML	A-4	0	80-95	75-90	55-80	50-75	20-25	NP-5
	3-25	Loam, clay loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0	80-95	70-90	55-85	50-80	20-30	5-15
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oro Grande	0-3	Very gravelly loam.	GM-GC	A-1, A-2	15-25	40-60	35-60	30-40	20-30	20-25	5-10
	3-8	Very cobbly loam	GM-GC, SM-SC	A-2, A-4	30-55	55-75	50-70	40-50	30-40	20-25	5-10
	8-13	Very gravelly loam, extremely gravelly loam.	GM-GC	A-1, A-2	20-30	30-55	25-50	20-35	15-25	20-25	5-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
28*:											
Hightower	0-14	Loam	ML	A-4	0	80-95	75-90	55-80	50-75	20-25	NP-5
	14-31	Loam, clay loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0	80-95	70-90	55-85	50-80	20-30	5-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oro Grande	0-3	Very gravelly loam.	GM-GC	A-1, A-2	15-25	40-60	35-60	30-40	20-30	20-25	5-10
	3-12	Very gravelly loam, extremely gravelly clay loam.	GM-GC	A-1, A-2	20-30	30-55	25-50	20-35	15-25	20-25	5-10
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
29	0-2	Sandy loam	SM	A-4	0	100	80-100	60-70	35-45	15-20	NP-5
Hightower Variant	2-26	Loam, sandy loam	CL-ML	A-4	0	100	80-100	65-75	65-70	20-25	5-10
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
30*:											
Hogadero	0-4	Loam	ML, CL-ML	A-4	0-10	80-95	75-90	65-80	50-70	25-35	5-10
	4-8	Gravelly clay loam, gravelly loam.	CL-ML, SM-SC	A-2, A-4	0-10	75-85	70-80	45-65	30-55	25-30	5-10
	8-60	Very gravelly loam, extremely gravelly loam, very gravelly sandy loam.	GM-GC, GP-GC	A-2, A-1	0-10	25-55	20-50	15-35	5-15	25-30	5-10
Pena	0-14	Gravelly loam	GM, GM-GC, SM, SM-SC	A-4	0-5	60-75	55-70	50-65	35-50	20-30	NP-10
	14-18	Very gravelly loam, gravelly loam.	GM-GC, GM SM-SC, SM	A-1, A-2	15-25	45-70	40-65	30-45	20-35	25-35	5-10
	18-60	Very gravelly loam, gravelly loam.	GM, GM-GC	A-1, A-2	15-30	35-55	30-50	30-50	20-35	20-30	NP-10
31*. Lava flows											
32*: Lithic Argiustolls.											
Rock outcrop.											
33 Lozier	0-13	Very gravelly loam.	GM-GC	A-1, A-2, A-4	5-20	30-60	25-55	20-50	15-45	25-30	5-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
34*:											
Malargo	0-4	Loam	ML, CL-ML	A-4	0	95-100	90-100	80-90	60-70	25-35	5-10
	4-49	Loam, silt loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-4	0	95-100	90-100	75-95	45-75	25-35	5-10
	49-60	Loam, fine sandy loam, sandy loam.	ML, CL-ML, SM, SM-SC	A-4, A-2	0	95-100	90-100	60-85	30-60	25-35	5-10
Bluepoint	0-4	Loamy fine sand	SM	A-2, A-4	0	100	100	65-85	25-45	---	NP
	4-60	Loamy fine sand, fine sand.	SM	A-2, A-4	0	100	100	65-85	25-45	---	NP
35 Manzano	0-24	Loam	CL-ML	A-4	0	90-100	90-100	85-100	60-80	20-30	5-10
	24-60	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	80-100	75-100	70-100	50-85	25-40	5-15
36*:											
Mokiak	0-3	Very gravelly loam.	SM	A-1	0-5	70-80	30-40	20-30	10-15	15-20	NP-5
	3-22	Very gravelly clay loam.	GM-GC, GC	A-2, A-1	0-5	30-50	25-45	20-35	10-25	25-35	5-15
	22	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
37*:											
Mokiak	0-9	Stony loam	GM-GC, GC	A-4, A-6	0-25	55-70	50-65	40-60	35-50	15-30	5-15
	9-24	Very gravelly clay loam, extremely gravelly clay loam.	GC, GP-GC	A-2	0-10	20-45	10-35	5-25	5-20	30-40	15-25
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---
Stroupe	0-3	Very cobbly loam	SM, ML	A-4	45-70	80-95	75-90	65-85	45-65	20-30	NP-5
	3-30	Very cobbly clay loam, extremely cobbly clay loam, very cobbly clay.	GC, CL	A-6, A-7	30-50	65-80	60-75	55-75	45-70	35-45	15-25
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
38*:											
Monjeau	0-6	Loam	CL-ML, ML	A-4	0	95-100	90-100	65-85	60-80	20-30	NP-10
	6-38	Clay loam, clay	CL, CH	A-6, A-7	0	95-100	90-100	70-90	65-85	30-55	15-30
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---
Docdee	0-8	Very cobbly loam	CL-ML, GM, GM-GC, ML	A-4, A-2	40-60	55-90	45-80	40-75	30-60	20-30	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
39*:											
Monjeau	0-7	Loam	CL-ML, ML	A-4	0	95-100	90-100	65-85	60-80	20-30	NP-10
	7-31	Clay loam, clay	CL, CH	A-6, A-7	0	95-100	90-100	70-90	65-85	30-55	15-30
	31	Weathered bedrock	---	---	---	---	---	---	---	---	---
Docdee	0-4	Very cobbly loam	CL-ML, GM, GM-GC, ML	A-4, A-2	40-60	55-90	45-80	40-75	30-60	20-30	NP-10
	4-12	Very gravelly loam.	GM, GM-GC	A-4	15-25	60-70	50-60	45-55	35-45	20-30	NP-10
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
40*:											
Monjeau	0-2	Loam	CL-ML, ML	A-4	0	95-100	90-100	65-85	60-80	20-30	NP-10
	2-32	Clay loam, clay	CL, CH	A-6, A-7	0	95-100	90-100	70-90	65-85	30-55	15-30
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
Docdee	0-10	Very cobbly loam	CL-ML, GM, GM-GC, ML	A-4, A-2	40-60	55-90	45-80	40-75	30-60	20-30	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
41	0-2	Sandy clay loam	SC, SM-SC	A-4, A-6	0	95-100	90-100	55-65	40-50	20-30	5-15
Nogal	2-30	Clay, sandy clay, gravelly clay.	CL, CH, GC	A-7	0	85-100	60-100	50-70	40-60	40-60	20-40
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
42*:											
Nogal	0-2	Very cobbly sandy clay loam.	GM-GC, GC, SC, SM-SC	A-2	30-50	50-75	45-70	30-50	25-35	20-30	5-15
	2-40	Clay, sandy clay, gravelly clay.	CL, CH, SC	A-7	0-10	80-100	60-100	50-70	40-60	40-60	20-40
	40	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 9.--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	
43----------	0-15	Loam----------	CL-ML, ML	A-4	0	95-100	90-100	65-85	60-80	20-30	NP-10
Nolten	15-35	Clay loam, clay	CL, CH	A-6, A-7	0	95-100	90-100	70-90	65-85	30-55	15-30
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
44----------	0-4	Loam----------	CL-ML, ML	A-4	0	95-100	90-100	65-85	60-80	20-30	NP-10
Nolten	4-39	Clay loam, clay	CL, CH	A-6, A-7	0	95-100	90-100	70-90	65-85	30-55	15-30
	39	Weathered bedrock	---	---	---	---	---	---	---	---	---
45*:											
Onite----------	0-7	Loamy fine sand	SM	A-2	0	100	100	50-95	15-35	---	NP
	7-60	Sandy loam, fine sandy loam.	SM	A-2	0	85-100	75-100	50-95	15-35	---	NP
Bluepoint-------	0-4	Loamy fine sand	SM	A-2, A-4	0	100	100	65-85	25-45	---	NP
	4-60	Loamy fine sand, fine sand.	SM	A-2, A-4	0	100	100	65-85	25-45	---	NP
46----------	0-8	Very cobbly clay loam.	GM-GC, SM-SC	A-4	50-70	55-85	50-80	40-70	35-50	25-30	5-10
Oro Grande	8-17	Extremely cobbly clay loam.	SC, GM-GC, SM-SC, GC	A-4, A-6	40-65	65-75	65-75	55-70	40-50	25-35	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
47----------	0-8	Very cobbly clay loam.	GM-GC, SM-SC	A-4	40-65	65-75	65-75	55-70	40-50	25-30	5-10
Oro Grande	8-15	Very cobbly clay loam.	SC, GM-GC, SM-SC, GC	A-4, A-6	40-65	65-75	65-75	55-70	40-50	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
48----------	0-5	Loam----------	CL-ML, ML	A-4	0	100	100	70-100	65-85	20-30	NP-10
Paco	5-45	Clay loam, clay	CL, CH	A-7, A-6	0	100	100	75-100	65-90	30-55	15-30
	45-49	Gravelly clay loam, gravelly clay.	CL, CH, SC, GC	A-6, A-7	0	60-80	55-75	50-60	45-55	30-55	15-30
	49	Weathered bedrock	---	---	---	---	---	---	---	---	---
49----------	0-9	Loam----------	CL-ML, ML	A-4	0	100	100	70-100	65-85	20-30	NP-10
Paco	9-53	Clay loam, clay	CL, CH	A-7, A-6	0	100	100	75-100	65-90	30-55	15-30
	53	Weathered bedrock	---	---	---	---	---	---	---	---	---
50----------	0-7	Loam----------	CL-ML, ML	A-4	0	100	100	70-100	65-85	20-30	NP-10
Paco	7-49	Clay loam, clay	CL, CH	A-7, A-6	0	100	100	75-100	65-90	30-55	15-30
	49	Weathered bedrock	---	---	---	---	---	---	---	---	---
51*:											
Paco----------	0-7	Loam----------	CL-ML, ML	A-4	0	100	100	70-100	65-85	20-30	NP-10
	7-60	Clay loam, clay	CL, CH	A-7, A-6	0	100	100	75-100	65-90	30-55	15-30
	60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Penapon---------	0-10	Very gravelly loam.	GM-GC, GM	A-1, A-2, A-4	15-30	25-60	20-55	20-45	15-40	20-30	NP-10
	10-60	Extremely gravelly loam, very gravelly clay loam.	GM-GC, GC	A-2, A-1	10-25	25-55	20-50	15-40	15-35	25-35	5-15
52*:											
Pajara----------	0-4	Extremely cobbly loam.	GM, GM-GC	A-1, A-2	45-55	35-50	30-45	20-35	15-30	25-35	5-10
	4-14	Extremely cobbly sandy clay, very cobbly clay.	GC	A-2	25-45	45-65	40-60	35-55	20-35	35-50	15-30
	14-60	Extremely cobbly loam.	GM, GM-GC	A-2, A-4	25-40	45-65	40-60	35-50	25-40	25-35	5-10

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
52*:											
Witt	0-7	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	70-90	20-30	NP-10
	7-34	Clay loam, silty clay loam, loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-15
	34-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	50-80	25-40	5-15
53	0-2	Loam	CL-ML, CL	A-4, A-6	0-10	90-100	85-100	70-90	50-70	25-35	5-15
Pastura	2-13	Loam, clay loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0	75-95	65-90	60-80	50-70	25-35	5-15
	13	Indurated	---	---	---	---	---	---	---	---	---
54*:											
Pastura	0-13	Sandy loam	SM	A-4, A-2	0-10	90-100	85-100	55-80	30-50	20-25	NP-5
	13	Indurated	---	---	---	---	---	---	---	---	---
Harvey	0-15	Sandy loam	SM, ML	A-4, A-2	0	80-100	80-100	55-90	30-60	20-30	NP-5
	15-60	Clay loam, loam	CL-ML, CL, SC, SM-SC	A-4, A-6	0	80-100	80-100	70-100	35-80	25-40	5-15
55*:											
Pastura	0-2	Loam	CL-ML, CL	A-4, A-6	0-10	90-100	85-100	70-90	50-70	25-35	5-15
	2-13	Loam, clay loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0	75-95	65-90	60-80	50-70	25-35	5-15
	13	Indurated	---	---	---	---	---	---	---	---	---
Partri	0-4	Loam	CL-ML	A-4	0	100	100	90-100	70-90	20-30	5-10
	4-31	Clay loam, silty clay loam, clay.	CL, CH	A-7	0	95-100	90-100	80-100	75-85	40-60	20-35
	31-60	Loam, clay loam	CL, ML	A-6, A-4	0	100	100	85-100	60-80	30-40	5-15
56	0-4	Stony loam	ML, CL-ML	A-4	25-50	90-100	85-100	75-90	55-70	25-35	5-10
Patos	4-30	Very stony clay, extremely stony clay, stony clay loam.	CL, CH	A-7	30-80	90-100	85-100	75-90	65-85	40-55	15-30
	30-60	Extremely stony clay loam.	CL	A-6	70-85	80-100	75-100	70-95	55-75	35-40	15-20
57	0-5	Bouldery loam	ML, CL-ML	A-4	25-50	90-100	85-100	75-90	55-70	25-35	5-10
Patos	5-31	Very stony clay, extremely stony clay, very stony clay loam.	CL, CH	A-7	30-80	90-100	85-100	75-90	65-85	40-55	15-30
	31-60	Extremely stony clay loam.	CL	A-6	70-85	80-100	75-100	70-95	55-75	35-40	15-20
58*:											
Pena	0-12	Gravelly loam	GM, GM-GC, SM, SM-SC	A-4	0-5	60-75	55-70	50-65	35-50	20-30	NP-10
	12-60	Very cobbly loam, extremely cobbly loam.	GM, GM-GC	A-1, A-2	35-75	35-55	30-50	30-50	20-35	20-30	NP-10
Dioxice	0-10	Loam	CL	A-6	0	95-100	90-100	80-100	70-85	30-40	10-15
	10-30	Loam, clay loam, sandy clay loam.	ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	60-85	30-45	5-20
	30-60	Loam, clay loam, gravelly loam.	ML, CL	A-4, A-6, A-7	0-15	65-100	60-100	55-100	50-85	30-45	5-20

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
59*:											
Pena	0-10	Gravelly loam	GM, GM-GC, SM, SM-SC	A-4	0-5	60-75	55-70	50-65	35-50	20-30	NP-10
	10-60	Very gravelly loam, gravelly loam.	GM-GC, GM	A-1, A-2	25-55	50-60	45-55	35-50	20-35	25-35	5-10
Hogadero	0-10	Gravelly loam	CL-ML, CL, SC, SM-SC	A-4, A-6, A-2	0-10	80-95	50-75	45-65	30-55	25-35	5-15
	10-60	Very gravelly loam, extremely gravelly loam, very gravelly sandy loam.	GM-GC, GP-GC	A-2, A-1	0-10	25-55	20-50	15-35	5-15	25-30	5-10
60*:											
Penapon	0-11	Very cobbly loam	CL-ML, ML, SC, GM-GC	A-4	45-65	60-95	55-85	40-65	40-60	20-30	NP-10
	11-60	Very gravelly loam, extremely gravelly loam, very cobbly clay loam.	GM-GC, GC, SM-SC, SC	A-2, A-4, A-6, A-1	25-55	25-75	20-70	15-55	15-50	25-35	5-15
Tortugas	0-13	Very cobbly loam	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-65	20-30	5-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
61*:											
Penistaja	0-8	Fine sandy loam	ML, SM	A-4	0	100	100	90-100	40-60	20-25	NP-5
	8-38	Sandy clay loam, clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0	100	100	95-100	45-75	25-35	5-15
	38-60	Sandy loam, fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	100	100	70-95	30-55	20-30	NP-10
Travessilla	0-12	Sandy loam	SM	A-2, A-4	0-5	85-100	80-100	50-70	25-40	---	NP
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
62*:											
Plack	0-17	Loam	ML, CL-ML	A-4	0-5	90-100	75-100	70-95	50-75	20-35	5-10
	17	Indurated	---	---	---	---	---	---	---	---	---
Dioxice	0-10	Loam	CL	A-6	0	95-100	90-100	80-100	70-85	30-40	10-15
	10-39	Loam, clay loam	ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	60-85	30-45	5-20
	39-60	Loam, clay loam, gravelly loam.	ML, CL	A-4, A-6, A-7	0-15	65-100	60-100	55-100	50-85	30-45	5-20
63*:											
Plack	0-11	Loam	ML, CL-ML	A-4	0-5	90-100	75-100	70-95	50-75	20-35	5-10
	11	Indurated	---	---	---	---	---	---	---	---	---
Dioxice	0-8	Loam	CL	A-6	0	95-100	90-100	80-100	70-85	30-40	10-15
	8-27	Loam, clay loam	ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	60-85	30-45	5-20
	27-60	Loam, clay loam, gravelly loam.	ML, CL	A-4, A-6, A-7	0-15	65-100	60-100	55-100	50-85	30-45	5-20
64*:											
Plack	0-12	Fine sandy loam	SM, ML	A-4	0-5	90-100	80-100	70-80	35-55	15-25	NP-5
	12	Indurated	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 9.--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	
64*:											
Penistaja	0-9	Sandy loam	ML, SM	A-4	0	100	100	90-100	40-60	20-25	NP-5
	9-34	Sandy clay loam, clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0	100	100	95-100	45-75	25-35	5-15
	34-60	Sandy loam, fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	100	100	70-95	30-55	20-30	NP-10
65*:											
Purcella	0-12	Loam	CL-ML	A-4	0-5	85-100	80-100	70-90	55-70	25-30	5-10
	12-22	Cobbly loam, cobbly clay loam, clay loam.	CL-ML, CL	A-4, A-6	0-30	80-100	75-100	70-95	50-70	25-35	5-15
	22-60	Very cobbly loam, very cobbly clay loam, extremely cobbly clay loam.	GC, GM-GC	A-4, A-6, A-2	30-55	40-65	35-60	35-60	25-40	25-40	5-15
Riverwash.											
66	0-6	Silt loam	CL-ML	A-4	0	100	100	85-100	70-90	20-30	5-10
Rance	6-32	Silt loam, loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	75-90	20-30	5-15
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
67*:											
Rance	0-7	Silt loam	CL-ML	A-4	0	100	100	85-100	70-90	20-30	5-10
	7-24	Silt loam, loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	75-90	20-30	5-15
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---
67*:											
Tanbark	0-4	Silt loam	ML, CL-ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	4-20	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-85	25-35	5-15
	20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
68*:											
Reflection	0-3	Fine sandy loam	ML, SM	A-4	0	100	100	75-90	45-65	20-25	NP-5
	3-60	Loam, clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-85	25-35	5-15
Malargo	0-5	Fine sandy loam	SM	A-4	0	95-100	90-100	70-80	40-50	20-25	NP-5
	5-20	Loam, silt loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-4	0	95-100	90-100	75-95	45-75	25-35	5-10
	20-60	Loam, fine sandy loam, sandy loam.	ML, CL-ML, SM, SM-SC	A-4, A-2	0	95-100	90-100	60-85	30-60	25-35	5-10
69	0-7	Clay loam	CL	A-6	0	100	100	90-100	75-90	30-40	10-20
Remunda	7-60	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	75-95	40-55	15-35
70	0-6	Loam	ML, CL-ML	A-4	0	95-100	90-100	80-90	60-80	25-35	5-10
Reventon	6-35	Clay loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-95	65-85	25-40	5-15
	35-60	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	95-100	85-100	80-95	55-70	25-40	5-15
71	0-7	Loam	ML, CL-ML	A-4	0	95-100	90-100	80-90	60-80	25-35	5-10
Reventon	7-33	Clay loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-95	65-85	25-40	5-15
	33-60	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	95-100	85-100	80-95	55-70	25-40	5-15

See footnote at end of table.

TABLE 9.--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	
72*:											
Reventon	0-7	Loam	ML, CL-ML	A-4	0	95-100	90-100	80-90	60-80	25-35	5-10
	7-40	Clay loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-95	65-85	25-40	5-15
	40-60	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	95-100	85-100	80-95	55-70	25-40	5-15
Sampson	0-6	Loam	CL-ML	A-4	0	95-100	90-100	75-95	50-65	20-30	5-10
	6-47	Clay loam, loam, silty clay loam.	CL, SC	A-6	0	95-100	90-100	75-90	40-75	25-40	10-20
	47-60	Loam, sandy loam, sandy clay loam.	CL-ML, SM-SC	A-4	0	90-100	75-100	60-90	35-70	20-30	5-10
73*:											
Rock outcrop.											
Stroupe	0-4	Very stony loam	SM, ML	A-4	45-70	80-95	75-90	65-85	45-65	20-30	NP-5
	4-21	Very stony clay, very stony clay loam.	GC, CL	A-6, A-7	30-50	65-80	60-75	55-75	45-70	35-45	15-25
	21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Deama	0-6	Very cobbly loam	GM, ML, SM	A-4	35-50	60-80	55-75	50-70	40-60	25-30	NP-5
	6	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
74 Romine	0-9	Extremely gravelly loam.	GP-GM, GM, GM-GC	A-1	25-30	15-40	10-35	10-30	5-15	20-25	NP-10
	9-23	Very cobbly loam, very cobbly clay loam.	GC	A-2, A-6	25-40	45-70	40-65	25-50	20-45	20-30	10-15
	23-60	Very cobbly loam, extremely cobbly loam.	GM, GM-GC, GP-GM	A-1, A-2, A-4	25-50	20-70	15-65	10-50	5-45	20-25	NP-10
75 Roswell	0-60	Fine sand	SM	A-2	0	100	95-100	65-75	20-35	---	NP
76 Ruidoso	0-4	Clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-95	35-45	10-20
	4-60	Clay loam, clay	CL	A-6, A-7	0	100	100	90-100	70-85	35-50	15-30
77*:											
Ruidoso	0-10	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-95	35-45	10-20
	10-60	Clay loam, clay	CL	A-6, A-7	0	100	100	90-100	70-85	35-50	15-30
Tortugas	0-2	Very cobbly silt loam.	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-65	20-30	5-10
	2-8	Very cobbly loam	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-55	20-30	5-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
78 Ruidoso Variant	0-2	Clay loam	CL	A-6	0	100	100	70-90	65-85	25-40	10-20
	2-60	Silty clay, clay	CL, CH	A-6, A-7	0	100	100	80-100	80-95	30-55	15-30
79 Sampson	0-6	Loam	CL-ML	A-4	0	95-100	90-100	75-95	50-65	20-30	5-10
	6-47	Clay loam, loam, silty clay loam.	CL, SC	A-6	0	95-100	90-100	75-90	40-75	25-40	10-20
	47-60	Loam, sandy loam, sandy clay loam.	CL-ML, SM-SC	A-4	0	90-100	75-100	60-90	35-70	20-30	5-10

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
80---------- Sampson	0-4	Loam----------	CL-ML	A-4	0	95-100	90-100	75-95	50-65	20-30	5-10
	4-42	Clay loam, loam, silty clay loam.	CL, SC	A-6	0	95-100	90-100	75-90	40-75	25-40	10-20
	42-60	Loam, sandy loam, sandy clay loam.	CL-ML, SM-SC	A-4	0	90-100	75-100	60-90	35-70	20-30	5-10
81---------- Sampson	0-8	Loam----------	CL-ML	A-4	0	95-100	90-100	75-95	50-65	20-30	5-10
	8-43	Clay loam, loam, silty clay loam.	CL, SC	A-6	0	95-100	90-100	75-90	40-75	25-40	10-20
	43-60	Loam, sandy loam, sandy clay loam.	CL-ML, SM-SC	A-4	0	90-100	75-100	60-90	35-70	20-30	5-10
82---------- Sharps	0-4	Silt loam--------	CL-ML	A-4	0	85-100	85-100	60-95	50-80	20-30	5-10
	4-30	Clay loam, loam, silty clay loam.	CL	A-6	0	85-100	85-100	60-95	50-85	25-40	10-20
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
83*:											
Sharps----------	0-4	Silt loam--------	CL-ML	A-4	0	85-100	85-100	60-95	50-80	20-30	5-10
	4-30	Clay loam, loam, silty clay loam.	CL	A-6	0	85-100	85-100	60-95	50-85	25-40	10-20
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
84---------- Socorro	0-7	Very gravelly loam.	GC, GM-GC	A-2, A-4, A-6, A-1	30-50	35-55	30-50	30-45	20-40	25-35	5-15
	7-15	Very cobbly loam, very cobbly silt loam.	GC, GM-GC	A-2, A-4, A-6	40-65	45-65	40-60	35-55	25-50	25-35	5-15
	15-26	Very gravelly silt loam, extremely stony clay loam, very cobbly loam.	GC, GP-GC, GM-GC	A-2, A-1	40-85	15-35	10-30	10-30	5-20	25-35	5-15
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
85---------- Stroupe	0-5	Very stony loam	SM, ML	A-4	45-70	80-95	75-90	65-85	45-65	20-30	NP-5
	5-24	Very cobbly sandy clay, extremely cobbly sandy clay.	GC, CL	A-6, A-7	30-50	65-80	60-75	55-75	45-70	35-45	15-25
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
86---------- Stroupe	0-8	Bouldery sandy clay loam.	GM, SM, ML	A-4	30-40	70-90	65-85	60-80	40-60	20-30	NP-5
	8-36	Very gravelly sandy clay, gravelly clay.	GC, SC	A-2	15-25	45-70	40-65	30-45	25-35	35-45	15-25
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
87*:											
Stroupe----------	0-4	Very stony loam	SM, ML	A-4	45-70	80-95	75-90	65-85	45-65	20-30	NP-5
	4-21	Very stony clay, very stony clay loam.	GC, CL	A-6, A-7	30-50	65-80	60-75	55-75	45-70	35-45	15-25
	21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Witt----------	0-7	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	70-90	20-30	NP-10
	7-34	Clay loam, silty clay loam, loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-15
	34-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	50-80	25-40	5-15

See footnote at end of table.

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
88*:											
Tanbark	0-4	Silt loam	ML, CL-ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	4-20	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-85	25-35	5-15
	20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tortugas	0-12	Very cobbly loam	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-65	20-30	5-10
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
89*:											
Tortugas	0-12	Very cobbly loam	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-65	20-30	5-10
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Asparas	0-2	Loam	CL, CL-ML	A-4, A-6	0	100	100	80-90	55-75	20-30	5-15
	2-24	Clay loam, loam	CL	A-6	0	100	100	80-90	60-80	30-40	10-20
	24-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	80-90	55-80	20-30	5-15
Rock outcrop.											
90*:											
Tortugas	0-13	Very cobbly loam	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-65	20-30	5-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
91*:											
Tortugas	0-11	Very cobbly loam	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-65	20-30	5-10
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
92*:											
Tortugas	0-4	Very cobbly silt loam.	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-65	20-30	5-10
	4-10	Very cobbly loam	SM-SC, CL-ML	A-4	20-30	75-85	65-75	55-70	40-55	20-30	5-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ruidoso	0-10	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	85-95	35-45	10-20
	10-60	Clay loam, clay	CL	A-6, A-7	0	100	100	90-100	70-85	35-50	15-30
Rock outcrop.											
93*:											
Travessilla	0-7	Gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0-5	55-80	50-75	35-60	20-45	15-20	NP-5
	7	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
94	0-4	Loam	ML, CL-ML	A-4	0	80-100	75-100	70-90	50-70	25-35	5-10
Tulargo	4-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-90	55-75	25-40	5-15

See footnote at end of table.

TABLE 9.--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	
95*:											
Tulargo	0-15	Loam	ML, CL-ML	A-4	0	80-100	75-100	70-90	50-70	25-35	5-10
	15-48	Loam, clay loam	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-90	55-75	25-40	5-15
	48-60	Gravelly loam, gravelly clay loam, cobbly loam.	CL, CL-ML, SM-SC, SC	A-4, A-6	0-20	80-95	60-90	55-80	45-65	25-40	5-15
Andergeorge	0-3	Gravelly fine sandy loam.	SM, SM-SC, GM, GM-GC	A-1, A-2	0	60-70	50-60	35-50	20-35	20-30	NP-10
	3-11	Very gravelly loam.	GM, GM-GC, SM, SM-SC	A-2, A-4	0-15	45-70	35-60	30-55	25-40	20-30	NP-10
	11-60	Very gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-50	20-40	15-35	10-25	20-30	NP-10
96*:											
Witt	0-7	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	70-90	20-30	NP-10
	7-34	Clay loam, silty clay loam, loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-15
	34-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	50-80	25-40	5-15
Penistaja	0-10	Fine sandy loam	ML, SM	A-4	0	100	100	90-100	40-60	20-25	NP-5
	10-30	Sandy clay loam, clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0	100	100	95-100	45-75	25-35	5-15
	30-60	Sandy loam, fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	100	100	70-95	30-55	20-30	NP-10

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
1*:											
Andergeorge	0-5	8-18	2.0-6.0	0.10-0.12	7.9-8.4	<2	Low	0.24	5	4	---
	5-22	8-18	2.0-6.0	0.08-0.10	7.9-9.0	<2	Low	0.28			
	22-60	5-18	2.0-6.0	0.06-0.08	7.4-7.8	<2	Low	0.24			
Darvey	0-6	20-27	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	0.37	5	4L	.5-.9
	6-60	20-35	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37			
Asparas	0-2	20-27	0.6-2.0	0.16-0.19	7.9-8.4	<2	Moderate	0.32	5	4L	1-2
	2-24	20-35	0.2-0.6	0.17-0.21	7.9-8.4	<2	Moderate	0.32			
	24-60	20-30	0.6-2.0	0.16-0.21	7.9-8.4	<2	Moderate	0.32			
2	0-4	15-25	0.6-2.0	0.12-0.17	7.4-7.8	<2	Low	0.32	1	7	---
Bernal	4-17	18-35	0.6-2.0	0.12-0.20	7.4-7.8	<2	Moderate	0.32			
	17	---	---	---	---	---	---	----			
3*:											
Blakeney	0-13	10-18	2.0-6.0	0.08-0.15	7.9-8.4	<2	Low	0.24	1	3	.5-2
	13	---	---	---	---	---	---	----			
Arch	0-8	8-18	2.0-6.0	0.12-0.14	7.9-8.4	<2	Low	0.24	5	3	---
	8-39	15-30	0.6-2.0	0.17-0.19	7.9-9.0	<2	Moderate	0.37			
	39-60	10-20	2.0-6.0	0.11-0.13	7.9-8.4	<2	Low	0.24			
4*:											
Clovis	0-4	10-17	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low	0.28	5	3	.8-2
	4-34	20-35	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.24			
	34-60	9-30	2.0-6.0	0.09-0.12	7.9-8.4	<2	Low	0.37			
Harvey	0-5	10-20	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.37	5	3	.5-.9
	5-60	15-35	0.6-2.0	0.14-0.18	7.9-8.4	<2	Moderate	0.37			
5*:											
Clovis	0-2	15-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.37	5	5	.8-2
	2-60	20-35	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.24			
Harvey	0-4	15-25	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low	0.37	5	4L	.5-.9
	4-60	15-35	0.6-2.0	0.14-0.18	7.9-8.4	<2	Moderate	0.37			
6*:											
Clovis	0-2	15-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.37	5	5	.8-2
	2-60	20-35	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.24			
Pastura	0-2	20-27	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37	1	4L	---
	2-13	20-30	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate	0.37			
	13	---	---	---	---	---	---	----			
7. Cumulic Haplustolls											
8*:											
Darvey	0-6	20-27	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	0.37	5	4L	.5-.9
	6-60	20-35	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37			
Asparas	0-2	20-27	0.6-2.0	0.16-0.19	7.9-8.4	<2	Moderate	0.32	5	4L	1-2
	2-24	20-35	0.2-0.6	0.17-0.21	7.9-8.4	<2	Moderate	0.32			
	24-60	20-30	0.6-2.0	0.16-0.21	7.9-8.4	<2	Moderate	0.32			
9*:											
Darvey	0-4	20-27	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	0.37	5	4L	.5-.9
	4-60	20-35	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
9*:											
Pastura	0-2	20-27	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37	1	4L	---
	2-13	20-30	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate	0.37			
	13	---	---	---	---	---	---	---			
10	0-10	15-25	0.6-2.0	0.18-0.21	6.6-7.8	<2	Low	0.24	5	4L	1-2
Deacon	10-60	18-35	0.2-0.6	0.15-0.18	6.6-8.4	<2	Moderate	0.24			
11	0-6	18-27	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low	0.28	1	8	---
Deama	6	---	---	---	---	---	---	---			
12*, 13*:											
Deama	0-6	18-27	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low	0.28	1	8	---
	6	---	---	---	---	---	---	---			
Pastura	0-2	20-27	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37	1	4L	---
	2-13	20-30	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate	0.37			
	13	---	---	---	---	---	---	---			
14*:											
Deama	0-6	18-27	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low	0.28	1	8	---
	6	---	---	---	---	---	---	---			
Rock outcrop.											
15	0-11	15-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.37	5	4L	1-2
Dioxice	11-34	20-35	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate	0.37			
	34-60	20-30	0.2-0.6	0.08-0.16	7.4-8.4	<2	Moderate	0.37			
16*:											
Ector	0-7	20-27	0.6-2.0	0.06-0.12	7.9-8.4	<2	Low	0.10	1	8	---
	7	---	---	---	---	---	---	---			
Kimbrough	0-8	15-20	0.6-2.0	0.11-0.15	7.4-8.4	<2	Low	0.28	1	5	<2
	8	---	---	---	---	---	---	---			
17*, 18*:											
Ector	0-7	20-27	0.6-2.0	0.06-0.12	7.9-8.4	<2	Low	0.10	1	8	---
	7	---	---	---	---	---	---	---			
Rock outcrop.											
19	0-4	18-27	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.43	5	4L	2-3
Gabaldon	4-60	18-34	0.6-2.0	0.17-0.19	7.4-8.4	<2	Moderate	0.37			
20*:											
Gabaldon	0-8	18-27	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.43	5	4L	2-3
	8-60	18-34	0.6-2.0	0.17-0.19	7.4-8.4	<2	Moderate	0.37			
Riverwash.											
21	0-8	18-27	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low	0.37	5	6	1-2
Gavilan	8-16	27-35	0.6-2.0	0.12-0.17	6.6-7.3	<2	Moderate	0.28			
	16-43	35-60	0.06-0.2	0.05-0.14	7.4-7.8	<2	Moderate	0.17			
	43-60	27-35	0.2-0.6	0.06-0.14	7.9-8.4	<2	Moderate	0.24			
22	0-6	18-27	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low	0.37	5	6	1-2
Gavilan	6-60	35-60	0.06-0.2	0.05-0.14	7.4-7.8	<2	Moderate	0.17			
23	0-18	18-27	2.0-6.0	0.07-0.11	6.6-7.3	<2	Low	0.28	5	7	1-2
Gavilan	18-60	35-60	0.06-0.2	0.05-0.14	7.4-7.8	<2	Moderate	0.17			
24*:											
Harvey	0-4	10-20	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.37	5	3	.5-.9
	4-60	15-35	0.6-2.0	0.14-0.18	7.9-8.4	<2	Moderate	0.37			
Darvey	0-6	10-18	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	0.28	5	3	.5-.9
	6-60	20-35	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
25*:											
Harvey	0-6	15-25	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low	0.37	5	4L	.5-.9
	6-60	15-35	0.6-2.0	0.14-0.18	7.9-8.4	<2	Moderate	0.37			
Darvey	0-6	20-27	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	0.37	5	4L	.5-.9
	6-60	20-35	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37			
26	0-3	18-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low	0.37	2	6	---
Hightower	3-22	18-35	0.6-2.0	0.16-0.21	7.4-8.4	<2	Moderate	0.32			
	22	---	---	---	---	---	---	---			
27*:											
Hightower	0-3	18-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low	0.37	2	6	---
	3-25	18-35	0.6-2.0	0.16-0.21	7.4-8.4	<2	Moderate	0.32			
	25	---	---	---	---	---	---	---			
Oro Grande	0-3	18-27	0.6-2.0	0.08-0.10	6.6-8.4	<2	Low	0.10	1	7	---
	3-8	18-27	0.6-2.0	0.08-0.10	6.6-8.4	<2	Low	0.10			
	8-13	18-27	0.6-2.0	0.05-0.07	6.6-8.4	<2	Low	0.10			
	13	---	---	---	---	---	---	---			
28*:											
Hightower	0-14	18-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low	0.37	2	6	---
	14-31	18-35	0.6-2.0	0.16-0.21	7.4-8.4	<2	Moderate	0.32			
	31	---	---	---	---	---	---	---			
Oro Grande	0-3	18-27	0.6-2.0	0.08-0.10	6.6-8.4	<2	Low	0.10	1	7	---
	3-12	18-30	0.6-2.0	0.05-0.07	6.6-8.4	<2	Low	0.10			
	12	---	---	---	---	---	---	---			
29	0-2	7-18	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low	0.24	3	3	---
Hightower Variant	2-26	18-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.37			
	26	---	---	---	---	---	---	---			
30*:											
Hogadero	0-4	18-27	0.6-2.0	0.14-0.16	6.6-8.4	<2	Low	0.37	5	6	---
	4-8	15-29	0.6-2.0	0.11-0.12	7.9-8.4	<2	Low	0.32			
	8-60	15-25	0.6-2.0	0.05-0.07	7.9-8.4	<2	Low	0.28			
Pena	0-14	7-27	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low	0.32	5	5	1-2
	14-18	10-27	0.6-2.0	0.05-0.08	7.9-8.4	2-4	Low	0.24			
	18-60	7-27	0.6-2.0	0.03-0.08	7.9-8.4	2-4	Low	0.28			
31*.											
Lava flows											
32*:											
Lithic Argiustolls.											
Rock outcrop.											
33	0-13	20-27	0.6-2.0	0.05-0.10	7.9-8.4	<2	Very low	0.10	1	8	<1
Lozier	13	---	---	---	---	---	---	---			
34*:											
Malargo	0-4	18-27	0.6-2.0	0.16-0.18	7.9-9.0	<2	Low	0.37	5	4L	---
	4-49	18-27	0.6-2.0	0.15-0.17	7.9-9.0	<2	Low	0.37			
	49-60	15-27	2.0-6.0	0.14-0.16	7.9-9.0	<2	Low	0.28			
Bluepoint	0-4	2-6	6.0-20	0.06-0.10	7.4-9.0	<2	Low	0.17	5	2	---
	4-60	2-6	6.0-20	0.05-0.09	7.9-9.0	<4	Low	0.17			
35	0-24	10-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.28	5	6	2-3
Manzano	24-60	18-34	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate	0.32			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
36*:											
Mokiak	0-3	10-15	2.0-6.0	0.06-0.08	7.4-7.8	<2	Low	0.17	2	8	1-2
	3-22	27-35	0.6-2.0	0.07-0.09	7.4-7.8	<2	Low	0.15			
	22	---	---	---	---	---					
Rock outcrop.											
37*:											
Mokiak	0-9	10-25	2.0-6.0	0.06-0.08	7.4-7.8	<2	Low	0.28	2	8	1-2
	9-24	27-35	0.6-2.0	0.07-0.09	7.4-7.8	<2	Low	0.15			
	24	---	---	---	---	---					
Stroupe	0-3	18-27	0.6-2.0	0.05-0.07	6.6-7.8	<2	Low	0.24	2	8	---
	3-30	35-50	0.06-0.2	0.07-0.09	6.6-8.4	<2	Moderate	0.24			
	30	---	---	---	---	---					
Rock outcrop.											
38*:											
Monjeau	0-6	18-27	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low	0.37	3	6	---
	6-38	35-60	0.06-0.2	0.14-0.19	6.6-7.3	<2	High	0.24			
	38	---	---	---	---	---					
Docdee	0-8	18-27	0.6-2.0	0.06-0.12	6.6-7.3	<2	Low	0.10	1	8	2-4
	8	---	---	---	---	---					
39*:											
Monjeau	0-7	18-27	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low	0.37	3	6	---
	7-31	35-60	0.06-0.2	0.14-0.19	6.6-7.3	<2	High	0.24			
	31	---	---	---	---	---					
Docdee	0-4	18-27	0.6-2.0	0.06-0.12	6.6-7.3	<2	Low	0.10	1	8	2-4
	4-12	18-27	0.6-2.0	0.06-0.12	6.6-7.3	<2	Low	0.10			
	12	---	---	---	---	---					
40*:											
Monjeau	0-2	18-27	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low	0.37	3	6	---
	2-32	35-60	0.06-0.2	0.14-0.19	6.6-7.3	<2	High	0.24			
	32	---	---	---	---	---					
Docdee	0-10	18-27	0.6-2.0	0.06-0.12	6.6-7.3	<2	Low	0.10	1	8	2-4
	10	---	---	---	---	---					
41	0-2	20-35	0.6-2.0	0.14-0.16	7.4-8.4	<2	Low	0.32	3	5	---
Nogal	2-30	40-60	0.06-0.2	0.11-0.17	7.4-8.4	<2	High	0.24			
	30	---	---	---	---	---					
42*:											
Nogal	0-2	20-35	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low	0.20	3	8	---
	2-40	40-60	0.06-0.2	0.10-0.17	7.4-8.4	<2	High	0.24			
	40	---	---	---	---	---					
Rock outcrop.											
43	0-15	18-27	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low	0.37	3	6	---
Nolten	15-35	35-60	0.06-0.2	0.14-0.19	6.6-7.3	<2	High	0.24			
	35	---	---	---	---	---					
44	0-4	18-27	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low	0.37	3	6	---
Nolten	4-39	35-60	0.06-0.2	0.14-0.19	6.6-7.3	<2	High	0.24			
	39	---	---	---	---	---					
45*:											
Onite	0-7	2-8	6.0-20	0.06-0.10	7.4-7.8	<2	Low	0.17	5	2	---
	7-60	5-12	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low	0.24			
Bluepoint	0-4	2-6	6.0-20	0.06-0.10	7.4-9.0	<2	Low	0.17	5	2	---
	4-60	2-6	6.0-20	0.05-0.09	7.9-9.0	<4	Low	0.17			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
46----------	0-8	27-35	0.6-2.0	0.06-0.09	6.6-8.4	<2	Low-------	0.32	1	8	---
Oro Grande	8-17	27-35	0.6-2.0	0.06-0.09	6.6-8.4	<2	Low-------	0.32			
	17	---	---	---	---	---	----------	----			
47----------	0-8	27-35	0.6-2.0	0.06-0.09	6.6-8.4	<2	Low-------	0.32	1	8	---
Oro Grande	8-15	27-35	0.6-2.0	0.06-0.09	6.6-8.4	<2	Low-------	0.32			
	15	---	---	---	---	---	----------	----			
48----------	0-5	18-27	0.6-2.0	0.16-0.18	6.1-6.5	<2	Low-------	0.37	4	6	---
Paco	5-45	35-55	0.06-0.2	0.14-0.20	6.6-7.8	<2	High------	0.24			
	45-49	35-55	0.06-0.2	0.10-0.15	6.6-7.8	<2	High------	0.24			
	49	---	---	---	---	---	----------	----			
49----------	0-9	18-27	0.6-2.0	0.16-0.18	6.1-6.5	<2	Low-------	0.37	4	6	---
Paco	9-53	35-55	0.06-0.2	0.14-0.20	6.6-7.8	<2	High------	0.24			
	53	---	---	---	---	---	----------	----			
50----------	0-7	18-27	0.6-2.0	0.16-0.18	6.1-6.5	<2	Low-------	0.37	4	6	---
Paco	7-49	35-55	0.06-0.2	0.14-0.20	6.6-7.8	<2	High------	0.24			
	49	---	---	---	---	---	----------	----			
51*:											
Paco----------	0-7	18-27	0.6-2.0	0.16-0.18	6.1-6.5	<2	Low-------	0.37	4	6	---
	7-60	35-55	0.06-0.2	0.14-0.20	6.6-7.8	<2	High------	0.24			
	60	---	---	---	---	---	----------	----			
Penapon---------	0-10	15-25	2.0-6.0	0.06-0.11	7.9-8.4	<2	Low-------	0.28	5	6	---
	10-60	20-35	0.6-2.0	0.06-0.13	7.9-8.4	<2	Low-------	0.28			
52*:											
Pajara----------	0-4	18-27	0.6-2.0	0.07-0.09	7.4-8.4	<2	Low-------	0.10	5	8	---
	4-14	35-50	0.06-0.2	0.08-0.10	7.4-8.4	<2	Moderate	0.15			
	14-60	18-27	0.6-2.0	0.09-0.11	7.4-9.0	<2	Low-------	0.28			
Witt----------	0-7	10-25	0.6-2.0	0.18-0.20	6.6-8.4	<2	Low-------	0.43	5	5	.5-.8
	7-34	18-35	0.2-0.6	0.18-0.21	6.6-8.4	<2	Moderate	0.37			
	34-60	15-30	0.6-2.0	0.16-0.19	7.9-8.4	<2	Moderate	0.32			
53----------	0-2	20-27	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37	1	4L	---
Pastura	2-13	25-30	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate	0.37			
	13	---	---	---	---	---	----------	----			
54*:											
Pastura---------	0-13	5-15	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low-------	0.28	1	3	---
	13	---	---	---	---	---	----------	----			
Harvey----------	0-15	10-20	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low-------	0.37	5	3	.5-.9
	15-60	15-35	0.6-2.0	0.14-0.18	7.9-8.4	<2	Moderate	0.37			
55*:											
Pastura---------	0-2	20-27	0.6-2.0	0.17-0.20	7.9-8.4	<2	Moderate	0.37	1	4L	---
	2-13	20-30	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate	0.37			
	13	---	---	---	---	---	----------	----			
Partri----------	0-4	18-27	0.6-2.0	0.16-0.21	6.6-8.4	<2	Low-------	0.37	5	6	1-3
	4-31	35-55	0.06-0.2	0.14-0.21	6.6-8.4	<2	High------	0.32			
	31-60	20-35	0.2-0.6	0.16-0.21	7.9-8.4	<2	Moderate	0.32			
56----------	0-4	18-27	0.6-2.0	0.12-0.15	7.4-7.8	<2	Low-------	0.28	5	8	---
Patos	4-30	35-60	0.06-0.2	0.08-0.11	7.4-8.4	<2	High------	0.15			
	30-60	27-35	0.2-0.6	0.06-0.09	7.9-8.4	<2	Moderate	0.24			
57----------	0-5	18-27	0.6-2.0	0.12-0.15	7.4-7.8	<2	Low-------	0.28	5	8	---
Patos	5-31	35-60	0.06-0.2	0.08-0.11	7.4-8.4	<2	High------	0.15			
	31-60	27-35	0.2-0.6	0.06-0.09	7.9-8.4	<2	Moderate	0.24			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
58*:											
Pena	0-12	7-27	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low	0.32	5	5	1-2
	12-60	7-27	0.6-2.0	0.03-0.08	7.9-8.4	2-4	Low	0.28			
Dioxice	0-10	15-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.37	5	4L	1-2
	10-30	20-35	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate	0.37			
	30-60	20-30	0.2-0.6	0.08-0.16	7.4-8.4	<2	Moderate	0.37			
59*:											
Pena	0-10	7-27	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low	0.32	5	5	1-2
	10-60	10-27	0.6-2.0	0.05-0.08	7.9-8.4	2-4	Low	0.24			
Hogadero	0-10	18-27	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low	0.32	5	7	---
	10-60	15-25	0.6-2.0	0.05-0.07	7.9-8.4	<2	Low	0.28			
60*:											
Penapon	0-11	5-25	2.0-6.0	0.06-0.11	7.4-8.4	<2	Low	0.24	5	8	---
	11-60	20-35	0.6-2.0	0.05-0.14	7.9-8.4	<2	Low	0.20			
Tortugas	0-13	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low	0.10	1	8	2-4
	13	---	---	---	---	---	---	---			
61*:											
Penistaja	0-8	10-20	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low	0.24	5	3	.5-.9
	8-38	20-30	0.6-2.0	0.15-0.18	6.6-8.4	<2	Moderate	0.32			
	38-60	15-20	2.0-6.0	0.12-0.15	6.6-8.4	<2	Low	0.24			
Travessilla	0-12	5-15	2.0-6.0	0.11-0.13	6.6-8.4	<2	Low	0.24	1	3	---
	12	---	---	---	---	---	---	---			
62*:											
Plack	0-17	15-27	0.6-2.0	0.10-0.18	7.9-8.4	<2	Low	0.32	1	4L	1-3
	17	---	---	---	---	---	---	---			
Dioxice	0-10	15-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.37	5	4L	1-2
	10-39	20-35	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate	0.37			
	39-60	20-30	0.2-0.6	0.08-0.16	7.4-8.4	<2	Moderate	0.37			
63*:											
Plack	0-11	15-27	0.6-2.0	0.10-0.18	7.9-8.4	<2	Low	0.32	1	4L	1-3
	11	---	---	---	---	---	---	---			
Dioxice	0-8	15-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.37	5	4L	1-2
	8-27	20-35	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate	0.37			
	27-60	20-30	0.2-0.6	0.08-0.16	7.4-8.4	<2	Moderate	0.37			
64*:											
Plack	0-12	14-18	0.6-2.0	0.10-0.14	7.9-8.4	<2	Low	0.24	1	3	1-2
	12	---	---	---	---	---	---	---			
Penistaja	0-9	10-20	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low	0.24	5	3	.5-.9
	9-34	20-30	0.6-2.0	0.15-0.18	6.6-8.4	<2	Moderate	0.32			
	34-60	15-20	2.0-6.0	0.12-0.15	6.6-8.4	<2	Low	0.24			
65*:											
Purcella	0-12	18-25	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low	0.37	5	5	---
	12-22	18-30	0.6-2.0	0.14-0.17	7.4-8.4	<2	Moderate	0.28			
	22-60	18-35	0.2-0.6	0.09-0.12	7.4-8.4	<2	Moderate	0.24			
Riverwash.											
66	0-6	18-27	0.6-2.0	0.17-0.20	7.4-8.4	2-8	Low	0.43	2	4L	---
Rance	6-32	18-27	0.6-2.0	0.17-0.20	7.9-8.4	4-8	Low	0.43			
	32	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
67*:											
Rance	0-7	18-27	0.6-2.0	0.17-0.20	7.4-8.4	2-8	Low	0.43	2	4L	---
	7-24	18-27	0.6-2.0	0.17-0.20	7.9-8.4	4-8	Low	0.43			
	24	---	---	---	---	---	---	---			
Tanbark	0-4	18-27	0.6-2.0	0.19-0.21	7.4-8.4	<2	Low	0.43	1	4L	---
	4-20	18-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	20	---	---	---	---	---	---	---			
68*:											
Reflection	0-3	12-18	2.0-6.0	0.13-0.15	7.4-9.0	<2	Low	0.37	5	3	---
	3-60	18-30	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.37			
Malargo	0-5	15-20	2.0-6.0	0.13-0.15	7.9-9.0	<2	Low	0.28	5	3	---
	5-20	18-27	0.6-2.0	0.15-0.17	7.9-9.0	<2	Low	0.37			
	20-60	15-27	2.0-6.0	0.14-0.16	7.9-9.0	<2	Low	0.28			
69	0-7	28-35	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.32	5	6	1-2
Remunda	7-60	35-50	0.06-0.2	0.16-0.19	6.6-8.4	<2	High	0.28			
70	0-6	18-27	0.6-2.0	0.17-0.20	7.4-7.8	<2	Low	0.37	5	6	1-2
Reventon	6-35	18-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	35-60	18-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
71	0-7	18-27	0.6-2.0	0.17-0.20	7.4-7.8	<2	Low	0.37	5	6	1-2
Reventon	7-33	18-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	33-60	18-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
72*:											
Reventon	0-7	18-27	0.6-2.0	0.17-0.20	7.4-7.8	<2	Low	0.37	5	6	1-2
	7-40	18-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	40-60	18-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
Sampson	0-6	15-27	0.6-2.0	0.18-0.21	6.6-7.3	<2	Low	0.24	5	5	3-4
	6-47	18-35	0.6-2.0	0.15-0.20	6.6-7.8	<2	Moderate	0.24			
	47-60	18-35	0.6-2.0	0.13-0.17	7.4-7.8	<2	Low	0.24			
73*:											
Rock outcrop.											
Stroupe	0-4	18-27	0.6-2.0	0.05-0.07	6.6-7.8	<2	Low	0.24	2	8	---
	4-21	35-50	0.06-0.2	0.07-0.09	6.6-8.4	<2	Moderate	0.24			
	21	---	---	---	---	---	---	---			
Deama	0-6	18-27	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low	0.28	1	8	---
	6	---	---	---	---	---	---	---			
74	0-9	18-27	2.0-6.0	0.05-0.07	7.4-7.8	<2	Low	0.05	3	8	---
Romine	9-23	22-35	2.0-6.0	0.07-0.10	7.4-7.8	<2	Moderate	0.10			
	23-60	18-27	2.0-6.0	0.06-0.08	7.4-8.4	<2	Low	0.10			
75	0-60	4-10	6.0-20	0.05-0.07	6.6-7.8	<2	Low	0.17	5	1	---
Roswell											
76	0-4	30-40	0.06-0.2	0.19-0.21	6.6-7.3	<2	Moderate	0.37	5	4	2-3
Ruidoso	4-60	35-50	0.06-0.2	0.15-0.21	6.6-7.8	<2	High	0.32			
77*:											
Ruidoso	0-10	30-40	0.06-0.2	0.19-0.21	6.6-7.3	<2	Moderate	0.37	5	4	2-3
	10-60	35-50	0.06-0.2	0.15-0.21	6.6-7.8	<2	High	0.32			
Tortugas	0-2	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low	0.10	1	8	2-4
	2-8	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low	0.10			
	8	---	---	---	---	---	---	---			
78	0-2	30-40	0.06-0.2	0.19-0.21	7.4-7.8	<2	Moderate	0.32	5	4L	2-3
Ruidoso Variant	2-60	40-50	0.06-0.2	0.15-0.17	7.4-7.8	<2	High	0.24			

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
79----------	0-6	15-27	0.6-2.0	0.18-0.21	6.6-7.3	<2	Low-------	0.24	5	5	3-4
Sampson	6-47	18-35	0.6-2.0	0.15-0.20	6.6-7.8	<2	Moderate	0.24			
	47-60	18-35	0.6-2.0	0.13-0.17	7.4-7.8	<2	Low-------	0.24			
80----------	0-4	15-27	0.6-2.0	0.18-0.21	6.6-7.3	<2	Low-------	0.24	5	5	3-4
Sampson	4-42	18-35	0.6-2.0	0.15-0.20	6.6-7.8	<2	Moderate	0.24			
	42-60	18-35	0.6-2.0	0.13-0.17	7.4-7.8	<2	Low-------	0.24			
81----------	0-8	15-27	0.6-2.0	0.18-0.21	6.6-7.3	<2	Low-------	0.24	5	5	3-4
Sampson	8-43	18-35	0.6-2.0	0.15-0.20	6.6-7.8	<2	Moderate	0.24			
	43-60	18-35	0.6-2.0	0.13-0.17	7.4-7.8	<2	Low-------	0.24			
82----------	0-4	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.24	2	5	.5-2
Sharps	4-30	20-35	0.2-0.6	0.15-0.17	6.6-8.4	<2	Moderate	0.24			
	30	---	---	---	---	---	----------	----			
83*:											
Sharps----------	0-4	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.24	2	5	.5-2
	4-30	20-35	0.2-0.6	0.15-0.17	6.6-8.4	<2	Moderate	0.24			
	30	---	---	---	---	---	----------	----			
Rock outcrop.											
84----------	0-7	18-27	0.6-2.0	0.08-0.10	7.9-8.4	<2	Low-------	0.32	2	8	---
Socorro	7-15	20-27	0.6-2.0	0.08-0.10	8.5-9.0	<2	Low-------	0.32			
	15-26	20-30	2.0-6.0	0.05-0.07	8.5-9.0	<2	Low-------	0.28			
	26	---	---	---	---	---	----------	----			
85----------	0-5	18-27	0.6-2.0	0.05-0.07	6.6-7.8	<2	Low-------	0.24	2	8	---
Stroupe	5-24	35-50	0.06-0.2	0.07-0.09	6.6-8.4	<2	Moderate	0.24			
	24	---	---	---	---	---	----------	----			
86----------	0-8	20-35	0.6-2.0	0.07-0.09	6.6-8.4	<2	Low-------	0.24	2	8	---
Stroupe	8-36	35-50	0.06-0.2	0.07-0.09	6.6-8.4	<2	Moderate	0.24			
	36	---	---	---	---	---	----------	----			
87*:											
Stroupe----------	0-4	18-27	0.6-2.0	0.05-0.07	6.6-7.8	<2	Low-------	0.24	2	8	---
	4-21	35-50	0.06-0.2	0.07-0.09	6.6-8.4	<2	Moderate	0.24			
	21	---	---	---	---	---	----------	----			
Witt----------	0-7	10-25	0.6-2.0	0.18-0.20	6.6-8.4	<2	Low-------	0.43	5	5	.5-.8
	7-34	18-35	0.2-0.6	0.18-0.21	6.6-8.4	<2	Moderate	0.37			
	34-60	15-30	0.6-2.0	0.16-0.19	7.9-8.4	<2	Moderate	0.32			
88*:											
Tanbark----------	0-4	18-27	0.6-2.0	0.19-0.21	7.4-8.4	<2	Low-------	0.43	1	4L	---
	4-20	18-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	20	---	---	---	---	---	----------	----			
Tortugas--------	0-12	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low-------	0.10	1	8	2-4
	12	---	---	---	---	---	----------	----			
89*:											
Tortugas--------	0-12	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low-------	0.10	1	8	2-4
	12	---	---	---	---	---	----------	----			
Asparas----------	0-2	20-27	0.6-2.0	0.16-0.19	7.9-8.4	<2	Moderate	0.32	5	4L	1-2
	2-24	20-35	0.2-0.6	0.17-0.21	7.9-8.4	<2	Moderate	0.32			
	24-60	20-30	0.6-2.0	0.16-0.21	7.9-8.4	<2	Moderate	0.32			
Rock outcrop.											
90*:											
Tortugas--------	0-13	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low-------	0.10	1	8	2-4
	13	---	---	---	---	---	----------	----			
Rock outcrop.											

See footnote at end of table.

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
91*:											
Tortugas	0-11	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low	0.10	1	8	2-4
	11	---	---	---	---	---	---	---			
Rock outcrop.											
92*:											
Tortugas	0-4	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low	0.10	1	8	2-4
	4-10	15-25	0.6-2.0	0.05-0.08	7.9-8.4	<2	Low	0.10			
	10	---	---	---	---	---	---	---			
Ruidoso	0-10	30-40	0.06-0.2	0.19-0.21	6.6-7.3	<2	Moderate	0.37	5	4	2-3
	10-60	35-50	0.06-0.2	0.15-0.21	6.6-7.8	<2	High	0.32			
Rock outcrop.											
93*:											
Travessilla	0-7	5-18	2.0-6.0	0.13-0.15	6.6-8.4	<2	Low	0.32	1	5	---
	7	---	---	---	---	---	---	---			
Rock outcrop.											
94	0-4	18-27	0.6-2.0	0.14-0.17	7.9-8.4	<2	Low	0.37	5	4L	---
Tulargo	4-60	18-35	0.6-2.0	0.15-0.19	7.9-8.4	<2	Moderate	0.32			
95*:											
Tulargo	0-15	18-27	0.6-2.0	0.14-0.17	7.9-8.4	<2	Low	0.37	5	4L	---
	15-48	18-35	0.6-2.0	0.15-0.19	7.9-8.4	<2	Moderate	0.32			
	48-60	18-35	0.6-2.0	0.11-0.14	7.9-8.4	<2	Moderate	0.32			
Andergeorge	0-3	8-18	2.0-6.0	0.10-0.12	7.9-8.4	<2	Low	0.24	5	4	---
	3-11	8-18	2.0-6.0	0.08-0.10	7.9-9.0	<2	Low	0.28			
	11-60	5-18	2.0-6.0	0.06-0.08	7.4-7.8	<2	Low	0.24			
96*:											
Witt	0-7	10-25	0.6-2.0	0.18-0.20	6.6-8.4	<2	Low	0.43	5	5	.5-.8
	7-34	18-35	0.2-0.6	0.18-0.21	6.6-8.4	<2	Moderate	0.37			
	34-60	15-30	0.6-2.0	0.16-0.19	7.9-8.4	<2	Moderate	0.32			
Penistaja	0-10	10-20	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low	0.24	5	3	.5-.9
	10-30	20-30	0.6-2.0	0.15-0.18	6.6-8.4	<2	Moderate	0.32			
	30-60	15-20	2.0-6.0	0.12-0.15	6.6-8.4	<2	Low	0.24			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SOIL AND WATER FEATURES

["Flooding" and terms such as "none," "very brief," and "occasional" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
1*:											
Andergeorge	B	None	---	---	>60	---	---	---	Low	High	Low.
Darvey	B	None	---	---	>60	---	---	---	Low	High	Low.
Asparas	C	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
2---- Bernal	D	None	---	---	10-20	Hard	---	---	Moderate	Moderate	Low.
3*:											
Blakeney	C	None	---	---	>60	---	12-20	Thin	Low	Moderate	Low.
Arch	B	None	---	---	>60	---	---	---	Low	High	Low.
4*, 5*:											
Clovis	B	None	---	---	>60	---	---	---	Low	Moderate	Low.
Harvey	B	None	---	---	>60	---	---	---	Low	High	Low.
6*:											
Clovis	B	None	---	---	>60	---	---	---	Low	Moderate	Low.
Pastura	D	None	---	---	>60	---	5-20	Thick	Low	High	Low.
7. Cumulic Haplustolls											
8*:											
Darvey	B	None	---	---	>60	---	---	---	Low	High	Low.
Asparas	C	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
9*:											
Darvey	B	None	---	---	>60	---	---	---	Low	High	Low.
Pastura	D	None	---	---	>60	---	5-20	Thick	Low	High	Low.
10---- Deacon	B	None	---	---	>60	---	---	---	Moderate	High	Low.
11---- Deama	D	None	---	---	7-20	Hard	---	---	Low	Moderate	Low.
12*, 13*:											
Deama	D	None	---	---	7-20	Hard	---	---	Low	Moderate	Low.
Pastura	D	None	---	---	>60	---	5-20	Thick	Low	High	Low.
14*:											
Deama	D	None	---	---	7-20	Hard	---	---	Low	Moderate	Low.
Rock outcrop.											
15---- Dioxice	B	None	---	---	>60	---	---	---	Moderate	High	Low.
16*:											
Ector	D	None	---	---	4-20	Hard	---	---	Low	High	Low.
Kimbrough	D	None	---	---	>60	---	4-20	Thick	Low	Moderate	Low.
17*, 18*:											
Ector	D	None	---	---	4-20	Hard	---	---	Low	High	Low.

See footnote at end of table.

TABLE 11.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
17*, 18*: Rock outcrop.											
19---------- Gabaldon	B	Frequent----	Very brief	Jun-Sep	>60	---	---	---	Moderate	Moderate	Low.
20*: Gabaldon---------	B	Frequent----	Very brief	Jun-Sep	>60	---	---	---	Moderate	Moderate	Low.
Riverwash.											
21, 22, 23-------- Gavilan	C	None--------	---	---	>60	---	---	---	Moderate	High-----	Low.
24*, 25*: Harvey----------	B	None--------	---	---	>60	---	---	---	Low------	High-----	Low.
Darvey----------	B	None--------	---	---	>60	---	---	---	Low------	High-----	Low.
26---------- Hightower	C	None--------	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
27*, 28*: Hightower--------	C	None--------	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
Oro Grande-------	D	None--------	---	---	7-20	Hard	---	---	Moderate	Moderate	Low.
29---------- Hightower Variant	B	None--------	---	---	20-40	Soft	---	---	Low------	Moderate	Low.
30*: Hogadero---------	B	None--------	---	---	>60	---	---	---	Moderate	High-----	Low.
Pena----------	B	None--------	---	---	>60	---	---	---	Moderate	High-----	Low.
31*. Lava flows											
32*: Lithic argiustolls.											
Rock outcrop.											
33---------- Lozier	D	None--------	---	---	4-16	Hard	---	---	Low------	High-----	Low.
34*: Malargo----------	B	None--------	---	---	>60	---	---	---	Low------	High-----	High.
Bluepoint--------	A	None--------	---	---	>60	---	---	---	Low------	High-----	Low.
35---------- Manzano	C	Occasional	Very brief	May-Oct	>60	---	---	---	Moderate	High-----	Low.
36*: Mokiak----------	B	None--------	---	---	20-40	Hard	---	---	Moderate	High-----	Low.
Rock outcrop.											
37*: Mokiak----------	B	None--------	---	---	20-40	Hard	---	---	Moderate	High-----	Low.
Stroupe----------	C	None--------	---	---	20-40	Hard	---	---	Moderate	High-----	Low.
Rock outcrop.											
38*, 39*, 40*: Monjeau----------	D	None--------	---	---	20-40	Soft	---	---	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 11.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
38*, 39*, 40*:											
Docdee	D	None	---	---	5-20	Hard	---	---	Moderate	Moderate	Low.
41	D	None	---	---	20-40	Soft	---	---	Low	High	Low.
Nogal											
42*:											
Nogal	D	None	---	---	20-40	Soft	---	---	Low	High	Low.
Rock outcrop.											
43, 44	D	None	---	---	20-40	Soft	---	---	Moderate	Moderate	Low.
Nolten											
45*:											
Onite	B	None	---	---	>60	---	---	---	Low	Moderate	Low.
Bluepoint	A	None	---	---	>60	---	---	---	Low	High	Low.
46, 47	D	None	---	---	7-20	Hard	---	---	Moderate	Moderate	Low.
Oro Grande											
48, 49, 50	C	None	---	---	40-60	Soft	---	---	Moderate	Moderate	Low.
Paco											
51*:											
Paco	C	None	---	---	40-60	Soft	---	---	Moderate	Moderate	Low.
Penapon	B	None	---	---	>60	---	---	---	Moderate	High	Low.
52*:											
Pajara	C	None	---	---	>60	---	---	---	Low	High	Low.
Witt	B	None	---	---	>60	---	---	---	Moderate	High	Low.
53	D	None	---	---	>60	---	5-20	Thick	Low	High	Low.
Pastura											
54*:											
Pastura	D	None	---	---	>60	---	5-20	Thick	Low	High	Low.
Harvey	B	None	---	---	>60	---	---	---	Low	High	Low.
55*:											
Pastura	D	None	---	---	>60	---	5-20	Thick	Low	High	Low.
Partri	C	None	---	---	>60	---	---	---	Low	High	Low.
56, 57	C	None	---	---	>60	---	---	---	Low	Moderate	Low.
Patos											
58*:											
Pena	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Dioxice	B	None	---	---	>60	---	---	---	Moderate	High	Low.
59*:											
Pena	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Hogadero	B	None	---	---	>60	---	---	---	Moderate	High	Low.
60*:											
Penapon	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Tortugas	D	None	---	---	6-20	Hard	---	---	Low	Moderate	Low.
61*:											
Penistaja	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Travessilla	D	None	---	---	6-20	Hard	---	---	Low	Moderate	Low.

See footnote at end of table.

TABLE 11.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
62*, 63*:											
Plack	D	None	---	---	>60	---	4-20	Thin	Moderate	Moderate	Low.
Dioxice	B	None	---	---	>60	---	---	---	Moderate	High	Low.
64*:											
Plack	D	None	---	---	>60	---	4-20	Thin	Moderate	Moderate	Low.
Penistaja	B	None	---	---	>60	---	---	---	Moderate	High	Low.
65*:											
Purcella	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Riverwash.											
66--Rance	C	None	---	---	20-35	Soft	---	---	Low	High	High.
67*:											
Rance	C	None	---	---	20-35	Soft	---	---	Low	High	High.
Tanbark	C	None	---	---	10-20	Hard	---	---	Low	High	High.
68*:											
Reflection	B	None	---	---	>60	---	---	---	Low	High	High.
Malargo	B	None	---	---	>60	---	---	---	Low	High	High.
69--Remunda	D	None	---	---	>60	---	---	---	Low	High	Low.
70, 71--Reventon	B	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
72*:											
Reventon	B	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
Sampson	B	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
73*:											
Rock outcrop.											
Stroupe	C	None	---	---	20-40	Hard	---	---	Moderate	High	Low.
Deama	D	None	---	---	7-20	Hard	---	---	Low	Moderate	Low.
74--Romine	B	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
75--Roswell	A	None	---	---	>60	---	---	---	Low	Low	Low.
76--Ruidoso	C	None	---	---	>60	---	---	---	Low	Moderate	Low.
77*:											
Ruidoso	C	None	---	---	>60	---	---	---	Low	Moderate	Low.
Tortugas	D	None	---	---	6-20	Hard	---	---	Low	Moderate	Low.
78--Ruidoso Variant	C	None	---	---	>60	---	---	---	Low	Moderate	Low.
79, 80, 81--Sampson	B	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
82--Sharps	C	None	---	---	20-40	Soft	---	---	Low	High	Low.

See footnote at end of table.

TABLE 11.--SOIL AND WATER FEATURES--Continued

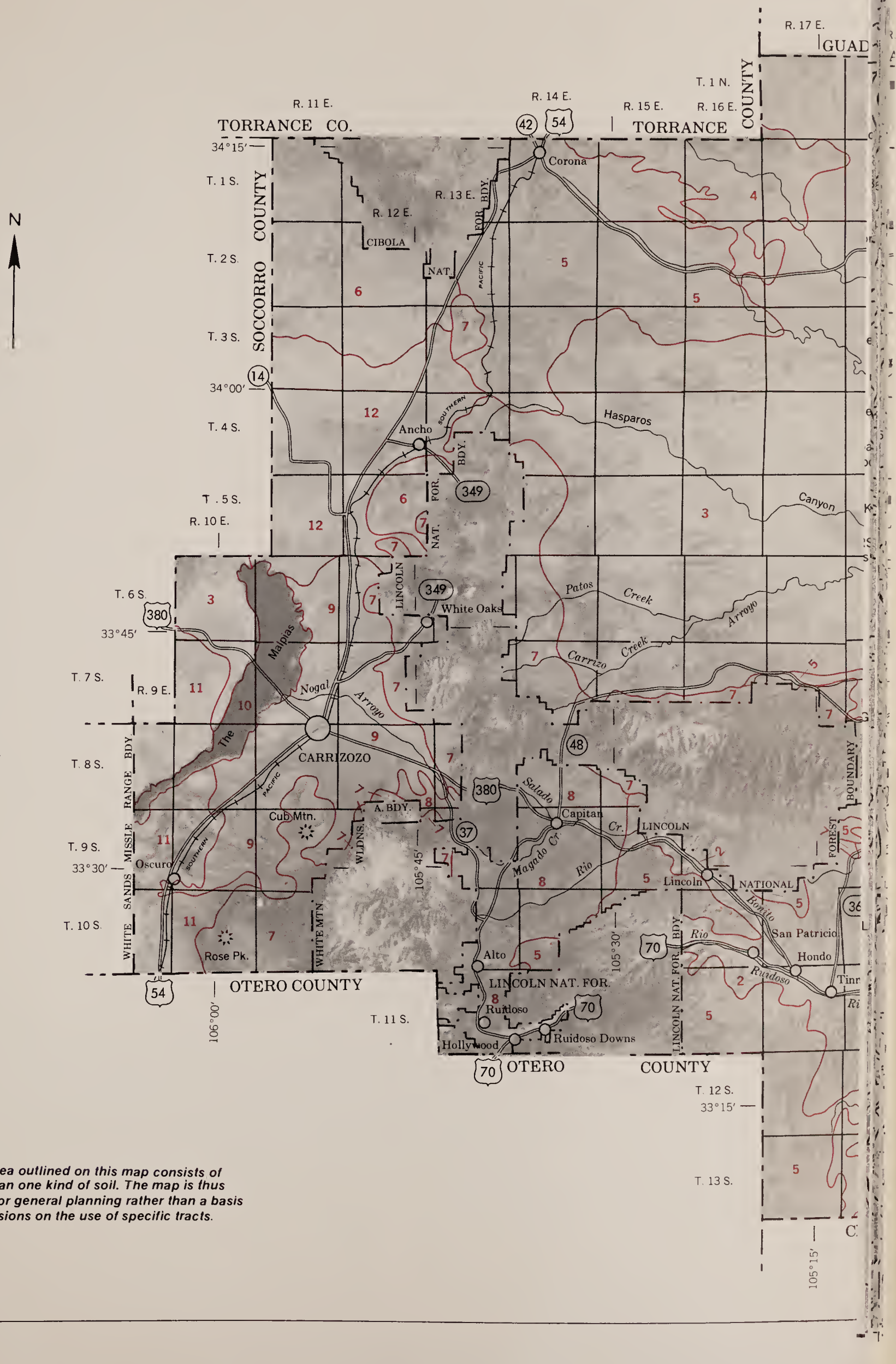
Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
83*:											
Sharps	C	None	---	---	20-40	Soft	---	---	Low	High	Low.
Rock outcrop.											
84--Socorro	C	None	---	---	20-40	Hard	---	---	Low	High	Low.
85, 86--Stroupe	C	None	---	---	20-40	Hard	---	---	Moderate	High	Low.
87*:											
Stroupe	C	None	---	---	20-40	Hard	---	---	Moderate	High	Low.
Witt	B	None	---	---	>60	---	---	---	Moderate	High	Low.
88*:											
Tanbark	C	None	---	---	10-20	Hard	---	---	Low	High	High.
Tortugas	D	None	---	---	6-20	Hard	---	---	Low	Moderate	Low.
89*:											
Tortugas	D	None	---	---	6-20	Hard	---	---	Low	Moderate	Low.
Asparas	C	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
Rock outcrop.											
90*, 91*:											
Tortugas	D	None	---	---	6-20	Hard	---	---	Low	Moderate	Low.
Rock outcrop.											
92*:											
Tortugas	D	None	---	---	6-20	Hard	---	---	Low	Moderate	Low.
Ruidoso	C	None	---	---	>60	---	---	---	Low	Moderate	Low.
Rock outcrop.											
93*:											
Travessilla	D	None	---	---	6-20	Hard	---	---	Low	Moderate	Low.
Rock outcrop.											
94--Tulargo	B	None	---	---	>60	---	---	---	Low	High	High.
95*:											
Tulargo	B	None	---	---	>60	---	---	---	Low	High	High.
Andergeorge	B	None	---	---	>60	---	---	---	Low	High	Low.
96*:											
Witt	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Penistaja	B	None	---	---	>60	---	---	---	Moderate	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

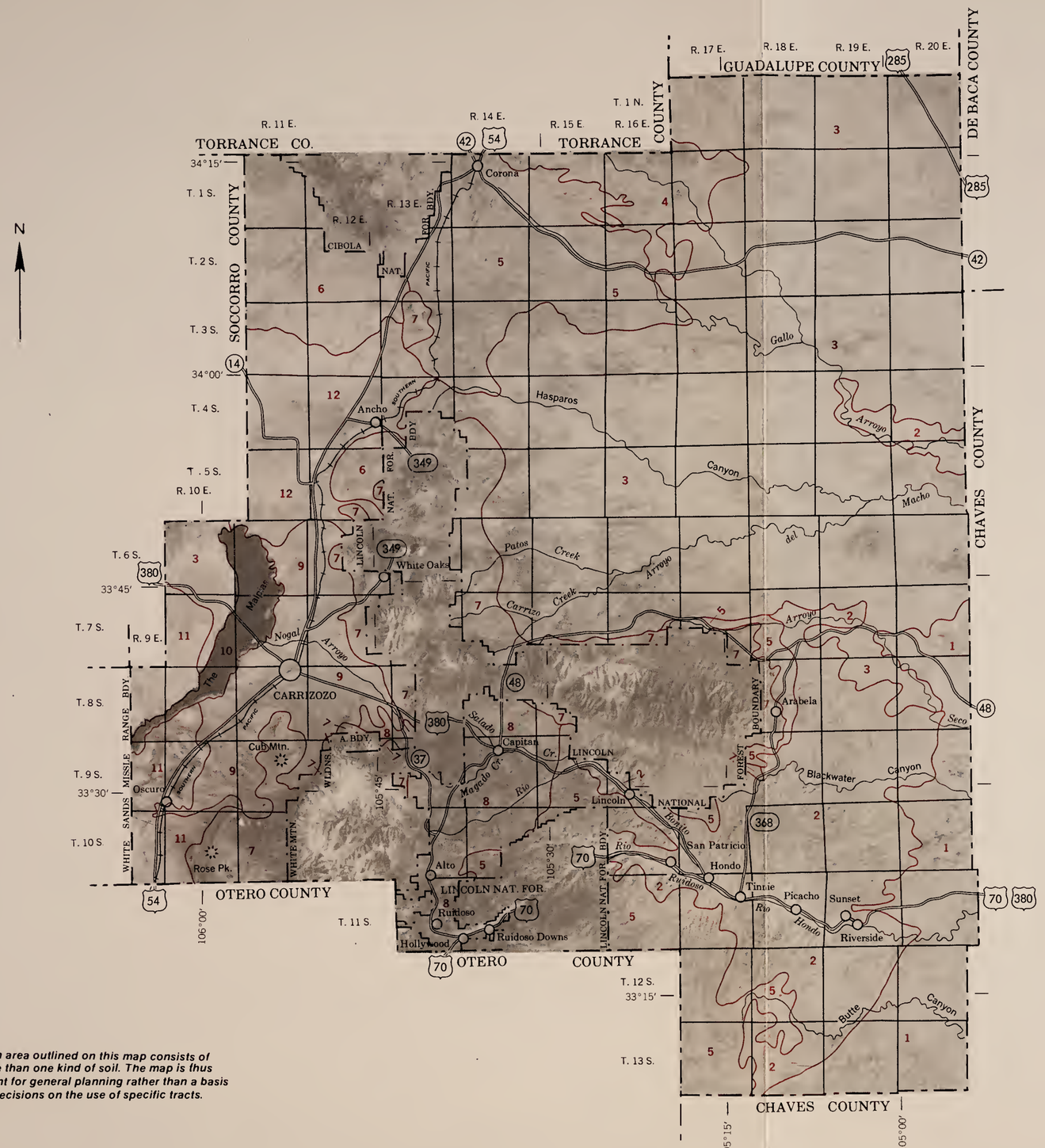
TABLE 12.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Andergeorge	Loamy-skeletal, gypsic, mesic Typic Gypsiorthids
Arch	Fine-loamy, mixed, thermic Ustochreptic Calciorthids
Asparas	Fine-loamy, mixed, mesic Aridic Argiustolls
Bernal	Loamy, mixed, mesic Lithic Argiustolls
Blakeney	Loamy, mixed, thermic, shallow Ustochreptic Paleorthids
Bluepoint	Mixed, thermic Typic Torripsamments
Clovis	Fine-loamy, mixed, mesic Ustollic Haplargids
Darvey	Fine-loamy, mixed, mesic Ustollic Calciorthids
Deacon	Fine-loamy, mixed, mesic Aridic Haplustolls
Deama	Loamy-skeletal, carbonatic, mesic Lithic Calciustolls
Dioxice	Fine-loamy, mixed, mesic Aridic Calciustolls
Docdee	Loamy-skeletal, mixed, mesic Lithic Haplustolls
Ector	Loamy-skeletal, carbonatic, thermic Lithic Calciustolls
Gabaldon	Fine-silty, mixed, mesic Cumulic Haplustolls
Gavilan	Clayey-skeletal, mixed, mesic Udic Argiustolls
Harvey	Fine-loamy, mixed, mesic Ustollic Calciorthids
Hightower	Fine-loamy, mixed, mesic Torriorthentic Haplustolls
Hightower Variant	Fine-loamy, mixed, mesic Aridic Ustochrepts
Hogadero	Loamy-skeletal, mixed, mesic Aridic Calciustolls
Kimbrough	Loamy, mixed, thermic, shallow Petrocalcic Calciustolls
Lozier	Loamy-skeletal, carbonatic, thermic Lithic Calciorthids
Malargo	Fine-loamy, gypsic, thermic Typic Gypsiorthids
Manzano	Fine-loamy, mixed, mesic Cumulic Haplustolls
Mokiak	Loamy-skeletal, mixed, mesic Aridic Argiustolls
Monjeau	Fine, mixed, mesic Udic Argiustolls
Nogal	Fine, mixed, mesic Typic Haplustalfs
Nolten	Fine, mixed, mesic Udic Argiustolls
Onite	Coarse-loamy, mixed, thermic Typic Haplargids
Oro Grande	Loamy-skeletal, mixed, mesic Lithic Haplustolls
Paco	Fine, mixed, mesic Udic Argiustolls
Pajara	Clayey-skeletal, mixed, mesic Calciorthidic Paleustolls
Partri	Fine, mixed, mesic Aridic Argiustolls
Pastura	Loamy, mixed, mesic, shallow Ustollic Paleorthids
Patos	Clayey-skeletal, mixed, mesic Typic Haplustalfs
Pena	Loamy-skeletal, mixed, mesic Aridic Calciustolls
Penapon	Loamy-skeletal, mixed, mesic Typic Calciustolls
Penistaja	Fine-loamy, mixed, mesic Ustollic Haplargids
Plack	Loamy, mixed, mesic, shallow Petrocalcic Calciustolls
Purcella	Loamy-skeletal, mixed, mesic Aridic Argiustolls
Rance	Fine-silty, gypsic, mesic Ustic Torriorthents
Reflection	Fine-loamy, gypsic, thermic Typic Gypsiorthids
Remunda	Fine, mixed, mesic Aridic Argiustolls
Reventon	Fine-loamy, mixed, mesic Typic Argiustolls
Romine	Loamy-skeletal, mixed, mesic Typic Argiustolls
Roswell	Mixed, thermic Ustic Torripsamments
Ruidoso	Fine, mixed, mesic Pachic Argiustolls
Ruidoso Variant	Fine, mixed, mesic Pachic Argiustolls
Sampson	Fine-loamy, mixed, mesic Pachic Argiustolls
Sharps	Fine-silty, mixed, mesic Ustollic Haplargids
Socorro	Loamy-skeletal, carbonatic, mesic Ustollic Calciorthids
Stroupe	Clayey-skeletal, mixed, mesic Aridic Argiustolls
Tanbark	Loamy, gypsic, mesic, shallow Ustic Torriorthents
Tortugas	Loamy-skeletal, carbonatic, mesic Lithic Haplustolls
Travessilla	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Tulargo	Fine-loamy, gypsic, mesic Typic Gypsiorthids
Witt	Fine-silty, mixed, mesic Ustollic Haplargids

☆ U.S. GOVERNMENT PRINTING OFFICE: 1983 O - 403-122 QL 3



Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



N

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

MAP UNITS

SOILS AND ROCK OUTCROP ON UPLANDS AND IN VALLEYS

1 Ector-Kimbrough-Rock outcrop: Very shallow and shallow, well drained, nearly level to very steep soils, and Rock outcrop; on hills

2 Deama-Rock outcrop: Very shallow and shallow, well drained, nearly level to very steep soils, and Rock outcrop; on hills, mesa sides, and breaks

3 Pastura-Deama-Darvey: Very shallow, shallow, and very deep, well drained, nearly level to moderately sloping soils; on hills, mesa sides, piedmonts, and valley sides

4 Penistaja-Plack—Travessilla: Very shallow, shallow, and very deep, well drained, nearly level to moderately sloping soils; on valley sides, ridges, hills, mesas, and piedmonts

5 Tortugas-Rock outcrop-Asparas: Very shallow, shallow, and very deep, well drained, nearly level to extremely steep soils, and Rock outcrop; in valleys and on hills, piedmonts, ridges, and mountainsides

6 Tortugas-Witt-Stroupe: Very shallow, shallow, moderately deep, and very deep, well drained, nearly level to extremely steep soils; in valleys and on hills, mesas, mountainsides, and breaks

SOILS AND LAVA FLOWS ON UPLANDS AND IN VALLEYS

7 Mokiak-Reventon-Sampson: Moderately deep and very deep, well drained, nearly level to extremely steep soils; in valleys and on valley sides, piedmonts, and mountainsides

8 Romine-Hightower-Oro Grande: Very shallow to moderately deep and very deep, well drained, nearly level to extremely steep soils; on ridges, hills and alluvial plains and in swales

9 Tulargo-Harvey-Clovis: Very deep, well drained, nearly level to gently sloping soils; on piedmonts and valley sides

10 Lava flows: Geologically recent basalt lava

11 Malargo-Lozier-Bluepoint: Very shallow, shallow, and very deep, well drained and somewhat excessively drained, nearly level to extremely steep soils; on hills and piedmonts

12 Gabaldon-Sharps-Rance: Moderately deep and very deep, well drained, nearly level to gently sloping soils; on uplands, valley floors, and stream terraces

Compiled 1981

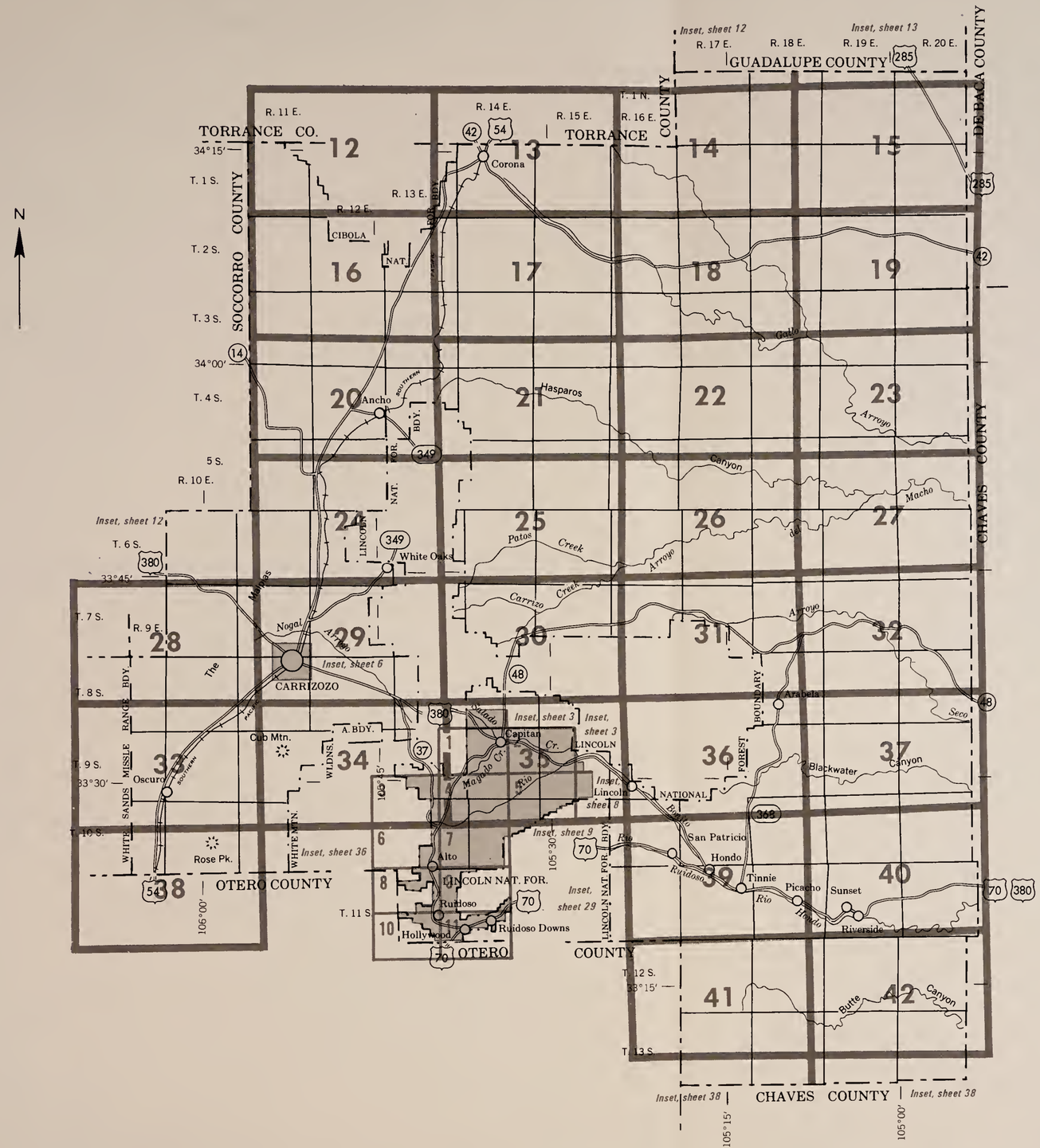
US DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
UNIVERSITY OF NEW MEXICO AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

LINCOLN COUNTY AREA, NEW MEXICO

SCALE 1:633,600

5 0 5 10 MILES



Area mapped at scale of 1:24,000

Area mapped at scale of 1:63,360

INDEX TO MAP SHEETS

LINCOLN COUNTY AREA, NEW MEXICO

SCALE 1:633,600

5 0 5 10 MILES

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LINCOLN COUNTY AREA, NEW MEXICO

U.S.DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

SOIL LEGEND

SYMBOL	NAME
1	Andergeorge-Darvey-Asparas association, gently sloping
2	Bernal gravelly loam, 3 to 15 percent slopes*
3	Blakeney-Arch association, moderately undulating
4	Clovis-Harvey association, gently sloping
5	Clovis-Harvey association, loam surface, gently sloping
6	Clovis-Pastura association, gently sloping
7	Cumulic Haplustolls, gently sloping
8	Darvey-Asparas association, gently sloping
9	Darvey-Pastura association, gently sloping
10	Deacon loam, 0 to 8 percent slopes*
11	Deama very cobbly loam, moderately sloping
12	Deama-Pastura association, moderately undulating
13	Deama-Pastura association, moderately sloping
14	Deama-Rock outcrop association, very steep
15	Dioxice loam, 2 to 5 percent slopes*
16	Ector-Kimbrough association, gently sloping
17	Ector-Rock outcrop association, moderately sloping
18	Ector-Rock outcrop association, moderately steep
19	Gabaldon silt loam, 0 to 2 percent slopes*
20	Gabaldon-Riverwash association, nearly level
21	Gavilan loam, 0 to 8 percent slopes*
22	Gavilan gravelly loam, 15 to 30 percent slopes*
23	Gavilan very gravelly loam, 30 to 50 percent slopes*
24	Harvey-Darvey association, gently sloping
25	Harvey-Darvey association, loam surface, gently sloping
26	Hightower loam, 3 to 8 percent slopes*
27	Hightower-Oro Grande complex, 3 to 8 percent slopes*
28	Hightower-Oro Grande complex, moderately steep
29	Hightower Variant sandy loam, 3 to 8 percent slopes*
30	Hogadero-Pena association, moderately undulating
31	Lava flows
32	Lithic Argiustolls-Rock outcrop association, extremely steep
33	Lozier very gravelly loam, very steep
34	Malargo-Bluepoint association, hummocky
35	Manzano loam, 0 to 3 percent slopes*
36	Mokiak-Rock outcrop association, extremely steep
37	Mokiak-Stroupe-Rock outcrop association, very steep
38	Monjeau-Docdee complex, 8 to 15 percent slopes*
39	Monjeau-Dccdee complex, 15 to 30 percent slopes*
40	Monjeau-Docdee complex, 30 to 75 percent slopes*
41	Nogal sandy clay loam, 8 to 15 percent slopes*
42	Nogal-Rock outcrop complex, moderately steep
43	Nolten loam, 8 to 15 percent slopes*
44	Nolten loam, 15 to 30 percent slopes*
45	Onite-Bluepoint association, hummocky
46	Oro Grande very cobbly clay loam, moderately steep
47	Oro Grande very cobbly clay loam, very steep
48	Paco loam, 15 to 30 percent slopes*
49	Paco loam, dry, 3 to 8 percent slopes*
50	Paco loam, dry, 8 to 15 percent slopes*
51	Paco-Penapon complex, moderately sloping
52	Pajara-Witt association, moderately sloping
53	Pastura loam, gently sloping
54	Pastura-Harvey association, moderately rolling
55	Pastura-Partri association, gently sloping
56	Patos stony loam, gently sloping
57	Patos bouldery loam, moderately steep
58	Pena-Dioxice complex, moderately sloping
59	Pena-Hogadero association, hilly
60	Penapon-Tortugas very cobbly loams, extremely steep
61	Penistaja-Travessilla association, gently sloping
62	Plack-Dioxice loams, 0 to 8 percent slopes*
63	Plack-Dioxice association, gently sloping
64	Plack-Penistaja association, gently sloping
65	Purcella-Riverwash association, gently sloping
66	Rance silt loam, 2 to 5 percent slopes*
67	Rance-Tanbark silt loams, 2 to 9 percent slopes*
68	Reflection-Malargo association, moderately sloping
69	Remunda clay loam, gypsum substratum, 3 to 8 percent slopes*
70	Reventon loam, 0 to 3 percent slopes*
71	Reventon loam, 3 to 8 percent slopes*
72	Reventon-Sampson association, gently sloping
73	Rock outcrop-Stroupe-Deama association, extremely steep
74	Romine extremely gravelly loam, 15 to 45 percent slopes*
75	Roswell fine sand, hummocky
76	Ruidoso clay loam, moist, 0 to 8 percent slopes*
77	Ruidoso-Tortugas association, moderately sloping
78	Ruidoso Variant clay loam, 0 to 8 percent slopes*
79	Sampson loam, 0 to 5 percent slopes*
80	Sampson loam, moist, 0 to 8 percent slopes*
81	Sampson loam, moist, 8 to 15 percent slopes*
82	Sharps silt loam, 2 to 5 percent slopes*
83	Sharps-Rock outcrop association, moderately sloping
84	Socorro very gravelly loam, 0 to 8 percent slopes*
85	Stroupe very stony loam, moderately steep
86	Stroupe bouldery sandy clay loam, extremely steep
87	Stroupe-Witt association, moderately steep
88	Tanbark-Tortugas association, very steep
89	Tortugas-Asparas-Rock outcrop association, moderately sloping
90	Totrugas-Rock outcrop association, moderately sloping
91	Tortugas-Rock outcrop association, extremely steep
92	Tortugas-Ruidoso-Rock outcrop association, very steep
93	Travessilla-Rock outcrop association, moderately sloping
94	Tulargo loam, 0 to 5 percent slopes*
95	Tulargo-Andergeorge association, gently sloping
96	Witt-Penistaja association, gently sloping

* narrowly defined

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool — DAVIS AIRSTRIP, FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS
- Interstate — 79
- Federal — 410
- State — 52
- County, farm or ranch — 378

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or small — water, w

PITS
- Gravel pit — G.P.
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — GAS
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

Canals or ditches
- Double-line (label) — CANAL
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — SvE 107

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 1

LINCOLN NATIONAL FOREST

Capitan

Salado Creek

Magado Creek

BOUNDARY

LIMIT OF SOIL SURVEY

(Joins inset B, sheet 3)

(Joins sheet 2)

(Joins sheet 4)

(Joins sheet 34-1:63 360)

705,000 FEET

930,000 FEET

915,000 FEET

680,000 FEET

R. 13 E.

R. 14 E.

T. 9 S.

N

2 Miles

10000 Feet

5000

Scale 1:24000

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 2

(2)

N

710 000 FEET

(Joins sheet 35 -1:63 360)

R. 14 E. | R. 15 E.

930 000 FEET

(Joins sheet 1)

T. 9 S.

Scale 1:24000

2 Miles

10000 Feet

5000

1

5000 4000 3000 2000 1000 0 0

Gyp

Spring Canyon

Salado Creek

Bonito Rio

LINCOLN NATIONAL FOREST

(Joins sheet 35-1:63 360)

915 000 FEET

(Joins inset A, sheet 3)

(Joins sheet 5)

735 000 FEET

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 3

650 000 FEET

910 000 FEET

INSET A

740 000 FEET R. 15 E.

918 000 FEET

T. 9 S.

(Joins sheet 2)

(Joins sheet 35 -1:63 360)

912 000 FEET

(Joins inset, sheet 8)

744 000 FEET

3000 AND 4000-FOOT GRID TICKS

R. 13 E.

(Joins sheet 34 -1:63 360)

LINCOLN NATIONAL FOREST BOUNDARY

LINCOLN NATIONAL FOREST

INSET B

695 000 FEET

(Joins sheet 35 -1:63 360)

R. 14 E.

940 000 FEET

LIMIT OF SOIL SURVEY

Salado Creek

(Joins sheet 1)

705 000 FEET

T. 9 S. | T. 8 S.

935 000 FEET

(Joins sheet 35 -1:63 360)

(Joins sheet 4)

T. 10 S. | T. 9 S.

895 000 FEET

LIMIT OF SOIL SURVEY

675 000 FEET

(Joins sheet 6)

N

2 Miles

10000 Feet

5000

Scale 1:24000

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 4

4

N

Scale 1:24000

2 Miles

10000 Feet

R. 13 E. | R. 14 E.

705 000 FEET

910 000 FEET

(Joins sheet 1)

(Joins sheet 3)

T. 10 S. | T. 9 S.

(Joins sheet 5)

895 000 FEET

680 000 FEET

(Joins sheet 7)

Bonito Rio

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO NO. 4

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 5

710 000 FEET

910 000 FEET

R. 14 E. | R. 15 E.

(Joins sheet 2)

(Joins sheet 4)

(Joins inset, sheet 9)

735 000 FEET

895 000 FEET

Fort Stanton

Bonito

Rio

BOUNDARY OF LINCOLN NATIONAL FOREST SOIL SURVEY LIMIT

LINCOLN NATIONAL FOREST

T. 10 S. | T. 9 S. (Joins inset, sheet 8)

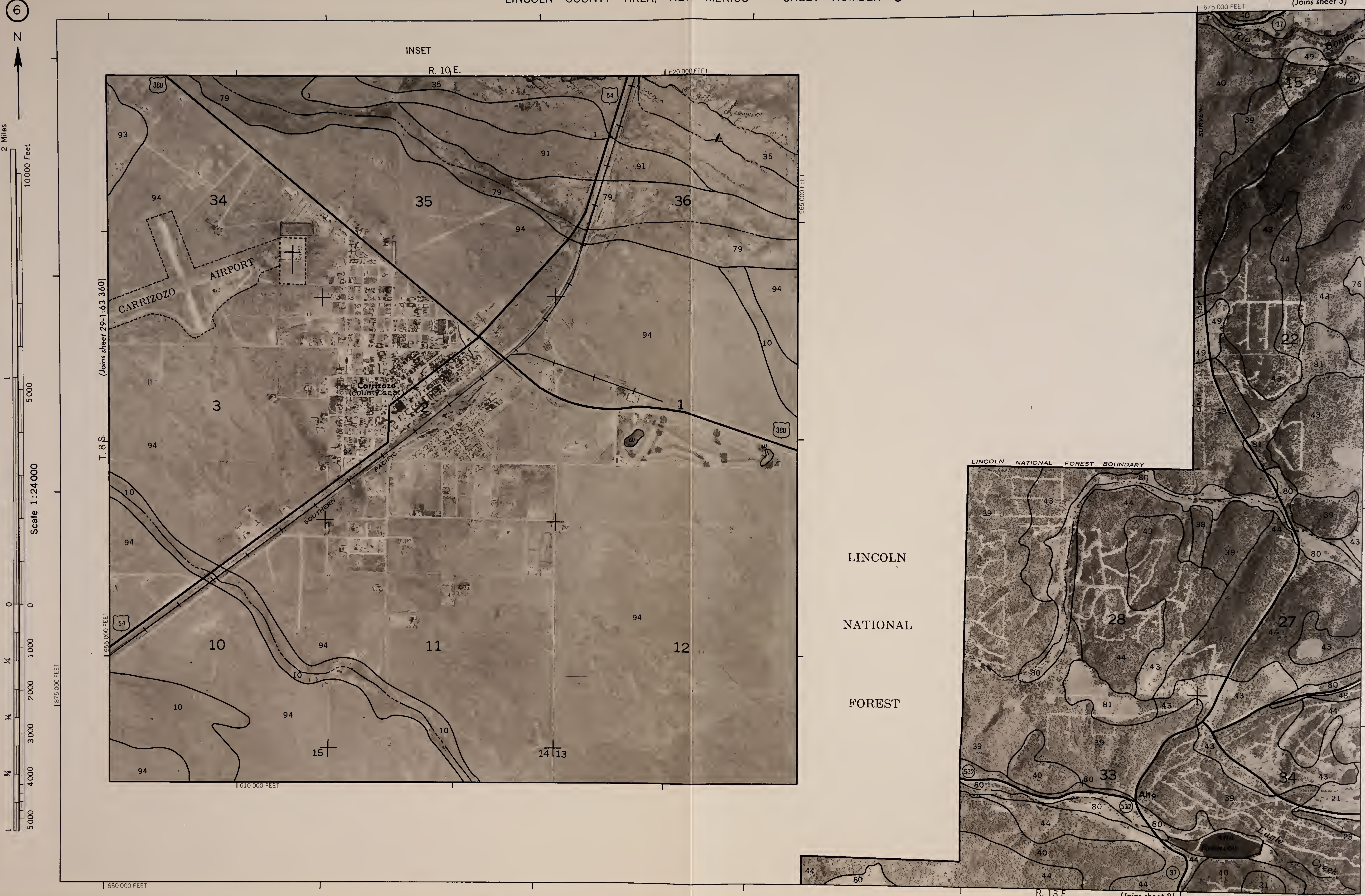
5

N

2 Miles

10000 Feet

Scale 1:24000


6
N
Scale 1:24 000
2 Miles
10 000 Feet
5000
1
0
1000
2000
3000
4000
5000
INSET
R. 10 E.
620 000 FEET
610 000 FEET
955 000 FEET
965 000 FEET
(Joins sheet 29-1.63 360)
T. 8 S.
CARRIZOZO AIRPORT
Carrizozo (county seat)
SOUTHERN PACIFIC
34
35
36
3
1
10
11
12
15
14
13
380
54
LINCOLN
NATIONAL
FOREST
LINCOLN NATIONAL FOREST BOUNDARY
675 000 FEET
(Joins sheet 3)
890 000 FEET
650 000 FEET
875 000 FEET
(Joins sheet 7)
T. 10 S.
R. 13 E.
(Joins sheet 8)
Bonito
15
22
27
28
33
34
Alto
Eagle Creek
37
532
LINCOLN COUNTY AREA, NEW MEXICO NO. 6

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 7

680 000 FEET

890 000 FEET

R. 13 E. | R. 14 E.

(Joins sheet 4)

(Joins sheet 6)

(Joins inset, sheet 9)

(Joins sheet 9)

705 000 FEET

875 000 FEET

T. 10S.

Angus

LINCOLN NATIONAL FOREST BOUNDARY SURVEY

7

N

2 Miles

10000 Feet

Scale 1:24000

1 0 0

1 5000

¼ 1000

½ 2000

¾ 3000

1 4000

¼ 5000

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Continuous grid lines are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NO. 6

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 8

(8)

N

2 Miles 10000 Feet

Scale 1:24000

INSET

(Joins inset A, sheet 3) R. 15 E.

(Joins sheet 35-1:63 360)

745 000 FEET

810 000 FEET

(Joins sheet 5)

T. 9 S.

T. 10 S.

800 000 FEET

740 000 FEET

(Joins sheet 35-1:63 360)

LIMIT OF SOIL SURVEY

LINCOLN NATIONAL FOREST

(Joins sheet 6)

675 000 FEET

870 000 FEET

T. 11 S.

T. 10 S.

LINCOLN NATIONAL FOREST

Gavilan Canyon

Spring Canyon

Cedar Creek

LIMIT OF SOIL SURVEY

LINCOLN NATIONAL FOREST BOUNDARY

Airstrip

OTERO COUNTY

855 000 FEET

660 000 FEET

R. 13 E.

Brady Canyon

(Joins sheet 9)

(Joins sheet 10)


R. 13 E. | R. 14 E.
680 000 FEET
(Joins sheet 7)
T. 11 S. | T. 10 S.
870 000 FEET
Eagle Creek
Gavilan Canyon
LIMIT OF SOIL SURVEY
LINCOLN NATIONAL FOREST
(Joins sheet 8)
Airfield
Bog Spring
LINCOLN NATIONAL FOREST BOUNDARY
R. 14 E. | R. 15 E.
(Joins sheet 5)
720 000 FEET
FOREST BOUNDARY
LINCOLN NATIONAL
850 000 FEET
T. 10 S.
(Joins sheet 7)
885 000 FEET
710 000 FEET
LIMIT OF SOIL SURVEY
LINCOLN NATIONAL FOREST
Ruidoso
Rio
SOIL SURVEY
LIMIT OF SOIL SURVEY
855 000 FEET
LINCOLN NATIONAL FOREST
(Joins sheet 11)
705 000 FEET
9
N
2 Miles
10 000 Feet
Scale 1:24 000

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 10

10

N

R. 12 E. | R. 13 E.

650 000 FEET

850 000 FEET

(Joins sheet 8)

LIMIT OF SOIL SURVEY

LINCOLN NATIONAL FOREST BOUNDARY

Rio Ruidoso

RUIDOSO

SUDDERETH DRIVE

Flume Canyon

Grindstone Canyon

Creek

Corrizo

LINCOLN NATIONAL FOREST

OTERO COUNTY

19 20 21 22 27 28 29 33 34

(Joins sheet 11)

T. 12 S. | T. 11 S.

835 000 FEET

675 000 FEET

2 Miles

10000 Feet

1 5000

Scale 1:24000

1 5000 ¾ 4000 ½ 3000 ¼ 2000 0 1000 0

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LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 11

R. 13 E. | R. 14 E.

705 000 FEET

(Joins sheet 9)

11

N

LINCOLN NATIONAL FOREST BOUNDARY

LIMIT OF SOIL SURVEY

LINCOLN NATIONAL FOREST BOUNDARY

LIMIT OF SOIL SURVEY

LINCOLN NATIONAL FOREST

LINCOLN NATIONAL FOREST

Gavilan Canyon

MOON MOUNTAIN

Ruidoso Downs

Ruidoso

Rio

Corrizo Creek

SUDDERETH DRIVE

Hollywood

Canyon

Turkey Spring Canyon

Bill

Cherokee

DUDE MESA

OTERO COUNTY

(Joins sheet 10)

T. 11 S.

T. 12 S.

850 000 FEET

835 000 FEET

680 000 FEET

2 Miles

10000 Feet

Scale 1:24000

5000

12

N

R. 16 E. | R. 16 E. | R. 17 E.

830 000 FEET

1 216 000 FEET

T. 1 N.

GUADALUPE COUNTY

TORRANCE COUNTY

1 212 000 FEET

(Joins inset A, sheet 13)

(Joins sheet 14)

790 000 FEET

INSET A

4000 AND 10000-FOOT GRID TICKS

630 000 FEET

1 190 000 FEET

TORRANCE COUNTY

CIBOLA

CIBOLA LIMIT OF NATIONAL SOIL SURVEY FOREST

FOREST BOUNDARY

Pajara Canyon

GAS

T. 1 S. | T. 2 S.

SOCORRO COUNTY

1 160 000 FEET

600 000 FEET

(Joins sheet 16)

R. 10 E. | R. 11 E.

R. 9 E. | R. 9 E. | R. 10 E.

590 000 FEET

SOCORRO COUNTY

T. 6 S. | T. 7 S.

1 000 000 FEET

560 000 FEET

(Joins sheet 28)

Little Black Peak

int

380

INSET B

(Joins sheet 24)

1 020 000 FEET

Scale 1:63360

1 inch = 1 mile

1 centimeter = 0.63 kilometer

5 Miles

25000 Feet

20000

15000

10000

5000

0

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Cultural data is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Geodetic control and land division corners, if shown, are approximately positioned

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LINCOLN COUNTY AREA, NEW MEXICO NO. 12

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 13

13

N

840 000 FEET

R. 17 E. | R. 18 E.

R. 18 E. | R. 19 E.

1 220 000 FEET

(Joins inset A, sheet 12)

GUADALUPE COUNTY

DE BACA COUNTY

T. 1 N.

1 214 000 FEET

(Joins sheet 15)

910 000 FEET

6 000 AND 10000-FOOT GRID TICKS

INSET A

680 000 FEET

R. 12 E. | R. 13 E.

R. 13 E. | R. 14 E.

R. 14 E. | R. 15 E.

1 190 000 FEET

TORRANCE COUNTY

CIBOLA NATIONAL FOREST

CIBOLA NATIONAL FOREST BOUNDARY

SOUTHERN PACIFIC SOIL SURVEY LIMIT OF

Corona

Gallo Draw

T. 1 S.

1 160 000 FEET

(Joins sheet 14)

(Joins sheet 17)

750 000 FEET

5 Miles

25000 Feet

20000

15000

10000

5000

Scale 1:63 360

LINCOLN COUNTY AREA, NEW MEXICO NO. 12

Coordinate grid ticks and land division corners, if shown, are approximately positioned

This map is compiled on 1954 and 1955 aerial photography by the U. S. Department of Agriculture, soil conservation service and cooperating agencies

Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 14

14

N

R. 15 E. | R. 16 E. (Joins inset, sheet 12) R. 16 E. | R. 17 E.

830 000 FEET

1 210 000 FEET

T. 1 S. | T. 1 N.

TORRANCE COUNTY

(Joins sheet 13)

(Joins sheet 15)

1 160 000 FEET

760 000 FEET

(Joins sheet 18)

Scale 1:63360

5 Miles 4 3 2 1 0

25000 Feet 20000 15000 10000 5000 0 5000

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 15

15

840 000 FEET

1 210 000 FEET

(Joins inset, sheet 13)

T. 1 S. | T. 1 N.

(Joins sheet 14)

T. 1 S.

R. 17 E. | R. 18 E. | R. 18 E. | R. 19 E.

(Joins sheet 19)

910 000 FEET

1 : 60 000 FEET

N

Ramon

285

DE BACA COUNTY

5 Miles

25000 Feet

20000

15000

10000

5000

Scale 1:63360

UNCOLN COUNTY AREA, NEW MEXICO NO. 14

Contour lines, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 16

16

N

(Joins sheet 12)

R. 10 E. | R. 11 E.

R. 11 E. | R. 12 E.

670 000 FEET

1 150 000 FEET

CIBOLA NATIONAL FOREST

CIBOLA NATIONAL FOREST BOUNDARY
LIMIT OF SOIL SURVEY

SOCORRO COUNTY

T. 3 S. | T. 2 S.

1 110 000 FEET

600 000 FEET

(Joins sheet 20)

(Joins sheet 17)

Cerro Tecolote Peak

Lateral

Canyon

Gas

5 Miles 4 3 2 1 0

25000 Feet 20000 15000 10000 5000 0

Scale 1:63 360

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO NO. 16

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 17

17

N

R. 12 E. | R. 13 E. | R. 14 E. | R. 15 E.

T. 2 S. | T. 3 S.

680 000 FEET | 750 000 FEET

1 150 000 FEET | 1 110 000 FEET

(Joins sheet 13) | (Joins sheet 18) | (Joins sheet 16) | (Joins sheet 21)

Gallo Draw

Bonita Canyon

GAS

SOUTHERN PACIFIC

5 Miles | 25000 Feet | 20000 | 15000 | 10000 | 5000

Scale 1:63360

LINCOLN COUNTY AREA, NEW MEXICO NO. 16

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 18

18

N

(Joins sheet 14)

830 000 FEET

T. 2 S.

1 150 000 FEET

(Joins sheet 17)

Gallo

Draw

Canyon

Bonito

Gallo

Draw

1 110 000 FEET

T. 3 S. | T. 2 S.

(Joins sheet 19)

760 000 FEET

(Joins sheet 22)

R. 15 E. | R. 16 E.

R. 16 E. | R. 17 E.

Scale 1:63 360

5 Miles

4

3

2

1

0

25 000 Feet

20 000

15 000

10 000

5 000

0

5 000

This map is compiled on 1954 and 1973 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 19

840 000 FEET

R. 17 E. | R. 18 E. | R. 18 E. | R. 19 E. | R. 19 E. | R. 20 E.

(Joins sheet 15)

T. 2 S.

1 150 000 FEET

(Joins sheet 18)

T. 3 S. | T. 2 S.

DE BACA COUNTY

CHAVES COUNTY

Cola

del

Gallo

(Joins sheet 23)

910 000 FEET

1 110 000 FEET

19

N

5 Miles

25000 Feet

20000

15000

10000

5000

Scale 1:63360

Coordinate grid ticks and land division corners, if shown, are approximately positioned

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 20

20

N

(Joins sheet 16)

R. 10 E. | R. 11 E.

R. 11 E. | R. 12 E.

670 000 FEET

1 100 000 FEET

T. 4 S. | T. 3 S.

SOCORRO COUNTY

Canyon

Largo

VALLEY

ANCHO

Ancho

PACIFIC

SOUTHERN

SURVEY

LINCOLN NATIONAL FOREST BOUNDARY

LINCOLN NATIONAL FOREST

LIMIT OF SOIL

(Joins sheet 21)

T. 5 S. | T. 4 S.

1 050 000 FEET

600 000 FEET

(Joins sheet 24)

Scale 1:63360

1 inch = 5000 feet

1 cm = 10000 cm

5 Miles

25 000 Feet

20 000

15 000

10 000

5000

0

Prepared by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

This map is compiled on a 1:24 000 scale from aerial photographs dated 1973 and field observations made in 1974. Control for photogrammetric compilation was established by the U. S. Geological Survey. Soil boundaries, symbols, and descriptions were compiled by the Soil Conservation Service.

Projection is Lambert conformal conic. Horizontal datum is North American 1927 (NAD27).

Vertical datum is mean sea level.

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 21

This map is compiled on 1954 and 1972 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO NO. 20

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 22

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 23

840 000 FEET

R. 17 E. | R. 18 E. | R. 19 E. | R. 20 E.

(Joins sheet 19)

1 100 000 FEET

T. 4 S. | T. 3 S.

T. 5 S. | T. 4 S.

(Joins sheet 22)

(Joins sheet 27)

910 000 FEET

1 060 000 FEET

Gallo Arroyo

Cowboy Draw

Padilla

Canyon Creek

Juan Largo Gas Canyon

CHAVES COUNTY

23

N

5 Miles

4

3

2

1

25 000 Feet

20 000

15 000

10 000

5 000

0

Scale 1:63 360

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO NO. 22

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 24

24

N

(Joins sheet 20)

R. 10 E. | R. 11 E.

R. 11 E. | R. 12 E.

670 000 FEET

1 040 000 FEET

T. 6 S. | T. 5 S.

Red Lake

Coyote Canyon

PACIFIC SOUTHERN

MOUNTAINS

JICARILLA

LINCOLN NATIONAL FOREST BOUNDARY

LINCOLN NATIONAL FOREST

MALPIAS

THE

LIMIT OF SOIL SURVEY

MOUNTAIN

BAXTER

White Oaks

Canyon

Water

White Canyon

5 Miles 4 3 2 1 0

25 000 Feet 20 000 15 000 10 000 5 000 0

Scale 1:63360

1 ¼ ½ ¾ 1 Miles

5 000 0 5 000

(Joins inset B, sheet 12)

1 000 000 FEET

600 000 FEET

(Joins sheet 29)

R. 10 E. | R. 11 E.

R. 11 E. | R. 12 E. | R. 13 E.

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinates are Clarke 1866 datum

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 25

680 000 FEET

1 040 000 FEET

R. 12 E. | R. 13 E. | R. 14 E. | R. 15 E.

T. 6 S. | T. 5 S.

T. 7 S. | T. 6 S.

LINCOLN NATIONAL FOREST

SOIL SURVEY

LIMIT OF

LINCOLN NATIONAL FOREST BOUNDARY

Reventon Draw

Creek

Patos

(Joins sheet 21)

(Joins sheet 26)

(Joins sheet 30)

750 000 FEET

25

N

5 Miles

4

3

2

1

25 000 Feet

20000

15000

10000

5000

0

0

¼

½

¾

1

5000

Scale 1:63 360

1 000 000 FEET

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies

Coordinate grid lucks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO NO. 24

Coordinate grid ricks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 26

26

N

(Joins sheet 22)

R. 15 E. | R. 16 E.

R. 16 E. | R. 17 E.

830 000 FEET

1 050 000 FEET

(Joins sheet 25)

T. 6 S. | T. 5 S.

Scale 1:63360

5 Miles 4 3 2 1 0 1

25000 Feet 20000 15000 10000 5000 0 5000

Big Asparas Canyon

Gas

Hogadero Draw

Hogadero

Draw

Arroyo

Macho

del

Arroyo

Middle

Macho

Arroyo

1 000 000 FEET

760 000 FEET (Joins sheet 31)

R. 16 E. | R. 17 E.

R. 17 E. | R. 18 E.

(Joins sheet 27)

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 27

27

N

840 000 FEET

1 050 000 FEET

1 010 000 FEET

910 000 FEET

R. 17 E. | R. 18 E. | R. 19 E. | R. 20 E.

R. 18 E. | R. 19 E. | R. 20 E. | R. 21 E.

T. 6 S. | T. 5 S.

(Joins sheet 23)

(Joins sheet 26)

(Joins sheet 32)

Juan Largo Canyon

Asparas Canyon

Arroyo del Macho

GAS

CHAVES COUNTY

5 Miles

25000 Feet

20000

15000

10000

5000

Scale 1:63360

This map is compiled on 1954 and 1973 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

Scale 1:63360

5 Miles 4 3 2 1 0

25000 Feet 20000 15000 10000 5000 0

1 ¾ ½ ¼ 0 1 5 300

R. 8 E. | R. 9 E. *(Joins inset B, sheet 12)*

R. 9 E. | R. 10 E.

590 000 FEET

WHITE SANDS MISSILE RANGE

WHITE SANDS MISSILE RANGE BOUNDARY

SOIL SURVEY LIMIT OF

SOCORRO COUNTY

LINCOLN COUNTY

MALPIAS THE

VALLEY OF FIRES STATE PARK

Willow Spring

SOUTHERN PACIFIC

T. 8 S. | T. 7 S.

950 000 FEET

530 000 FEET

(Joins sheet 33)

(Joins sheet 29)

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Soil boundaries, symbols, and land division corners, if shown, are approximately positioned.

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Coordinate grid ticks and land division corners, if shown, are approximately positioned
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 29

600 000 FEET

R. 10 E. | R. 11 E.

R. 11 E. | R. 12 E.

(Joins sheet 24)

(Joins sheet 35)

753000 FEET

990 000 FEET

890 000 FEET

(Joins sheet 28)

T. 8 S. | T. 7 S.

T. 11 S. | T. 10 S.

(Joins sheet 39)

MALPIAS

THE

White Oaks Draw

PACIFIC SOUTHERN

LINCOLN NATIONAL FOREST BOUNDARY

LINCOLN NATIONAL FOREST

LIMIT OF SOIL SURVEY

Carrizozo

(Joins sheet 6, 1:24 000)

Nogal Arroyo

HUGHS HILL

950 000 FEET

840 000 FEET

OTERO CO.

R. 10 E. | R. 11 E.

62

R. 11 E. | R. 12 E. | R. 13 E.

(Joins sheet 34)

670 000 FEET

R. 16 E. 755 000 FEET

2000 AND 5000-FOOT GRID TICKS

29

N

5 Miles

25 000 Feet

20 000

15 000

10 000

5000

Scale 1:63 360

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 30

30

N

R. 13 E. | R. 14 E. | R. 15 E. | R. 16 E.

T. 7 S. | T. 6 S.

(Joins sheet 25)

750 000 FEET

990 000 FEET

(Joins sheet 31)

Aragon Creek

Corrizo Creek

Cottonwood Canyon

Canyon

Dry

LINCOLN NATIONAL FOREST BOUNDARY

LIMIT OF SOIL SURVEY

LINCOLN NATIONAL FOREST

T. 8 S. | T. 7 S.

950 000 FEET

680 000 FEET

(Joins sheet 35)

(Joins sheet 31)

Scale 1:63360

5 Miles | 4 | 3 | 2 | 1

25000 Feet | 20000 | 15000 | 10000 | 5000

1 | ¾ | ½ | ¼ | 0 | 0 | 5000

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 31

760 000 FEET

R. 16 E. | R. 17 E.

R. 17 E. | R. 18 E.

(Joins sheet 26)

T. 7 S. | T. 6 S.

T. 8 S. | T. 7 S.

950 000 FEET

(Joins sheet 30)

(Joins sheet 32)

(Joins sheet 36)

830 000 FEET

Deep Lake

LIMIT OF SOIL SURVEY

LINCOLN NATIONAL FOREST BOUNDARY

LINCOLN NATIONAL FOREST

Seco

Arroyo

Duran Canyon

int

31

N

5 Miles

25000 Feet

20000

15000

10000

5000

Scale 1:63 360

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LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 31

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

32

N

Scale 1:63360

5 Miles 4 3 2 1

25000 Feet 20000 15000 10000 5000

1 3/4 1/2 1/4 0 1 0 5000

(Joins sheet 27)

(Joins sheet 31)

(Joins sheet 37)

910 000 FEET

1 000 000 FEET

950 000 FEET

840 000 FEET

T. 7 S.

T. 8 S.

R. 18 E. | R. 19 E. | R. 20 E. | R. 21 E.

CHAVES COUNTY

Arroyo

Middle Arroyo

Seco

Serrano Arroyo

Zeutelgt Arroyo

Encinoso Canyon

Archuleta Creek

Salt Creek

GAS

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 33

33

530 000 FEET

940 000 FEET

R. 8 E. | R. 9 E.

R. 9 E. | R. 10 E.

(Joins sheet 28)

N

T. 9 S. | T. 8 S.

(Joins sheet 34)

T. 10 S. | T. 9 S.

5 Miles

25 000 Feet

20000

15 000

10000

5000

Scale 1:63360

WHITE SANDS MISSILE RANGE

WHITE SANDS MISSILE RANGE BOUNDARY

SOIL SURVEY LIMIT

Canyon

Bull Gap

SOUTHERN PACIFIC

Cottonwood Creek

Phillips Spring

Oscuro

880 000 FEET

600 000 FEET

(Joins sheet 38)

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NO. 33

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 34

34

N

(Joins sheet 29)

R. 10 E. | R. 11 E.

R. 11 E. | R. 12 E. | R. 13 E.

670 000 FEET

940 000 FEET

T. 9 S. | T. 8 S.

T. 10 S. | T. 9 S.

890 000 FEET

(Joins sheet 39)

610 000 FEET

(Joins sheet 33)

(Joins sheet 3 - 1:24 000)

Scale 1:63360

5 Miles

25 000 Feet

20000

15000

10000

5000

0

WILLOW HILLS

CUB MOUNTAIN

CHAVES MOUNTAIN

Sanders Canyon

Cottonwood Creek

Tanner Canyon

Tortolita Creek

Nogal Creek

Nogal

LIMIT OF SOIL SURVEY

LINCOLN NATIONAL FOREST BOUNDARY

LINCOLN NATIONAL FOREST

LINCOLN NATIONAL FOREST LIMIT OF SOIL SURVEY BOUNDARY

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

680 000 FEET

940 000 FEET

R. 14 E. | R. 15 E.

(Joins sheet 30)

R. 15 E. | R. 16 E.

(Joins inset, sheet 3 - 1:24 000)

(Joins sheet 2 - 1:24 000)

LINCOLN NATIONAL FOREST

SOIL SURVEY LINCOLN NATIONAL FOREST BOUNDARY

LIMIT OF

Gyp

Spring

Canyon

T. 9 S. | T. 8 S.

(Joins sheet 36)

LINCOLN NATIONAL FOREST LIMIT OF SOIL SURVEY BOUNDARY

Rio Bonito

380

(Joins sheet 2 - 1:24 000)

(Joins inset, sheet 3 - 1:24 000)

(Joins sheet 5 - 1:24 000)

LINCOLN NATIONAL FOREST

LINCOLN NATIONAL FOREST BOUNDARY SOIL SURVEY LIMIT OF

T. 10 S. | T. 9 S.

900 000 FEET

750 000 FEET

(Joins inset, sheet 29)

(Joins sheet 34)

R. 10 E.

605 000 FEET

(Joins sheet 38)

880 000 FEET

T. 10 S.

Three Rivers Canyon

SOIL SURVEY LIMIT OF

870 000 FEET

OTERO CO

610 000 FEET

5000 AND 10000-FOOT GRID TICKS

35

N

5 Miles

25000 Feet

20000

15000

10000

5000

Scale 1:63360

(36)

N

Scale 1:63360

5 Miles 4 3 2 1 0

25000 Feet 20000 15000 10000 5000 0

1 ¾ ½ ¼ 0 5000

(Joins sheet 35)

(Joins sheet 31)

(Joins sheet 39)

(Joins sheet 37)

830 000 FEET

940 000 FEET

900 000 FEET

770 000 FEET

LINCOLN NATIONAL FOREST

LINCOLN NATIONAL FOREST BOUNDARY

LIMIT OF SOIL SURVEY

Arabela

Lincoln

Bluewater Creek

Aguia Creek

Chiquita Creek

Blackwater Creek

Escondido Canyon

Diablo Canyon

Deadman Canyon

LONG RIDGE

T. 9 S. | T. 8 S.

T. 10 S. | T. 9 S.

R. 16 E. | R. 17 E.

R. 17 E. | R. 18 E.

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO NO. 36

LINCOLN COUNTY, NEW MEXICO

U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 37

LINCOLN COUNTY AREA, NEW MEXICO NO. 36

This map is compiled on 1954 and 1973 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks (and land division corners, if shown, are approximately positioned.

840 000 FEET
940 000 FEET
910 000 FEET
900 000 FEET

R. 18 E. | R. 19 E.
R. 19 E. | R. 20 E.
R. 20 E.

T. 9 S. | T. 8 S.
T. 10 S. | T. 9 S.

(Joins sheet 36)
(Joins sheet 32)
(Joins sheet 40)

Creek
Archuleta
Agua
Chiquita
Blackwater
Deadman
Canyon
Nelson
Salt
CHAVES COUNTY

37
N

5 Miles
25 000 Feet
20000
15000
10000
Scale 1:63360
5000
1 3/4 1/2 1/4 0

38

N

5 Miles 4 3 2 1 0

25000 Feet 20000 15000 10000 5000 0

Scale 1:63360

1 ¾ ½ ¼ 0 1 Inch

(Joins sheet 33)

600 000 FEET

WHITE SANDS MISSILE RANGE RESERVATION BOUNDARY

PACIFIC SOUTHERN

GODFREY HILLS

Rose Peak

880 000 FEET

T. 10 S.

(Joins inset, sheet 35)

R. 8 E. | R. 9 E. OTERO COUNTY R. 9 E. | R. 10 E.

INSET A

(Joins sheet 41)

840 000 FEET

OTERO COUNTY

Chivo Canyon

Pine Tree Canyon

786000 FEET

T. 13 S.

(Joins lower left)

776 000 FEET

CHAVES COUNTY

R. 17 E. | R. 18 E.

790 000 FEET

INSET B

(Joins sheet 42)

910 000 FEET

Pine Tree Canyon

986 000 FEET

T. 13 S.

(Joins inset A)

976 000 FEET

CHAVES COUNTY

R. 18 E. | R. 19 E. R. 19 E. | R. 20 E.

850 000 FEET

530 000 FEET

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO NO. 38

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 39

39

N

R. 16 E. | R. 17 E. | R. 17 E. | R. 18 E.

770 000 FEET

890 000 FEET

(Joins sheet 36)

(Joins sheet 40)

(Joins sheet 38)

T. 11 S. | T. 10 S.

T. 12 S. | T. 11 S.

OTERO COUNTY

(Joins sheet 41)

840 000 FEET

850 000 FEET

Rio Ruidoso

Bonito

Hondo

Rio Hondo

Tinnie

Alamo Canyon

Chavez Canyon

Tinnie Canyon

Talley Canyon

Nelson Canyon

LONG RIDGE

Casey Canyon

Gallo Canyon

Scale 1:63 360

1 inch = 1 mile

1 centimeter = 0.63 kilometer

5 Miles

25000 Feet

20000

15000

10000

5000

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO NO. 38

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 40

40

N

R. 18 E. | R. 19 E. | R. 19 E. | R. 20 E. | R. 20 E. | R. 21 E.

(Joins sheet 37)

910 000 FEET

890 000 FEET

T. 11 S. | T. 10 S.

Scale 1:63 360 (Joins sheet 39)

5 Miles — 25 000 Feet — 20 000 — 15 000 — 10 000 — 5000 — 5000

Nelson Canyon

Big Draw

Coyote Canyon

Tecolote Canyon

Big Draw

Tecolote

BORDER HILL

COUNTY

CHAVES

70 380

Sunset

Riverside

Border Canyon

Rio Hondo

Rocky Arroyo

850 000 FEET

(Joins sheet 42)

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Cultural and land lines are approximately positioned.

LINCOLN COUNTY AREA, NEW MEXICO NO. 40

LINCOLN COUNTY AREA, NEW MEXICO NO. 41

LINCOLN COUNTY AREA, NEW MEXICO NO. 41

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

770 000 FEET

830 000 FEET

R. 17 E. | R. 18 E.

(Joins sheet 39)

(Joins sheet 42)

T. 13 S. | T. 12 S.

790 000 FEET

840 000 FEET

(Joins inset A, sheet 38)

MESCALERO APACHE INDIAN RESERVATION

OTERO COUNTY

Gallo Canyon

Bonney Canyon

Casey Canyon

Maverick Canyon

Twin Butte Canyon

Monument Canyon

41

N

Scale 1:63360

1 inch = 5 miles

1 cm = 1 km

10000 15000 20000 25000 Feet

5000 0 5000

LINCOLN COUNTY AREA, NEW MEXICO — SHEET NUMBER 42

42

N

R. 18 E. | R. 19 E. | R. 19 E. | R. 20 E. | R. 20 E. | R. 21 E.

(Joins sheet 40)

910 000 FEET

840 000 FEET

T. 11 S.

T. 12 S.

T. 13 S.

Bonney

HILLS

Rocky

Arroyo

Canyon

Butte

Twin

Little

BORDER

Monument

CHAVES COUNTY

5 Miles

25000 Feet

20000

15000

10000

5000

Scale 1:63 360

(Joins sheet 41)

790 000 FEET

650 000 FEET

(Joins inset, sheet 38)

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and field division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO NO. 42

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)
- STATE COORDINATE TICK
- LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (79)
- Federal (410)
- State (52)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small (water; w)

PITS

- Gravel pit (G.P.)
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (SvE 107)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) (S)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot (0)

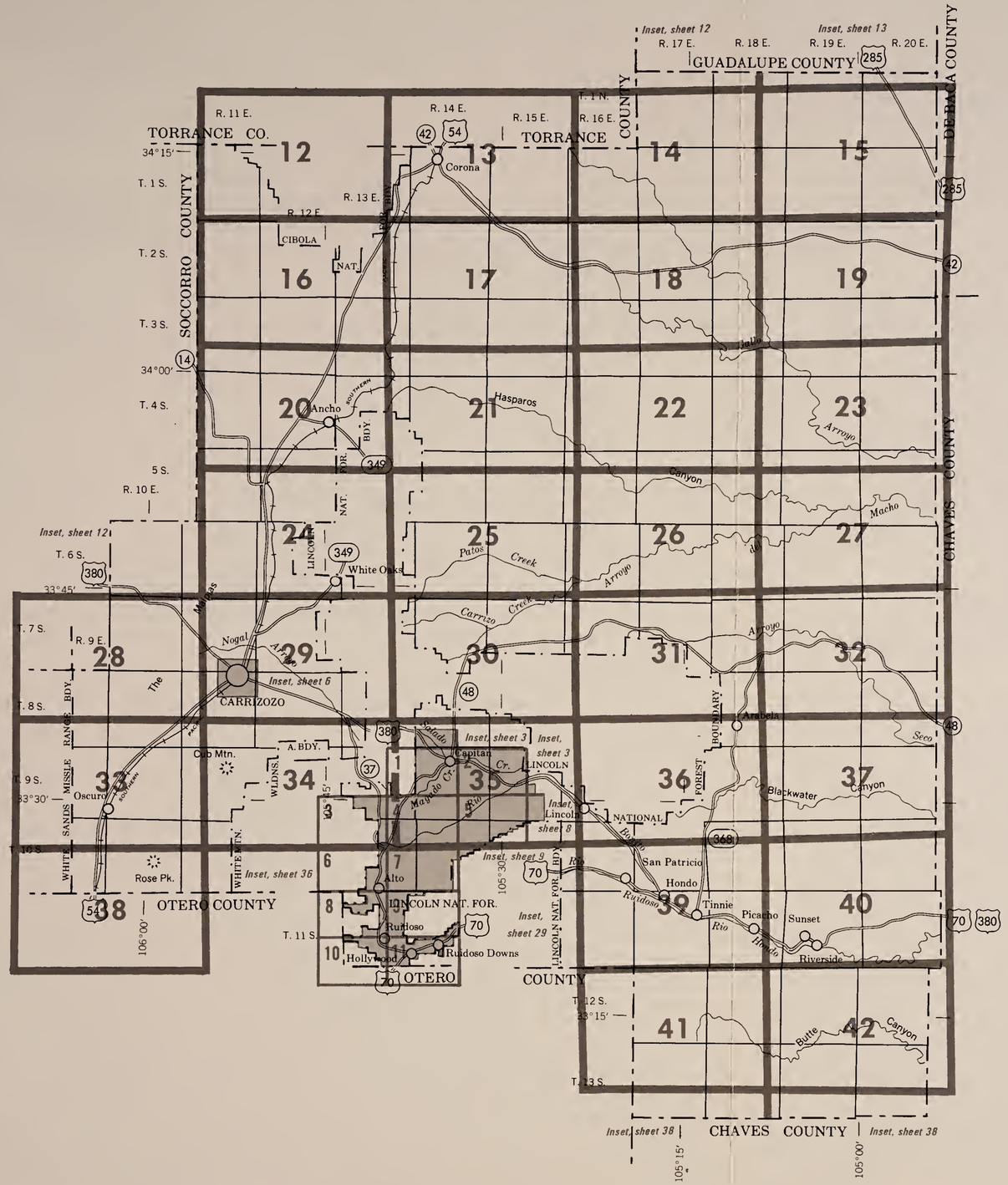
SOIL LEGEND

SYMBOL	NAME	SYMBOL	NAME
1	Andergeorge-Darvey-Asparas association, gently sloping	48	Paco loam, 15 to 30 percent slopes*
		49	Paco loam, dry, 3 to 8 percent slopes*
2	Bernal gravelly loam, 3 to 15 percent slopes*	50	Paco loam, dry, 8 to 15 percent slopes*
3	Blakeney-Arch association, moderately undulating	51	Paco-Penapon complex, moderately sloping
		52	Pajara-Witt association, moderately sloping
4	Clovis-Harvey association, gently sloping	53	Pastura loam, gently sloping
5	Clovis-Harvey association, loam surface, gently sloping	54	Pastura-Harvey association, moderately rolling
6	Clovis-Pastura association, gently sloping	55	Pastura-Partri association, gently sloping
7	Cumulic Haplustolls, gently sloping	56	Patos stony loam, gently sloping
		57	Patos bouldery loam, moderately steep
8	Darvey-Asparas association, gently sloping	58	Pena-Dioxice complex, moderately sloping
9	Darvey-Pastura association, gently sloping	59	Pena-Hogadero association, hilly
10	Deacon loam, 0 to 8 percent slopes*	60	Penapon-Tortugas very cobbly loams, extremely steep
11	Deama very cobbly loam, moderately sloping	61	Penistaja-Travessilla association, gently sloping
12	Deama-Pastura association, moderately undulating	62	Plack-Dioxice loams, 0 to 8 percent slopes*
13	Deama-Pastura association, moderately sloping	63	Plack-Dioxice association, gently sloping
14	Deama-Rock outcrop association, very steep	64	Plack-Penistaja association, gently sloping
15	Dioxice loam, 2 to 5 percent slopes*	65	Purcella-Riverwash association, gently sloping
16	Ector-Kimbrough association, gently sloping	66	Rance silt loam, 2 to 5 percent slopes*
17	Ector-Rock outcrop association, moderately sloping	67	Rance-Tanbark silt loams, 2 to 9 percent slopes*
18	Ector-Rock outcrop association, moderately steep	68	Reflection-Malargo association, moderately sloping
		69	Remunda clay loam, gypsum substratum, 3 to 8 percent slopes*
19	Gabaldon silt loam, 0 to 2 percent slopes*	70	Reventon loam, 0 to 3 percent slopes*
20	Gabaldon-Riverwash association, nearly level	71	Reventon loam, 3 to 8 percent slopes*
21	Gavilan loam, 0 to 8 percent slopes*	72	Reventon-Sampson association, gently sloping
22	Gavilan gravelly loam, 15 to 30 percent slopes*	73	Rock outcrop-Stroupe-Deama association, extremely steep
23	Gavilan very gravelly loam, 30 to 50 percent slopes*	74	Romine extremely gravelly loam, 15 to 45 percent slopes*
		75	Roswell fine sand, hummocky
24	Harvey-Darvey association, gently sloping	76	Ruidoso clay loam, moist, 0 to 8 percent slopes*
25	Harvey-Darvey association, loam surface, gently sloping	77	Ruidoso-Tortugas association, moderately sloping
26	Hightower loam, 3 to 8 percent slopes*	78	Ruidoso Variant clay loam, 0 to 8 percent slopes*
27	Hightower-Oro Grande complex, 3 to 8 percent slopes*		
28	Hightower-Oro Grande complex, moderately steep	79	Sampson loam, 0 to 5 percent slopes*
29	Hightower Variant sandy loam, 3 to 8 percent slopes*	80	Sampson loam, moist, 0 to 8 percent slopes*
30	Hogadero-Pena association, moderately undulating	81	Sampson loam, moist, 8 to 15 percent slopes*
		82	Sharps silt loam, 2 to 5 percent slopes*
31	Lava flows	83	Sharps-Rock outcrop association, moderately sloping
32	Lithic Argiustolls-Rock outcrop association, extremely steep	84	Socorro very gravelly loam, 0 to 8 percent slopes*
33	Lozier very gravelly loam, very steep	85	Stroupe very stony loam, moderately steep
		86	Stroupe bouldery sandy clay loam, extremely steep
34	Malargo-Bluepoint association, hummocky	87	Stroupe-Witt association, moderately steep
35	Manzano loam, 0 to 3 percent slopes*		
36	Mokiak-Rock outcrop association, extremely steep	88	Tanbark-Tortugas association, very steep
37	Mokiak-Stroupe-Rock outcrop association, very steep	89	Tortugas-Asparas-Rock outcrop association, moderately sloping
38	Monjeau-Docdee complex, 8 to 15 percent slopes*	90	Totrugas-Rock outcrop association, moderately sloping
39	Monjeau-Docdee complex, 15 to 30 percent slopes*	91	Tortugas-Rock outcrop association, extremely steep
40	Monjeau-Docdee complex, 30 to 75 percent slopes*	92	Tortugas-Ruidoso-Rock outcrop association, very steep
		93	Travessilla-Rock outcrop association, moderately sloping
41	Nogal sandy clay loam, 8 to 15 percent slopes*	94	Tularga loam, 0 to 5 percent slopes*
42	Nogal-Rock outcrop complex, moderately steep	95	Tularga-Andergeorge association, gently sloping
43	Nolten loam, 8 to 15 percent slopes*		
44	Nolten loam, 15 to 30 percent slopes*	96	Witt-Penistaja association, gently sloping
45	Onite-Bluepoint association, hummocky		
46	Oro Grande very cobbly clay loam, moderately steep		
47	Oro Grande very cobbly clay loam, very steep		

* narrowly defined

This map is compiled on 1954 and 1973 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

LINCOLN COUNTY AREA, NEW MEXICO NO. 42



Area mapped at scale of 1:24,000

Area mapped at scale of 1:63,360

INDEX TO MAP SHEETS

LINCOLN COUNTY AREA, NEW MEXICO

SCALE 1:633,600

5 0 5 10 MILES