United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with University of Arizona, Gila Valley Natural Resources Conservation District, Willcox-San Simon Natural Resources Conservation District, Redington Natural Resources Conservation District, and Winkelman Natural Resources Conservation District; and Arizona Agricultural Experiment Station

Soil Survey of Graham County, Arizona, Southwestern Part

How to Use This Soil Survey

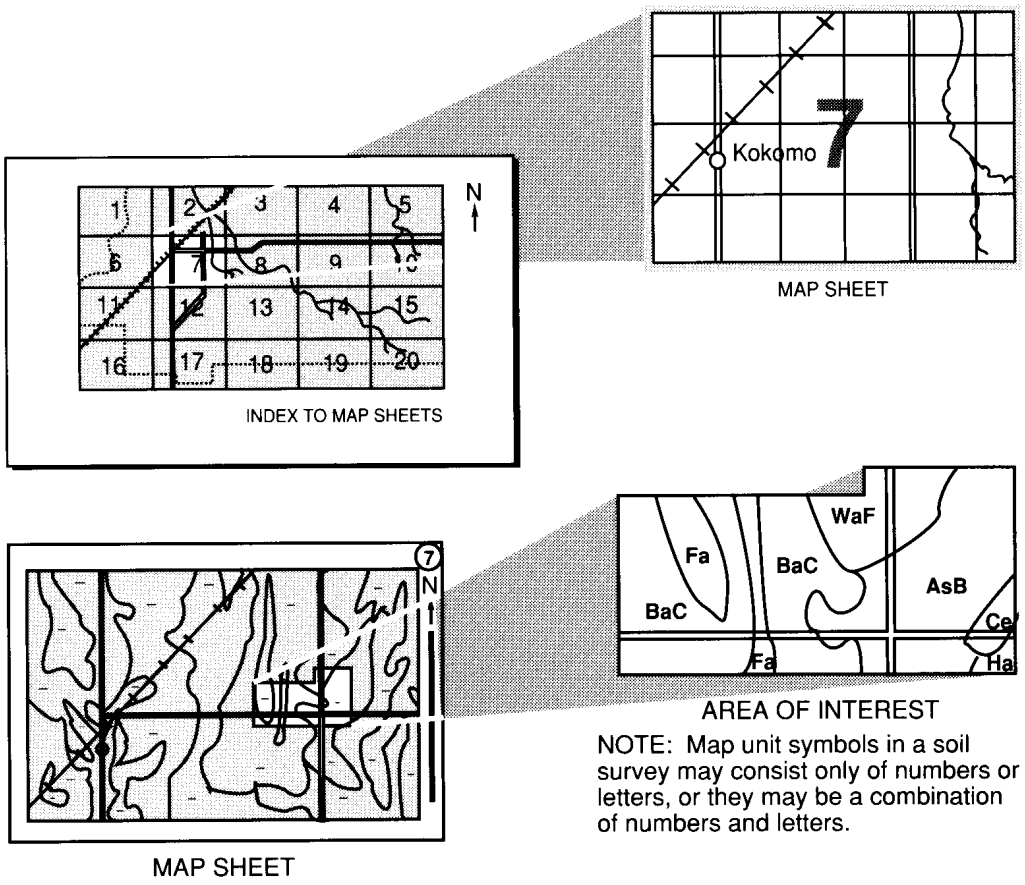
Detailed Soil Maps

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

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

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

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



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

National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in April 2008. Soil names and descriptions were approved in June 2008. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2008. This survey was made cooperatively by the Natural Resources Conservation Service; the Navajo Nation; the Navajo Mountain Soil and Water Conservation Service; and the Arizona Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Navajo Mountain Soil and Water Conservation District and the Navajo Nation.

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.

Nondiscrimination Statement

Citation

The correct citation for this survey is as follows:

United States Department of Agriculture, Natural Resources Conservation Service. 2011. Soil Survey of Graham County, Arizona, Southwestern Part. http://soils.usda.gov/survey/printed_surveys/

Cover Caption

Top left – Typical area of Cloverdale cobbley clay loam, 1 to 5 percent slopes, in the foreground and Beaumain-Cherrycow-Rock outcrop, 5 to 60 percent slopes, in the background, developed from volcanic parent material.

Top right – Typical area of Sasabe sandy loam, 1 to 8 percent slopes, developed from granitic parent material.

Bottom left – View from a center pivot, looking northeast at the Pinaleno Mountains.

Bottom right – Looking at the northern slopes of a typical landscape of Eloma-Tombstone-White House complex, 3 to 50 percent slopes, developed from mixed parent material sources.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

Contents

Issued 2011

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, 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 ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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 Natural Resources Conservation Service or the Cooperative Extension Service.

David McKay
State Conservationist
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Soil Survey of
Graham County, Arizona, Southwestern Part

By Nathan M. Starman, Natural Resources Conservation Service

Soil fieldwork by Craig A. Prink, Gregory W. Anderson, William A. Svetlik, Jesse F. Wood, Kyle W. Craig, and Nathan M. Starman, Natural Resources Conservation Service

Ecological site identification and development by David D. Womack, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the University of Arizona and the Arizona Agricultural Experiment Station. This survey is part of the technical assistance furnished to the Gila Valley Natural Resources Conservation District, the Willcox-San Simon Natural Resources Conservation District, the Redington Natural Resources Conservation District, and the Winkelman Natural Resources Conservation District.

This survey area is in south eastern Arizona (fig. 1). Its boundary extends from the San Carlos Indian Reservation in the north to the Cochise County line in the south, and from the Pinal-Pima County line in the west to the Coronado National Forest in the east. The survey area comprises about 410,000 acres.

General Nature of the Area

The survey area is part of the Sonoran and Southern Arizona Desert section of the Basin and Range Physiographic Province, which is characterized by north-south trending ranges of mountains with broad basins or valleys between the mountains. The survey area has a complex variety of terrain and soils. The vegetation ranges from that of desert shrub land to that of pine woodland. Elevation ranges from 2,983 feet to 6,469 feet. The annual precipitation ranges from 7 to 20 inches. The mean annual air temperature ranges from 50 to 72 degrees F.

The survey area is dominantly within Major Land Resource Area 41-Southeastern Arizona Basin and Range, but also includes areas of Major Land Resource Area 38-Mogollon Transition and 40-Sonoran Desert.

The survey area is surrounded by three mountain ranges: the Galiuro Mountains to the west, the Pinaleno Mountains to the east, and the Santa Teresa Mountains to the north. The survey area includes the eastern portion of the Aravaipa Canyon Basin. This basin is characterized by a relatively flat northwest-trending valley in the southern half of the basin and an incised valley, Aravaipa Canyon, that cuts through the Galiuro Mountains in the northern half. The geology in the area is variable and complex.

The survey area has three major drainage systems. The most significant drainage system is Aravaipa Creek. This creek is tributary to the San Pedro River and flows through Aravaipa Valley from the southeast to the northwest. The creek, intermittent in its upper reaches, becomes perennial in Aravaipa Canyon, where impermeable

Figure 1.—Location of Graham County, Southwestern Part in Arizona

bedrock forces groundwater into the creekbed. Major tributaries to Aravaipa Creek include Stowe Gulch, Deer Creek, Laurel Canyon, and Turkey Creek.

Another significant drainage system in the survey area is Sulfur Springs Valley. In the southeastern part of Aravaipa Valley, a bedrock high serves as a groundwater divide separating Aravaipa Valley from Sulfur Springs Valley. Ash Creek, Grant Creek, and High Creek are the major tributaries that flow into the upper reaches of Sulfur Springs Valley. This drainage system flows from the northwest to the southeast and is collectively referred to as Ash Creek.

Redfield Canyon is also a significant drainage system in the survey area. This canyon is tributary to the San Pedro River and has a perennial-intermittent flow. It is perennial in the upper reaches of the Galiuro Mountains, where it flows from north to south, and is intermittent in its lower reaches, where it flows from east to west.

The major land uses in the area are cattle grazing, recreation, and wildlife habitat. A few areas along Aravaipa Creek, Ash Creek, and Grant Creek are used for crop production.

Transportation Facilities

The only major Federal highway that serves the survey area is Interstate 10, which runs east and west approximately 9 miles south of the survey area's southern boundary. Arizona Highway 266, Bonita-Aravaipa Road, and Fort Grant Road run through the soil survey area, connecting the small towns of Bonita and Klondike, as well as nearby major towns of Willcox and Safford. There are no commercial airlines that serve the survey area.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their 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 biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, 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 a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil 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. Rangeland Management Specialists identified plant communities and assigned an ecological site to each map unit.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses. Soil scientists interpret the data from these analyses as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are 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 are 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 predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot 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.

This survey was completed during a two-year Cooperative Agreement with the University of Arizona. There were two goals for this survey. The first goal was to verify and document the benefits of digital soil mapping, particularly the segmentation tools built into the Definiens Developer 7.0 software, and assess its utility for initial soil surveys, as well as updates. Other aspects of digital soil mapping that were evaluated include the creation and assessment of raster soil maps, atmospheric correction methodologies, various spatial and terrain analysis, and the utility of other software as they pertain to soil survey applications. The second goal was to complete a conventional soil survey with appropriate products for customers before the national deadline of September 2011.

This survey was divided into three phases to incorporate both a research aspect into the process as well as a conventional soil survey. A pre-map was generated using a segmentation tool before the soil scientists went to the field to gather documentation. This pre-map was analyzed and verified using a combination of landform transects performed by soil scientists and a stratified random sampling scheme, in conjunction with an accuracy assessment (Phase One). There were 108 landform transects. Numerous landform transects were selected for a detailed assessment of their soil properties and landscape position. The soil properties and landscape position of these transects were analyzed to determine how they correlated to the polygon network created by the multiresolution segmentation performed in Definiens Developer 7.0.

A total of three AOIs (Area of Interest) of approximately 15,000 acres each were mapped independently by two soil scientists and then compared to the generated delineations (Phase Two). This was important not only to compare the similarities and differences between the machine-driven approach, but to capture the potential variability amongst the human element of soil mapping.

After the research aspects of the soil survey were completed, the soil scientists, utilizing the collected data throughout Phase One and Phase Two, integrated a conventional soil survey approach (Phase Three) into the required documentation to meet Region 8 and National Cooperative Soil Survey (NCSS) standards for SSURGO certification.

This survey was mapped at two levels of detail. At the more detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals. The detailed map units occur on the farmed fields within the Aravaipa Canyon corridor, as well as a few center pivot fields adjacent to the Ash Creek and Grant Creek flood plain. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the map units were designed to meet the need for that use.

The descriptions, name, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey area.

Detailed Soil Map Units and Classification of the Soils

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

Soil Map Unit Descriptions

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. 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 minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties 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, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. The contrasting components are mentioned in the map unit descriptions and listed under minor components. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components 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 landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit 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, 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, slope, stoniness, salinity, 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, Sasabe sandy loam, 1 to 8 percent slopes, is a phase of the Sasabe series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes and undifferentiated groups.

A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Eloma-Kimrose-Saddlebrook complex, 1 to 45 percent slopes, is an example.

An undifferentiated group is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Rafter and Stanford soils and Riverwash, 0 to 5 percent slopes, is an undifferentiated group in this survey.

This survey includes miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Riverwash and Rock outcrop are examples.

This survey includes 15 detailed soil map units that join an adjacent soil survey and share documentation. An example of this is Cherrycow cobbly clay loam, 5 to 45 percent slopes. Under the Location in the Typical Profile section, it states that the “Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part.”

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 2006). 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. The categories are defined in the following paragraphs.

ORDER. Twelve 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 Aridisol.

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 Argid (Arg, meaning argillic horizon, plus id, from Aridisol).

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; type of saturation; 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 Haplargids (Hapl, meaning minimal horizonation, plus argid, the suborder of the Aridisols that has an argillic horizon).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup 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 taxonomic class. 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. The adjective Ustic identifies the subgroup having a soil moisture regime that borders on ustic. An example is Ustic Haplargids.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, thermic Ustic Haplargids.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. An example is the Oracle series.

In the map unit descriptions, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series for a particular map unit. A pedon, a small three-dimensional area of soil, which is typical of the series within that map unit in the survey area, is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (USDA, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA, 1999) and in “Keys to Soil Taxonomy” (USDA, 2006). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

Soil Descriptions

1—Baboquivari sandy loam, 1 to 3 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*4,430 to 4,680 feet (1,350 to 1,426 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Baboquivari and similar soils: 90 percent

Minor components: Hooks, Mallet, Sasabe, White House

Soil Properties and Qualities

Baboquivari soils
Taxonomic classification: Fine-loamy, mixed, superactive, thermic Ustic Haplargids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 1 to 3 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover:10 percent
woody debris: 5 percent
bare soil: 80 percent
rock fragments
gravel: 5 percent
Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 10.9 (very high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: rare
Runoff class: low
Hydrologic group: C
Ecological site name: Sandy Loam, Deep 12-16” p.z.
Ecological site number: R041XC318AZ
Present vegetation: burroweed, mesquite, nightshade, sixweeks grama, spidergrass, vine mesquite
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Fort Grant; about 95 feet south and 1,070 feet east of the northwest corner of Section 35, Township 10 S, Range 23 E.
Geographic Coordinate System: 32° 31’ 43.60’’ north, 109° 58’ 12.00’’ west

A—0 to 4 inches (0 to 10 cm); yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 3/4), moist; 20 percent clay; strong thin platy parting to moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine irregular pores; 3 percent gravel; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Bt1—4 to 23 inches (10 to 58 cm); brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4), moist; 25 percent clay; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine roots; many very fine tubular pores; few continuous distinct clay films on faces of peds; 3 percent gravel; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Bt2—23 to 33 inches (58 to 84 cm); brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4), moist; 32 percent clay; moderate medium subangular blocky structure; hard, friable, very sticky, very plastic; common very fine roots; common very fine tubular pores; common continuous distinct clay films on faces of peds; 3 percent gravel; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt3—33 to 60 inches (84 to 152 cm); strong brown (7.5YR 4/6) clay loam, dark brown (7.5YR 3/4), moist; 32 percent clay; moderate medium subangular blocky structure; slightly hard, friable, very sticky, very plastic; common very fine roots; common very fine tubular pores; common continuous distinct clay films on faces of peds; 3 percent gravel; noneffervescent; neutral, pH 6.8.

Range in Characteristics

Rock fragments: less than 15 percent in control section
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 18 to 35 percent

A horizon
Hue: 7.5YR, 10YR
Value: 3 or 4 dry, 3 or 4 moist
Chroma: 3 or 4, dry or moist
Texture: sandy loam, loam, silt loam

Bt horizon
Hue: 5YR, 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 to 6, dry or moist
Texture: loam, clay loam, sandy clay loam

2—Beaumain-Cherrycow-Rock outcrop complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains
*Elevation:*3,620 to 6,330 feet (1,103 to 1,929 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–1 Mexican Oak–Pine Woodland and Oak Savannah

Map Unit Composition

Beaumain and similar soils: 30 percent
Cherrycow and similar soils: 25 percent
Rock outcrop, basalt: 20 percent

Minor components: loamy soils shallow to bedrock, clayey soils very shallow and shallow to bedrock.

Soil Properties and Qualities

Beaumain soils
Taxonomic classification: Clayey-skeletal, smectitic, thermic Aridic Lithic Argiustolls
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from basalt
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:5 percent
woody debris: 0 percent
bare soil: 10 percent
rock fragments

gravel: 70 percent
cobble: 20 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills 16-20” p.z.
Ecological site number: R041XA111AZ
Present vegetation: curly mesquite, annual forbs, perennial forbs, plains lovegrass, threeawn, tobosagrass
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle The Mesas; about 2,315 feet south and 1,755 feet west of the northeast corner of Section 11, Township 11 S, Range 21 E.
Geographic Coordinate System: 32° 29’ 34.30’’ north, 110° 10’ 19.90’’ west

A—0 to 1 inch (0 to 3 cm); dark reddish gray (5YR 4/2) very gravelly sandy clay loam, dark reddish brown (5YR 3/2), moist; 24 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, moderately sticky, moderately plastic; many fine roots; many fine interstitial pores; 35 percent gravel and 10 percent cobble; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt—1 inch to 9 inches (3 to 23 cm); dark reddish brown (5YR 3/2) very gravelly clay, very dark gray (5YR 3/1), moist; 45 percent clay; fine and medium single grain structure; very hard, very firm, very sticky, very plastic; many fine roots; many fine tubular pores; common discontinuous distinct clay films on faces of peds; 40 percent gravel and 10 percent cobble; noneffervescent; slightly acid, pH 6.4; abrupt wavy boundary.

R—9 to 60 inches (23 to 152 cm); unweathered basalt bedrock.

Range in Characteristics

Rock fragments: 35 to 75 percent
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in control section: 35 to 60 percent

A horizon
Hue: 5YR or 7.5YR
Value: 3 to 5 dry, 2 or 3 moist
Chroma: 2 or 3, dry or moist
Texture: clay loam, sandy clay loam

Bt horizon
Hue: 2.5YR, 5YR, or 7.5YR
Value: 3 to 5, dry or moist
Chroma: 2 to 6, dry or moist
Texture: clay, sandy clay

R horizon
Basalt bedrock

Cherrycow soils
Taxonomic classification: Fine, smectitic, thermic Aridic Argiustolls
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from basalt
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:5 percent
woody debris: 0 percent
bare soil: 15 percent
rock fragments
gravel: 60 percent
cobble: 20 percent
stone: 5 percent
Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 4.8 (low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills 16-20” p.z.
Ecological site number: R041XA111AZ
Present vegetation: cane beardgrass, curly mesquite, annual forbs, annual, pricklypear, threeawn
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle The Mesas; about 2,325 feet south and 1,700 feet west of the northeast corner of Section 11, Township 11 S, Range 21 E.
Geographic Coordinate System: 32° 29’ 34.10’’ north, 110° 10’ 19.30’’ west

A—0 to 2 inches (0 to 5 cm); dark reddish gray (5YR 4/2) clay loam, dark reddish brown (5YR 3/2), moist; 34 percent clay; weak thin platy parting to moderate fine granular structure; soft, very friable, moderately sticky, moderately plastic; many fine roots; many fine vesicular pores; 10 percent gravel; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt1—2 to 19 inches (5 to 48 cm); dark reddish brown (5YR 3/2) clay, very dark gray (5YR 3/1), moist; 50 percent clay; strong fine and medium angular blocky structure; very hard, very firm, very sticky, very plastic; many fine roots; many fine tubular

pores; few discontinuous distinct clay films on faces of peds; 10 percent gravel; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Bt2—19 to 34 inches (48 to 86 cm); reddish brown (5YR 5/4) sandy clay, reddish brown (5YR 4/3), moist; 45 percent clay; fine and medium single grain structure; moderately hard, firm, very sticky, very plastic; many fine roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 10 percent gravel; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

R—34 to 60 inches (86 to 152 cm); unweathered basalt bedrock.

Range in Characteristics

Rock fragments: 0 to 30 percent
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in control section: 35 to 60 percent

A horizon
- Hue: 5YR or 7.5YR
- Value: 3 to 5 dry, 2 or 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: clay loam

Bt horizons
- Hue: 5YR or 7.5YR
- Value: 3 to 5, dry or moist
- Chroma: 1 to 4, dry or moist
- Texture: clay, sandy clay

R horizon
- Basalt bedrock

Rock outcrop
Rock outcrop consists of barren rock that occurs as outcroppings of basalt. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near summits.

3—Beaumain-Rock outcrop-Cherrycow complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains
Elevation: 3,640 to 6,330 feet (1,109 to 1,929 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)
Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)
Frost-free period: 150 to 200 days
Major Land Resource Area: 38–Mogollon Transition
Land Resource Unit: 38–2 Interior Chaparral–Woodlands

Map Unit Composition

Beaumain and similar soils: 55 percent
Rock outcrop, andesite and basalt: 20 percent
Cherrycow and similar soils: 15 percent

Minor components: Soils that do not meet the requirements for a mollic epipedon occur on side slopes. Aridic Lithic Ustorthents soils occur on summits and nose slopes. Very shallow and shallow clayey soils to bedrock occur on shoulders and nose slopes.

Soil Properties and Qualities

Beaumain soils
Taxonomic classification: Clayey-skeletal, smectitic, thermic Aridic Lithic Argiustolls
Geomorphic position: generally on backslopes
Parent material: mixed alluvium and/or residuum weathered from andesite and/or basalt
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:45 percent
woody debris: 5 percent
bare soil: 10 percent
rock fragments
gravel: 55 percent
cobble: 15 percent
stone: 5 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Clayey Hills 16-20” p.z.
Ecological site number: R038XB215AZ
Present vegetation: singleleaf pinyon, juniper, mountain mahogany, other shrubs, perennial forbs, perennial grasses, silktassel, skunkbush sumac, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of San Carlos Indian Reservation, AZ, Parts of Gila and Graham Counties; USGS Quadrangle Rawhide Mountain; 1,560 feet north and 1,250 feet east of southwest corner of Section 23, Township 4 S, Range 18 E.
Geographic Coordinate System: 33° 4’ 3.94’’ north, 110° 28’ 46.76’’ west

A—0 to 3 inches (0 to 8 cm); brown (10YR 4/3) very gravelly loam, very dark grayish brown (10YR 3/2), moist; 22 percent clay; moderate fine and medium granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine

roots; many very fine and fine pores; 50 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; clear wavy boundary.

Bt—3 to 9 inches (8 to 23 cm); brown (7.5YR 4/3) very gravelly clay loam, dark brown (7.5YR 3/2), moist; 38 percent clay; moderate medium and coarse subangular blocky structure; hard, firm, very sticky, very plastic; common very fine and fine roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 50 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; clear wavy boundary.

R—9 to 60 inches (23 to 152 cm); unweathered basalt bedrock.

Range in Characteristics

Rock fragments: 35 to 75 percent
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in control section: 35 to 50 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 3 to 5 dry, 2 to 3 moist
- Chroma: 2 to 3 dry, 1 to 3 moist
- Texture: loam, clay loam

Bt horizon
- Hue: 5YR, 7.5YR
- Value: 3 to 5 dry, 2 to 3 moist
- Chroma: 2 to 3 dry, 1 to 3 moist
- Texture: clay loam, clay

R horizon
- Basalt, andesite bedrock

Rock outcrop
Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary volcanic rocks. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Cherrycow soils
Taxonomic classification: Fine, smectitic, thermic Aridic Argiustolls
Geomorphic position: generally on summits
Parent material: mixed alluvium and/or residuum weathered from andesite and/or basalt
Slope: 5 to 35 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:60 percent
  - woody debris: 5 percent
  - bare soil: 5 percent
- rock fragments

gravel: 20 percent
cobble: 10 percent
Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 3.4 (low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Clay Loam Upland 16-20” p.z.
Ecological site number: R038XB203AZ
Present vegetation: singleleaf pinyon, juniper, mountain mahogany, other shrubs, perennial forbs, perennial grasses, silktassel, skunkbush sumac, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of San Carlos Indian Reservation, AZ, Parts of Gila and Graham Counties; USGS Quadrangle Rawhide Mountain; 2,600 feet west and 650 feet south of northeast corner of Section 23, Township 4 S, Range 18 E.
Geographic Coordinate System: 33° 4’ 30.28’’ north, 110° 28’ 25.63’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) gravelly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; strong medium and coarse granular structure; slightly hard, very friable, very sticky, very plastic; many very fine and fine roots; many very fine and fine and common medium pores; 20 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt1—2 to 10 inches (5 to 25 cm); brown (7.5YR 4/3) cobbly clay, dark brown (7.5YR 3/3), moist; 58 percent clay; strong fine and medium subangular blocky structure; very hard, firm, very sticky, very plastic; many very fine and fine roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 10 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt2—10 to 30 inches (25 to 76 cm); brown (7.5YR 4/3) gravelly clay, dark brown (7.5YR 3/3), moist; 58 percent clay; strong medium and coarse angular blocky structure; very hard, very firm, very sticky, very plastic; common very fine and fine roots; common very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 10 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

R—30 to 60 inches (76 to 152 cm); unweathered basalt bedrock.

Range in Characteristics

Rock fragments: 10 to 30 percent
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in control section: 45 to 60 percent

A horizon
Hue: 5YR, 7.5YR
Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 3, dry or moist
Texture: clay loam, clay
Rock fragments: 10 to 50 percent

Bt horizons
Hue: 5YR, 7.5YR
Value: 3 to 5 dry, 2 to 3 moist
Chroma: 2 to 3, dry or moist
Texture: clay
Rock fragments: 5 to 30 percent

R horizon
Basalt, andesite bedrock

4—Blacktail clay, 0 to 5 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*4,640 to 4,930 feet (1,414 to 1,503 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–1 Mexican Oak–Pine Woodland and Oak Savannah

Map Unit Composition

Blacktail and similar soils: 90 percent

Minor components: Sasabe

Soil Properties and Qualities

Blacktail soils
Taxonomic classification: Fine, mixed, superactive, thermic Calcidic Argiustolls
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 15 percent
woody debris: 2 percent
bare soil: 40 percent
rock fragments
gravel: 40 percent
cobble: 5 percent
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Available water capacity total inches: 8.6 (high)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Ecological site name: Clayey Upland 16-20” p.z.
Ecological site number: R041XA126AZ
Present vegetation: aster, curly mesquite, mesquite, mustard, pricklypear, snakeweed, tobosagrass
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Kennedy Peak; about 1,775 feet north and 1,090 feet west of the southeast corner of Section 35, Township 8 S, Range 20 E.

Geographic Coordinate System: 32° 41’ 34.80’’ north, 110° 16’ 7.00’’ west

A—0 to 2 inches (0 to 5 cm); dark reddish gray (5YR 4/2) clay, dark reddish brown (5YR 3/3), moist; 48 percent clay; moderate medium and thick platy parting to weak fine granular structure; soft, very friable, very sticky, very plastic; many very fine and fine roots; many very fine vesicular and interstitial pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bt1—2 to 11 inches (5 to 28 cm); dark reddish brown (5YR 3/3) clay, dark reddish brown (5YR 3/3), moist; 55 percent clay; strong very fine and medium angular blocky structure; hard, firm, very sticky, very plastic; many very fine and fine roots; common very fine tubular pores; many distinct clay films on faces of peds and rock fragments; common pressure faces on faces of peds; 5 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bt2—11 to 35 inches (28 to 89 cm); dark reddish brown (5YR 3/3) clay, dark reddish brown (5YR 3/2), moist; 55 percent clay; strong medium and coarse angular blocky structure; extremely hard, extremely firm, very sticky, very plastic; common very fine, fine and medium roots; common very fine tubular pores; many distinct clay films on faces of peds and rock fragments; many pressure faces on faces of peds; 5 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

2Bk—35 to 60 inches (89 to 152 cm); light reddish brown (5YR 6/4) cobbly clay loam, reddish brown (5YR 4/3), moist; 30 percent clay; moderate very fine and fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine roots; common very fine tubular pores; many distinct carbonate coats on rock fragments; many fine carbonate masses; 5 percent gravel and 5 percent cobble; violently effervescent, 60 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Rock fragments: 0 to 10 percent
Organic matter: 0.5 to 3 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 35 to 60 percent

A horizon
- Hue: 5YR
- Value: 4 dry, 3 moist
- Chroma: 2 dry, 2 or 3 moist
- Texture: clay

Bt horizons
Hue: 5YR
Value: 3, dry or moist
Chroma: 3 dry, 2 or 3 moist
Texture: clay

Bk horizon
Hue: 5YR
Value: 6 dry, 5 moist
Chroma: 4, dry or moist
Texture: clay loam
Calcium carbonate equivalent: 10 to 60 percent

5—Bodecker soils and Riverwash, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*3,160 to 4,820 feet (963 to 1,469 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Stream Segment Properties and Qualities

Segment length: about 20 miles of Aravaipa Creek, 5 miles of Fourmile Creek, 5 miles of Rattlesnake Canyon, 5 miles of Lindsey Canyon, 5 miles of Sand Wash, 3 miles of Sheep Wash, 2 miles of Kennedy Falls Wash, 2 miles of Bear Canyon, and other smaller segments of Fresnal Wash, Klondyke Wash, and unnamed drainages.
Active flood plain width: 20 to 1,400 feet
Stream flow: intermittent stream; flows seasonally with rainfall events
Flooding hazard: frequent, very long; 7 to greater than 30 days
Flood month: July – September and January – March
Bank entrenchment:
percent cut: 90
percent uncut:10
vertical cut: 0.5 to 40 feet; averages about 1 foot to 8 feet
Depositional bar features: dynamic system of interbraided bars and channels that relocate with each major flood event
Meander pattern: irregular meander
Bank channel composition:
percent bedrock: 2
percent cobbles: 20
percent gravel: 50
percent sand: 20
percent silt and clay: 5
Stability: a dynamic system of interbraided components that aggrade and degrade seasonally

Map Unit Composition

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation,

but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic interbraided system of bars and channels. The active stream dynamics will cause these components to shift*Location*s. During severe rainfall events the channel will cut and fill throughout its length.

Minor components: soils that are sandy.

Soil Properties and Qualities

Bodecker soils
Taxonomic classification: Sandy-skeletal, mixed, thermic Ustic Torriorthents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 20 percent
woody debris: 5 percent
bare soil: 35 percent
rock fragments
gravel: 20 percent
cobble: 15 percent
Drainage class: excessively drained
Ksat solum: 0.57 to 39.69 inches per hour (4.00 to 280.00 micrometers per second)
Available water capacity total inches: 1.7 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: frequent
Runoff class: very low
Hydrologic group: A
Ecological site name: Sandy Wash 12-16” p.z.
Ecological site number: R041XC316AZ
Present vegetation: burrobush, mesquite, Russian thistle, willow
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS-Quadrangle - Klondyke NW; about 1,200 feet north and 940 feet west of the southeast corner of Section 7, Township 7 S, Range 19 E.
Geographic Coordinate System: 32° 50’ 9.40’’ north, 110° 20’ 8.20’’ west

C1—0 to 2 inches (0 to 5 cm); light brown (7.5YR 6/3) very fine sandy loam, brown (7.5YR 4/3), moist; 10 percent clay; moderate thick platy structure; soft, very friable, nonsticky, nonplastic; 10 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

C2—2 to 22 inches (5 to 56 cm); brown (7.5YR 4/4) very gravelly coarse sand, dark brown (7.5YR 3/4), moist; 4 percent clay; massive; loose, loose, nonsticky, nonplastic; 70 percent gravel; slightly effervescent; neutral, pH 7.2; abrupt smooth boundary.

C3—22 to 60 inches (56 to 152 cm); weak red (7.5R 5/3) extremely gravelly coarse sand, brown (7.5YR 4/3), moist; 2 percent clay; massive; loose, loose, nonsticky, nonplastic; 55 percent gravel; slightly effervescent; neutral, pH 7.0.

Range in Characteristics

Rock fragments: 0 to 70 percent
Reaction: 7.0 to 8.0 (neutral to moderately alkaline)
Average percent clay in the control section: 5 to 18 percent

C horizons
- Hue: 5YR, 7.5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: coarse sand, loamy sand, loamy fine sand, sand, sandy loam, very fine sandy loam, silt loam

Riverwash
- Width: 2 to 400 feet
- Depth of water when present: 0 to 36 inches

Riverwash consists of very deep, excessively drained, stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic interbraided system of bars and channels, commonly bordered by shallow to steep vertical banks cut into the alluvium. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. This material does not support vegetation because it undergoes constant scouring and shifting.

6—Bodecker-Altar-Riverwash complex, 0 to 5 percent slopes

Map Unit Setting

Landform(s): alluvial fans, flood plains
*Elevation:*4,540 to 5,090 feet (1,384 to 1,551 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)
Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)
Frost-free period: 170 to 220 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Bodecker and similar soils: 40 percent
Altar and similar soils: 35 percent
Riverwash: 15 percent

Minor components: Hooks, Mallet. Other minor components include soils that are sandy.

Soil Properties and Qualities

Bodecker soils
Taxonomic classification: Sandy-skeletal, mixed, thermic Ustic Torriorthents
Geomorphic position: drainageways and alluvial plains
Parent material: mixed stream alluvium

Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 30 percent
woody debris: 20 percent
bare soil: 20 percent
rock fragments
gravel: 30 percent
cobble: 3 percent
Drainage class: excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 2.5 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: very low
Hydrologic group: A
Ecological site name: Sandy Wash 12-16” p.z.
Ecological site number: R041XC316AZ
Present vegetation: catclaw, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Buford Hill; about 1,100 feet south and 1,860 feet west of the northeast corner of Section 24, Township 7 S, Range 21 E.
Geographic Coordinate System: 32° 48’ 56.90’’ north, 110° 9’ 6.00’’ west

C1—0 to 3 inches (0 to 8 cm); dark yellowish brown (10YR 4/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4), moist; 8 percent clay; weak fine granular structure; soft, very friable, nonsticky, nonplastic; 45 percent gravel; noneffervescent; neutral, pH 6.6; clear smooth boundary.

C2—3 to 12 inches (8 to 30 cm); dark yellowish brown (10YR 4/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4), moist; 8 percent clay; weak fine angular blocky structure; soft, very friable, nonsticky, nonplastic; 50 percent gravel; noneffervescent; neutral, pH 6.6; clear wavy boundary.

C3—12 to 32 inches (30 to 81 cm); dark yellowish brown (10YR 4/4) very gravelly loamy sand, dark yellowish brown (10YR 3/4), moist; 5 percent clay; massive; loose, very friable, nonsticky, nonplastic; 50 percent gravel; noneffervescent; neutral, pH 6.8; abrupt wavy boundary.

C4—32 to 60 inches (81 to 152 cm); dark yellowish brown (10YR 4/4) very gravelly loamy sand, dark brown (10YR 3/3), moist; 5 percent clay; massive; soft, very friable, nonsticky, nonplastic; 45 percent gravel; noneffervescent; neutral, pH 6.8.

Range in Characteristics

Rock fragments: 35 to 85 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)

Average percent clay in the control section: 3 to 10 percent

C horizons
Hue: 7.5YR, 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4, dry or moist
Texture: sandy loam, loamy sand

Altar soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Ustic Haplocambids
Geomorphic position: drainageways and benches and fans that border drainageways
Parent material: mixed alluvium
Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 25 percent
woody debris: 10 percent
bare soil: 15 percent
rock fragments
gravel: 50 percent
cobble: 3 percent
Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 5.8 (moderate)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: rare
Runoff class: low
Hydrologic group: C
Ecological site name: Sandy Loam, Deep 12-16” p.z.
Ecological site number: R041XC318AZ
Present vegetation: beargrass, catclaw, juniper, mesquite, snakeweed, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Buford Hill; about 1,140 feet south and 2,575 feet west of the northeast corner of Section 24, Township 7 S, Range 21 E.
Geographic Coordinate System: 32° 48’ 56.40’’ north, 110° 9’ 14.50’’ west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/2) very gravelly loam, dark brown (7.5YR 3/2), moist; 22 percent clay; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; common fine roots; common fine vesicular pores; 45 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bw—3 to 30 inches (8 to 76 cm); dark brown (7.5YR 3/2) very gravelly loam, very dark brown (7.5YR 2/2), moist; 25 percent clay; weak fine angular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine roots; common

fine tubular pores; 50 percent gravel; noneffervescent; neutral, pH 6.8; clear wavy boundary.

2Btb1—30 to 45 inches (76 to 114 cm); reddish brown (5YR 5/4) very gravelly clay loam, reddish brown (5YR 4/4), moist; 30 percent clay; moderate fine and medium angular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; common fine tubular pores; common continuous distinct clay bridges between sand grains; 50 percent gravel; noneffervescent; neutral, pH 7.0; gradual wavy boundary.

2Btb2—45 to 60 inches (114 to 152 cm); reddish brown (5YR 5/4) very gravelly clay loam, reddish brown (5YR 4/4), moist; 30 percent clay; moderate fine and medium angular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; common fine tubular pores; common continuous distinct clay bridges between sand grains; 45 percent gravel; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 10 to 30 percent
Calcium carbonate equivalent: 0 to 5 percent

A horizon
- Hue: 7.5YR
- Value: 3 to 5 dry, 2 or 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: loam

Bw horizon
- Hue: 7.5YR
- Value: 3 to 5 dry, 2 to 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: loam, sandy loam

Btb horizons
- Hue: 5YR, 7.5YR
- Value: 3 to 5 dry, 2 to 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: clay loam

Riverwash
- Width: 2 to 400 feet
- Depth of water when present: 0 to 36 inches

Riverwash consists of very deep, excessively drained, stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic interbraided system of bars and channels, commonly bordered by shallow to steep vertical banks cut into the alluvium. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. This material does not support vegetation because it undergoes constant scouring and shifting.

7—Bodedcker-Altar-Riverwash complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): alluvial fans, flood plains
*Elevation:*3,360 to 4,390 feet (1,024 to 1,338 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Bodecker and similar soils: 40 percent
Altar and similar soils: 25 percent
Riverwash: 20 percent

Minor components: Combate, Eloma, Hooks, Mallet, Tombstone. Other minor components include sandy soils, loamy-skeletal soils that are fluvents, coarse-loamy calcareous soils that are fluvents.

Soil Properties and Qualities

Bodecker soils
Taxonomic classification: Sandy-skeletal, mixed, thermic Ustic Torriorthents
Geomorphic position: drainageways and alluvial plains
Parent material: mixed fan alluvium
Slope: 1 to 10 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 0 percent
  - woody debris: 0 percent
  - bare soil: 0 percent
- rock fragments
  - gravel: 80 percent
  - cobble: 20 percent

Drainage class: excessively drained
Ksat solum: 19.98 to 39.69 inches per hour (141.00 to 280.00 micrometers per second)
Available water capacity total inches: 0.6 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: very low
Hydrologic group: A
Ecological site name: Sandy Wash 12-16” p.z.
Ecological site number: R041XC316AZ

Present vegetation: catclaw acacia, globemallow, mesquite, red brome, whitethorn acacia
Land capability (irrigated): 3w
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 1,280 feet north and 2,040 feet west of the southeast corner of Section 13, Township 7 S, Range 19 E.
Geographic Coordinate System: 32° 49’ 18.10’’ north, 110° 21’ 23.30’’ west

C1—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) extremely gravelly coarse sand, dark brown (7.5YR 3/3), moist; 3 percent clay; weak very fine granular structure; loose, loose, nonsticky, nonplastic; common very fine roots; many very fine interstitial pores; 65 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C2—3 to 30 inches (8 to 76 cm); brown (7.5YR 4/3) extremely gravelly coarse sand, dark brown (7.5YR 3/3), moist; 2 percent clay; single grain; loose, loose, nonsticky, nonplastic; common very fine roots; many very fine interstitial pores; 75 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C3—30 to 60 inches (76 to 152 cm); brown (7.5YR 4/3) extremely gravelly coarse sand, dark brown (7.5YR 3/3), moist; 3 percent clay; single grain; loose, loose, nonsticky, nonplastic; few very fine roots; many very fine interstitial pores; 80 percent gravel; strongly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Rock fragments: 15 to 80 percent gravel, 25 to 30 percent cobbles
Reaction: 7.6 to 8.2 (slightly to moderately alkaline)
Average percent clay in the control section: 5 to 18 percent

C horizons
Hue: 5YR, 7.5YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 3 or 4 dry, 2 to 4 moist
Texture: coarse sand, loamy sand, sand, sandy loam, fine sandy loam

Altar soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Ustic Haplocalcids
Geomorphic position: drainageways and alluvial plains
Parent material: mixed fan alluvium
Slope: 1 to 10 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 35 percent
woody debris: 5 percent
bare soil: 25 percent

rock fragments
gravel: 35 percent
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Available water capacity total inches: 5.1 (moderate)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Ecological site name: Sandy Loam, Deep 12-16” p.z.
Ecological site number: R041XC318AZ
Present vegetation: catclaw acacia, graythorn, mesquite, whitethorn acacia
Land capability (irrigated): 3w
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 1,235 feet south and 955 feet east of the northwest corner of Section 7, Township 7 S, Range 20 E.
Geographic Coordinate System: 32° 50’ 37.00’’ north, 110° 20’ 48.20’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 14 percent clay; weak thin platy parting to weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine interstitial and many very fine tubular pores; 45 percent gravel; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

Bw—2 to 16 inches (5 to 41 cm); dark brown (7.5YR 3/3) very gravelly sandy clay loam, dark brown (7.5YR 3/2), moist; 20 percent clay; moderate medium subangular blocky and moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine and few coarse roots; many very fine tubular pores; common continuous distinct clay films on rock fragments; finely disseminated carbonates; 35 percent gravel; strongly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bk1—16 to 30 inches (41 to 76 cm); brown (7.5YR 4/3) extremely gravelly sandy loam, dark brown (7.5YR 3/3), moist; 14 percent clay; massive; slightly hard, friable, moderately sticky, moderately plastic, loose, slightly sticky, slightly plastic; many very fine and fine roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 60 percent gravel and 5 percent cobble; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Bk2—30 to 60 inches (76 to 152 cm); light brown (7.5YR 6/3) very gravelly loam, brown (7.5YR 4/3), moist; 16 percent clay; moderate fine subangular blocky and moderate very fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine tubular pores; many continuous distinct carbonate coats on faces of peds and rock fragments; 40 percent gravel; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Average percent clay in the control section: 5 to 18 percent

A horizon
Hue: 5YR, 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 2 or 3, dry or moist
Texture: coarse sand, loamy sand, sandy loam

Rock fragments: 40 to 50 percent gravel
Reaction: 7.2 (neutral)

Bw and Bk horizons
Hue: 5YR, 7.5YR
Value: 3 to 6 dry, 3 or 4 moist
Chroma: 2 or 3, dry or moist
Texture: sandy loam, loam, sandy clay loam
Rock fragments: 35 to 60 percent gravel, 5 to 20 percent cobbles
Reaction: 7.6 to 8.0 (slightly alkaline)

Altar as used in this map unit is a taxadjunct to the series because it contains a calcic horizon. Altar series is Loamy-skeletal, mixed, superactive, thermic Ustic Haplocambids.

Riverwash
Width: 2 to 100 feet
Depth of water when present: 0 to 36 inches

Riverwash consists of very deep, excessively drained, stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic interbraided system of bars and channels, commonly bordered by shallow to steep vertical banks cut into the alluvium. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. This material does not support vegetation because it undergoes constant scouring and shifting.

8—Bodecker-Combate-Tenneco complex, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains, alluvial fans
*Elevation:*3,320 to 4,510 feet (1,012 to 1,375 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Bodecker and similar soils: 40 percent
Combate and similar soils: 20 percent
Tenneco and similar soils: 15 percent

Minor components: Altar, Guest, Hooks, Mallet, Riveroad, Sasabe. Other minor components include coarse-loamy soils with a calcic horizon, soils that are sandy.

Soil Properties and Qualities

Bodecker soils
Taxonomic classification: Sandy-skeletal, mixed, thermic Ustic Torriorthents
Geomorphic position: drainageways and alluvial plains
Parent material: mixed stream alluvium

Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 70 percent
woody debris: 5 percent
bare soil: 10 percent
rock fragments
gravel: 80 percent
cobble: 2 percent
stone: 2 percent
Drainage class: excessively drained
Ksat solum: 5.95 to 39.69 inches per hour (42.00 to 280.00 micrometers per second)
Available water capacity total inches: 1.5 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: very low
Hydrologic group: A
Ecological site name: Sandy Wash 12-16” p.z.
Ecological site number: R041XC316AZ
Present vegetation: blue paloverde, mesquite, whitethorn acacia
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 2,125 feet south and 1,820 feet west of the northeast corner of Section 35, Township 7 S, Range 20 E.
Geographic Coordinate System: 32° 47’ 1.80’’ north, 110° 16’ 12.50’’ west

C1—0 to 9 inches (0 to 23 cm); brown (7.5YR 4/3) very gravelly coarse sand, dark brown (7.5YR 3/3), moist; 4 percent clay; weak very fine granular structure; loose, loose, nonsticky, nonplastic; common very fine and fine roots; many very fine interstitial pores; 50 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

C2—9 to 42 inches (23 to 107 cm); brown (7.5YR 4/3) extremely gravelly loamy sand, dark brown (7.5YR 3/3), moist; 6 percent clay; single grain; loose, loose, nonsticky, nonplastic; common very fine and fine roots; many very fine interstitial pores; 65 percent gravel; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C3—42 to 60 inches (107 to 152 cm); brown (7.5YR 4/4) very gravelly coarse sand, dark brown (7.5YR 3/4), moist; 4 percent clay; single grain; loose, loose, nonsticky, nonplastic; common fine roots; many very fine interstitial pores; 45 percent gravel; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Rock fragments: 35 to 95 percent in the control section
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: less than 15 percent

C horizons
Hue: 5YR, 7.5YR, 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 or 4, dry or moist
Texture: loamy sand, coarse sand, sand, sandy loam

Combate soils
Taxonomic classification: Coarse-loamy, mixed, superactive, nonacid, thermic Ustic Torrifluvents
Geomorphic position: drainageways and alluvial plains
Parent material: mixed alluvium
Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 30 percent
woody debris: 5 percent
bare soil: 50 percent
rock fragments
gravel: 15 percent
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 5.3 (moderate)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Ecological site name: Sandy Loam, Deep 12-16” p.z.
Ecological site number: R041XC318AZ
Present vegetation: burroweed, mesquite, whitethorn acacia, wolfberry
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 2,345 feet south and 1,700 feet west of the northeast corner of Section 35, Township 7 S, Range 20 E.
Geographic Coordinate System: 32° 46’ 59.80’’ north, 110° 16’ 11.10’’ west

C1—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 8 percent clay; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine interstitial pores; 30 percent gravel; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

C2—4 to 30 inches (10 to 76 cm); brown (7.5YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 10 percent clay; weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine tubular pores; 25 percent gravel; noneffervescent; neutral, pH 7.2; clear smooth boundary.

C3—30 to 60 inches (76 to 152 cm); brown (7.5YR 5/3) gravelly sandy loam, brown (7.5YR 4/3), moist; 10 percent clay; weak very fine subangular blocky structure; soft,

very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine tubular pores; 25 percent gravel; strongly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Rock fragments: less than 35 percent in the control section
Reaction: 6.1 to 8.4 (slightly acid to moderately alkaline)
Average percent clay in the control section: 7 to 18 percent

A horizon
- Hue: 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3, dry or moist
- Texture: sandy loam, loamy sand, clay loam, fine sandy loam

C horizons
- Hue: 5YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 2 or 3 dry, 3 moist
- Texture: sandy loam, loamy sand, coarse sand

Tenneco soils
Taxonomic classification: Fine-loamy, mixed, superactive, thermic Ustic Haplocambids
Geomorphic position: drainageways and alluvial plains
Parent material: mixed alluvium
Slope: 0 to 5 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 45 percent
  - woody debris: 5 percent
  - bare soil: 30 percent
- rock fragments
  - gravel: 15 percent

Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Available water capacity total inches: 8.1 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Ecological site name: Sandy Loam, Deep 12-16” p.z.
Ecological site number: R041XC318AZ
Present vegetation: catclaw, clematis, hackberry, jimsonweed, mesquite, mustard, nightshade, red brome, snakeweed
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Klondyke; about 700 feet south and 360 feet east of the northwest corner of Section 36, Township 6 S, Range 19 E.

Geographic Coordinate System: 32° 52’ 27.30’’ north, 110° 21’ 57.20’’ west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/3) sandy loam, dark brown (7.5YR 3/3), moist; 10 percent clay; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine interstitial pores; slightly effervescent; slightly acid, pH 6.2; abrupt smooth boundary.

Bw—1 inch to 22 inches (3 to 56 cm); brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/4), moist; 18 percent clay; weak very fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; common very fine roots; many very fine tubular pores; 5 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk1—22 to 50 inches (56 to 127 cm); brown (7.5YR 5/4) loam, brown (7.5YR 4/4), moist; 22 percent clay; moderate very fine and fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine roots; many very fine tubular pores; many fine irregular weakly cemented carbonate masses; 10 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk2—50 to 60 inches (127 to 152 cm); brown (7.5YR 5/4) loam, brown (7.5YR 4/4), moist; 24 percent clay; moderate very fine and fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; few very fine roots; many fine tubular pores; many fine irregular weakly cemented carbonate masses; 10 percent gravel; strongly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Rock fragments: less than 35 percent in the control section
Reaction: 5.6 to 8.4 (moderately acid to moderately alkaline)
Average percent clay in the control section: 18 to 35 percent
Calcium carbonate equivalent: less than 15 percent

A horizon
- Hue: 7.5YR, 5YR
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 3 dry, 3 or 4 moist
- Texture: sandy loam, silt loam, clay loam, loam, sand, fine sandy loam

Bw horizon
- Hue: 7.5YR, 5YR, 2.5YR
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loam, sandy clay loam, clay loam

Bk horizons
- Hue: 7.5YR, 5YR, 2.5YR
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loam, sandy clay loam, clay loam

9—Brewster-Aravaipa-Rock outcrop complex, 3 to 60 percent slopes

Map Unit Setting

Landform(s): pediments
*Elevation:*3,920 to 6,460 feet (1,195 to 1,969 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)
Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)
Frost-free period: 150 to 200 days
Major Land Resource Area: 38–Mogollon Transition
Land Resource Unit: 38–2 Interior Chaparral–Woodlands

Map Unit Composition

Brewster and similar soils: 40 percent
Aravaipa and similar soils: 35 percent
Rock outcrop, granite: 20 percent

Minor components: Rafter. Other minor components include soils that are loamy-skeletal with argillic horizons, coarse loamy soils in drainageways.

Soil Properties and Qualities

Brewster soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic Haplustolls
Geomorphic position: generally on backslopes and toeslopes
Parent material: slope alluvium and/or residuum weathered from granite
Slope: 3 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 40 percent
woody debris: 20 percent
bare soil: 10 percent
rock fragments
gravel: 45 percent
cobble: 5 percent
Depth to restrictive feature(s): 5 to 12 inches to bedrock, paralithic; 8 to 12 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.6 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none

Runoff class: very high
Hydrologic group: D
Ecological site name: Granitic Hills 16-20” p.z.
Ecological site number: R038XB204AZ
Present vegetation: agave, bull grass, catclaw, snakeweed, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Buford Hill; about 4,060 feet south and 2,500 feet east of the northwest corner of Section 9, Township 7 S, Range 21 E.
Geographic Coordinate System: 32° 50’ 10.80’’ north, 110° 12’ 23.10’’ west

A1—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/2) very gravelly loam, very dark brown (7.5YR 2/2), moist; 18 percent clay; soft, very friable, moderately sticky, moderately plastic; 45 percent gravel; noneffervescent; neutral, pH 6.8; clear wavy boundary.

A2—2 to 8 inches (5 to 20 cm); brown (7.5YR 4/2) very gravelly loam, dark brown (7.5YR 3/2), moist; 25 percent clay; soft, very friable, slightly sticky, slightly plastic; 55 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Crt—8 to 10 inches (20 to 25 cm) weathered granite bedrock.

R—10 to 60 inches (25 to 152 cm); unweathered granite bedrock.

Range in Characteristics

Rock fragments: 35 to 60 percent
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 18 to 35 percent

A horizon
Hue: 7.5YR, 5YR
Value: 3 to 5 dry, 2 to 4 moist
Chroma: 2 or 3 dry, 2 to 4 moist
Texture: loam, sandy clay loam, clay loam

Cr and R horizons
Granite bedrock

Aravaipa soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic, shallow Aridic Argiustolls
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from granite
Slope: 3 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 40 percent

woody debris: 15 percent
bare soil: 15 percent
rock fragments
gravel: 45 percent
cobble: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Granitic Hills 16-20” p.z.
Ecological site number: R038XB204AZ
Present vegetation: cactus, catclaw acacia, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Buford Hill; about 440 feet south and 3,190 feet east of the northwest corner of Section 22, Township 7 S, Range 21 E.
Geographic Coordinate System: 32° 49’ 13.40’’ north, 110° 11’ 13.40’’ west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/2) very gravelly loam, very dark brown (7.5YR 2/2), moist; 25 percent clay; very hard, friable, very sticky, very plastic; 25 percent gravel; noneffervescent; neutral, pH 6.8; clear wavy boundary.

Bt—3 to 13 inches (8 to 33 cm); dark reddish gray (5YR 4/2) very gravelly clay, dark reddish brown (5YR 3/2), moist; 50 percent clay; soft, very friable, slightly sticky, slightly plastic; very few continuous distinct clay films on faces of peds and rock fragments; 50 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Crt—13 to 60 inches (33 to 152 cm) weathered granite bedrock.

Range in Characteristics

Rock fragments: 35 to 60 percent
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in the control section: 35 to 60 percent

A horizon
Hue: 7.5YR, 5YR
Value: 4 or 5 dry, 2 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: loam, sandy loam, clay loam

Bt horizon
Hue: 7.5YR, 5YR
Value: 3 or 4 dry, 3 to 5 moist
Chroma: 2 dry, 2 to 6 moist
Texture: clay, clay loam

Crt horizon
Granite bedrock

Rock outcrop
Rock outcrop consists of barren rock that occurs as outcrops of granite. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near the summits.

10—Caralampi cobbly sandy loam, 3 to 10 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*4,720 to 5,380 feet (1,439 to 1,640 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Caralampi and similar soils: 80 percent

Minor components: Eloma, Mallet

Soil Properties and Qualities

Caralampi soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Ustic Haplargids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 3 to 10 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 25 percent
  - woody debris: 0 percent
  - bare soil: 25 percent
- rock fragments
  - gravel: 20 percent
  - cobble: 15 percent
  - stone: 5 percent
  - boulder: 5 percent

Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Available water capacity total inches: 3.5 (low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: medium
Hydrologic group: C
Ecological site name: Sandy Loam Upland 12-16” p.z.

Ecological site number: R041XC319AZ
Present vegetation: burroweed, catclaw, hackberry, Lehmann lovegrass, mesquite
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGA Quadrangle - Webb Peak; about 160 feet north and 2,020 feet west of the southeast corner of Section 24, Township 9 S, Range 23 E.
Geographic Coordinate System: 32° 37’ 50.30’’ north, 109° 56’ 45.50’’ west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/4) gravelly sandy loam, brown (7.5YR 4/3), moist; 10 percent clay; weak fine granular parting to weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and few coarse roots; many very fine tubular and interstitial pores; 20 percent gravel and 10 percent cobble; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt—4 to 25 inches (10 to 64 cm); reddish brown (5YR 4/3) extremely cobbly sandy loam, dark reddish brown (5YR 3/3), moist; 18 percent clay; slightly hard, friable, nonsticky, nonplastic; common very fine and few medium roots; many very fine tubular pores; common continuous distinct clay films on rock fragments; common continuous distinct clay bridges between sand grains; 10 percent gravel and 30 percent cobble and 20 percent stone; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

2Bt—25 to 60 inches (64 to 152 cm); reddish brown (5YR 5/4) extremely stony clay loam, reddish brown (5YR 4/4), moist; 35 percent clay; strong fine and medium angular blocky structure; extremely hard, firm, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 10 percent gravel and 20 percent cobble and 40 percent stone; noneffervescent; slightly acid, pH 6.4.

Range in Characteristics

Rock fragments: 35 to 70 percent
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 18 to 35 percent

A horizon
Hue: 7.5YR
Value: 3 or 4, dry or moist
Chroma: 4, dry or moist
Texture: sandy loam

Bt horizons
Hue: 5YR, 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 or 4, dry or moist
Texture: sandy loam, loam, clay loam

11—Cherrycow cobbly clay loam, 5 to 45 percent slopes

Map Unit Setting

Landform(s): pediments
*Elevation:*5,270 to 5,490 feet (1,606 to 1,673 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–1 Mexican Oak–Pine Woodland and Oak Savannah

<pstyle:45>Map Unit Composition
Cherrycow and similar soils: 70 percent

Minor components: Blacktail, Cherrycow soils that have hues of 2.5YR, Riverwash. Other minor components include very deep soils containing greater than 35 percent rock fragments, clayey soils that are shallow to a petrocalcic.

Soil Properties and Qualities

Cherrycow soils
Taxonomic classification: Fine, smectitic, thermic Aridic Argiustolls
Geomorphic position: generally on backlopes
Parent material: slope alluvium derived from welded tuff
Slope: 5 to 45 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:80 percent
  - woody debris: 5 percent
  - bare soil: 15 percent
- rock fragments
  - gravel: 25 percent
  - cobble: 45 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: moderately well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 3.7 (low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Loamy Slopes 16-20” p.z.
Ecological site number: R041XA107AZ
Present vegetation: annual grasses, other annual forbs, mesquite, sideoats grama, blue grama, green sprangletop, burroweed, broom snakeweed, cane beardgrass, shrubby buckwheat, spidergrass
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Hookers Hot Springs; about 1,700 feet east and 500 feet north of southwest corner of Section 25, Township 13 S, Range 21 E.
Geographic Coordinate System: 32° 21’ 17.30’’ north, 110° 9’ 38.40’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) cobbly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; weak thin platy parting to moderate very fine subangular blocky structure; soft, very friable, very sticky, very plastic; few medium roots; many very fine irregular pores; 5 percent gravel and 10 percent cobble; noneffervescent; moderately acid, pH 6.0; abrupt smooth boundary.

Bt1—2 to 11 inches (5 to 28 cm); dark brown (7.5YR 3/2) clay, dark brown (7.5YR 3/2), moist; 48 percent clay; strong very fine and fine angular blocky structure; extremely hard, firm, very sticky, very plastic; many very fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 10 percent gravel; noneffervescent; moderately acid, pH 6.0; abrupt smooth boundary.

Bt2—11 to 26 inches (28 to 66 cm); reddish brown (5YR 4/3) clay, reddish brown (5YR 4/3), moist; 58 percent clay; strong medium and coarse angular blocky structure; extremely hard, firm, very sticky, very plastic; many very fine roots; few very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; many pressure faces; 10 percent gravel; noneffervescent; neutral, pH 6.8; abrupt wavy boundary.

R—26 to 60 inches (66 to 152 cm); unweathered welded tuff bedrock.

Range in Characteristics

Rock fragments: 10 to 25 percent
Organic matter: 1 to 3 percent
Reaction: 5.6 to 7.8 (moderately acid to slightly alkaline)
Average percent clay in the control section: 45 to 60 percent

A horizon
- Hue: 5YR, 7.5YR
- Value: 3 or 4 dry, 2.5 or 3 moist
- Chroma: 1 to 3, dry or moist
- Texture: loam, clay loam, clay
- Reaction: 5.6 to 7.3 (moderately acid to neutral)

Bt horizons
- Hue: 5YR, 7.5YR
- Value: 3 or 4 dry, 2.5 or 4 moist
- Chroma: 1 to 3, dry or moist
- Texture: clay
- Reaction: 5.6 to 7.8 (moderately acid to slightly alkaline)

R horizon
- Welded tuff bedrock

12—Cloverdale cobbly clay loam, 1 to 5 percent slopes

Map Unit Setting

Landform(s): alluvial fans and plains
*Elevation:*4,430 to 5,220 feet (1,350 to 1,591 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–1 Mexican Oak–Pine Woodland and Oak Savannah

Map Unit Composition

Cloverdale and similar soils: 90 percent

Minor components: Rafter. Other minor components include soils that are loamy-skeletal with argillic horizons, coarse-loamy soils in drainageways.

Soil Properties and Qualities

Cloverdale soils
Taxonomic classification: Fine, smectitic, thermic Torrertic Argiustolls
Geomorphic position: generally on summits
Parent material: mixed alluvium
Slope: 1 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover:10 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 40 percent
cobble: 40 percent
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Available water capacity total inches: 8.8 (high)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: medium
Hydrologic group: D
Ecological site name: Clayey Upland 16-20” p.z.
Ecological site number: R041XA126AZ
Present vegetation: little barley, cholla, curly mesquite, mustard, vine mesquite
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle The Mesas; about 388 feet north and 2,123 feet east of the southwest corner of Section 36, Township 11S, Range 21 E.
Geographic Coordinate System: 32° 25’ 39.70’’ north, 110° 9’ 33.90’’ west

A—0 to 4 inches (0 to 10 cm); dark brown (7.5YR 3/2) cobbly clay loam, dark brown (7.5YR 3/2), moist; 36 percent clay; strong medium and coarse angular blocky structure; very hard, very firm, very sticky, very plastic; many very fine roots; many

very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 15 percent cobble; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt1—4 to 13 inches (10 to 33 cm); dark brown (7.5YR 3/2) clay, dark brown (7.5YR 3/2), moist; 50 percent clay; strong medium and coarse angular blocky structure; extremely hard, very firm, very sticky, very plastic; many very fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; neutral, pH 6.6; gradual smooth boundary.

Bt2—13 to 36 inches (33 to 91 cm); strong brown (7.5YR 4/6) clay, reddish brown (5YR 4/4), moist; 50 percent clay; moderate very fine and fine subangular blocky structure; extremely hard, very firm, very sticky, very plastic; many very fine roots; many very fine interstitial and tubular pores; many patchy prominent clay films on faces of peds and rock fragments; many fine manganese masses; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Btk1—36 to 53 inches (91 to 135 cm); strong brown (7.5YR 4/6) gravelly clay loam, strong brown (7.5YR 4/6), moist; 36 percent clay; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine interstitial and tubular pores; many patchy prominent clay films on faces of peds and rock fragments; few continuous distinct carbonate coats on rock fragments; few fine manganese and carbonate masses; 20 percent gravel and 15 percent cobble; slightly effervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

Btk2—53 to 60 inches (135 to 152 cm); very dark grayish brown (10YR 3/2) very cobbly clay loam, very dark brown (7.5YR 2.5/2), moist; 32 percent clay; moderate fine granular structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; common patchy prominent clay films on faces of peds and rock fragments; few continuous distinct carbonate coats on rock fragments; 20 percent gravel and 15 percent cobble; violently effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Soil cracks: many vertical cracks 0.25 to 0.5 inch wide from the surface to a depth of 36 inches or more
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.8 (neutral to mildly alkaline)
Average percent clay in the control section: 35 to 60 percent

A horizon
- Hue: 10YR, 7.5YR, 5YR
- Value: 3 to 5 dry, 2 or 3 moist
- Chroma: 1 to 3, dry or moist
- Texture: loam, clay, clay loam
- Rock fragments: 15 to 30 percent

Bt horizon
- Hue: 7.5YR, 5YR, 2.5YR
- Value: 3 or 4 dry, 2 to 4 moist
- Chroma: 2 to 4 dry, 1 to 6 moist
- Texture: clay, clay loam

Btk horizons
- Hue: 7.5YR
- Value: 3 or 4, dry or moist

Chroma: 4 to 6, dry or moist
Texture: clay, clay loam
Rock fragments: 20 to 55 percent

13—Combate sandy loam, 0 to 1 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*4,430 to 4,470 feet (1,350 to 1,362 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Combate and similar soils: 90 percent

Minor components: fine-loamy soils, sandy soils.

Soil Properties and Qualities

Combate soils
Taxonomic classification: Coarse-loamy, mixed, superactive, nonacid, thermic Ustic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 1 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 0 percent
woody debris: 0 percent
bare soil: 100 percent
rock fragments
gravel: 10 percent
Drainage class: somewhat excessively drained
Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)
Available water capacity total inches: 8.4 (high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Present vegetation: bare ground
Land capability (irrigated): 3w
Land capability (non-irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Fort Grant; about 2,435 feet south and 2,155 feet west of the northeast corner of Section 21, Township 10 S, Range 23 E.
Geographic Coordinate System: 32° 33’ 5.10’’ north, 109° 59’ 51.90’’ west

Ap—0 to 10 inches (0 to 25 cm); brown (10YR 4/3) sandy loam, dark brown (10YR 3/3), moist; 10 percent clay; massive; slightly hard, friable, nonsticky, nonplastic; many very fine roots; many very fine irregular and many fine irregular pores; noneffervescent; slightly acid, pH 6.2; clear wavy boundary.

C1—10 to 18 inches (25 to 46 cm); brown (10YR 4/3) sandy loam, dark brown (10YR 3/3), moist; 10 percent clay; weak very fine and fine granular structure; slightly hard, friable, nonsticky, nonplastic; many very fine roots; many very fine tubular pores; noneffervescent; moderately acid, pH 6.0; abrupt wavy boundary.

C2—18 to 24 inches (46 to 61 cm); dark yellowish brown (10YR 4/4) loamy sand, dark brown (10YR 3/3), moist; 5 percent clay; weak very fine and fine granular structure; soft, friable, nonsticky, nonplastic; common very fine roots; many very fine tubular pores; noneffervescent; moderately acid, pH 6.0; clear wavy boundary.

C3—24 to 41 inches (61 to 104 cm); dark yellowish brown (10YR 4/4) sandy loam, dark brown (10YR 3/3), moist; 10 percent clay; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; common very fine roots; common very fine tubular pores; noneffervescent; slightly acid, pH 6.2; clear wavy boundary.

C4—41 to 60 inches (104 to 152 cm); dark yellowish brown (10YR 4/4) clay loam, very dark grayish brown (10YR 3/2), moist; 30 percent clay; weak medium subangular blocky structure; slightly hard, firm, moderately sticky, very plastic; few very fine roots; common very fine tubular pores; noneffervescent; slightly acid, pH 6.2.

Range in Characteristics

Rock fragments: less than 5 percent gravels
Reaction: 6.0 to 7.0 (moderately acid to neutral)
Average percent clay in the control section: 5 to 18 percent

Ap horizon
- Hue: 7.5YR, 10YR
- Value: 4 dry, 2 or 3 moist
- Chroma: 3 dry, 2 or 3 moist
- Texture: sandy loam, clay loam, loam

C horizon
- Hue: 7.5YR, 10YR
- Value: 3 or 4 dry, 2 to 3 moist
- Chroma: 3 or 4 dry, 2 or 3 moist
- Texture: sandy loam, loamy sand, clay loam, loam, fine sandy loam, coarse sand, silty clay loam, loamy coarse sand

14—Combate sandy loam, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*4,410 to 5,060 feet (1,344 to 1,542 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Combate and similar soils: 90 percent

Minor components: Hooks, Mallet. Other minor components include sandy soils in drainageways.

Soil Properties and Qualities

Combate soils
Taxonomic classification: Coarse-loamy, mixed, superactive, nonacid, thermic Ustic Torrifluvents
Geomorphic position: drainageways plus alluvial plains
Parent material: mixed stream alluvium
Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 30 percent
woody debris: 5 percent
bare soil: 65 percent
rock fragments
gravel: 5 percent
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 7.2 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Ecological site name: Loamy Bottom 12-16” p.z.
Ecological site number: R041XC312AZ
Present vegetation: camphorweed, desert willow, giant sacaton, redstem filaree, Russian thistle
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Fort Grant; about 3,265 feet south and 3,265 feet east of the northwest corner of Section 34, Township 9 S, Range 23 E.
Geographic Coordinate System: 32° 36’ 35.20’’ north, 109° 59’ 0.70’’ west

C1—0 to 3 inches (0 to 8 cm); dark yellowish brown (10YR 4/4) sandy loam, dark brown (7.5YR 3/2), moist; 10 percent clay; moderate thick platy parting to moderate fine and medium granular structure; soft, friable, nonsticky, nonplastic; common very

fine roots; many very fine interstitial pores; 3 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C2—3 to 10 inches (8 to 25 cm); dark yellowish brown (10YR 4/4) sandy loam, dark brown (7.5YR 3/3), moist; 10 percent clay; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; many very fine roots; many very fine tubular pores; 3 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C3—10 to 60 inches (25 to 152 cm); dark yellowish brown (10YR 4/4) sandy loam, dark brown (7.5YR 3/2), moist; 12 percent clay; weak medium subangular blocky structure; soft, friable, nonsticky, nonplastic; few very fine and fine roots; many very fine tubular and common fine tubular pores; 3 percent gravel; noneffervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Rock fragments: 0 to 35 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 7 to 18 percent

C horizons
- Hue: 7.5YR, 10YR
- Value: 3 to 5 dry, 2 to 4 moist
- Chroma: 3 or 4 dry, 1 to 4 moist
- Texture: sandy loam, coarse sandy loam, loam, sand, fine sandy loam, coarse sand

15—Contention family-Whitecliff family-Sasabe complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,350 to 4,960 feet (1,021 to 1,512 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Contention family and similar soils: 40 percent
Whitecliff family and similar soils: 20 percent
Sasabe and similar soils: 15 percent

Minor components: Altar, Baboquivari, Eloma, Hooks, Mallet, Tombstone, White House. Other minor components include soils that are fine and contain calcic horizons, and soils that are coarse-loamy and contain gypsum or calcic horizons.

Soil Properties and Qualities

Contention soils
Taxonomic classification: Fine, smectitic, thermic Typic Gypsitorrerts
Geomorphic position: generally on backslopes
Parent material: mixed fan alluvium
Slope: 5 to 60 percent

Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 20 percent
woody debris: 10 percent
bare soil: 50 percent
rock fragments
gravel: 25 percent
cobble: 5 percent
stone: 3 percent
Drainage class: well drained
Ksat solum: 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)
Available water capacity total inches: 8.8 (high)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Limy Slopes 12-16” p.z.
Ecological site number: R041XC308AZ
Present vegetation: burroweed, catclaw, mesquite, needle and thread, yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Eureka Ranch; about 375 feet north and 1,270 feet west of the southeast corner of Section 1, Township 9 S, Range 21 E.
Geographic Coordinate System: 32° 40’ 28.90’’ north, 110° 8’ 57.30’’ west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 15 percent clay; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common fine roots; common fine vesicular pores; 20 percent gravel; slightly effervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bky1—4 to 12 inches (10 to 30 cm); brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4), moist; 45 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; common fine roots; many fine tubular pores; common fine distinct cylindrical weakly cemented carbonate nodules; common fine distinct irregular weakly cemented gypsum masses; 5 percent gravel; strongly effervescent, 5 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bky2—12 to 36 inches (30 to 91 cm); reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4), moist; 50 percent clay; strong fine and medium angular blocky structure; hard, firm, very sticky, very plastic; common fine roots; many fine tubular pores; common fine distinct cylindrical weakly cemented carbonate nodules; common fine distinct irregular weakly cemented gypsum masses; 5 percent gravel; strongly effervescent, 5 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Bky3—36 to 48 inches (91 to 122 cm); brown (7.5YR 5/3) clay loam, brown (7.5YR 5/3), moist; 37 percent clay; strong fine and medium angular blocky structure; hard,

friable, moderately sticky, moderately plastic; many fine tubular pores; common fine distinct cylindrical weakly cemented carbonate nodules; common fine distinct irregular weakly cemented gypsum masses; 5 percent gravel; strongly effervescent, 5 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Bky4—48 to 60 inches (122 to 152 cm); brown (7.5YR 4/4) clay, brown (7.5YR 5/4), moist; 45 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; many fine tubular pores; common fine distinct cylindrical weakly cemented carbonate nodules; common fine distinct irregular weakly cemented gypsum masses in matrix; 5 percent gravel; strongly effervescent, 7 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2.

Range in Characteristics

Rock fragments: 0 to 25 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 35 to 60 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loamy sand, clay loam, silty clay loam, loam, silt loam, sandy clay loam, fine sandy loam, clay

Bky horizons
- Hue: 5YR, 7.5YR, 10YR
- Value: 3 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4 dry, 2 to 6 moist
- Texture: clay, clay loam, silty clay, loam, silt loam, sandy clay loam, sandy clay
- Gypsum content: 0 to 5 percent

Contention as used in this map unit is at the family level because this soil is mapped in the Ustic Aridic moisture regime. Contention series is Fine, smectitic, thermic, Typic Gypsitorrerts.

Whitecliff family soils
Taxonomic classification: Fine-silty, mixed, superactive, thermic Leptic Haplogypsids
Geomorphic position: generally on backslopes
Parent material: mixed fan alluvium
Slope: 5 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 10 percent
  - woody debris: 10 percent
  - bare soil: 50 percent
- rock fragments
  - gravel: 25 percent
  - cobble: 10 percent
  - stone: 3 percent

Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Available water capacity total inches: 10.0 (high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: C
Ecological site name: Limy Slopes 12-16” p.z.
Ecological site number: R041XC308AZ
Present vegetation: burroweed, catclaw, mesquite, needle and thread, yucca
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Eureka Ranch; about 1,190 feet south and 2,100 feet west of the northeast corner of Section 12, Township 9 S, Range 21 E.

Geographic Coordinate System: 32° 40’ 13.40’’ north, 110° 9’ 7.00’’ west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/3) sandy loam, brown (7.5YR 4/3), moist; 15 percent clay; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common fine roots; common fine vesicular pores; 10 percent gravel; strongly effervescent; 3 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Bky1—3 to 14 inches (8 to 36 cm); brown (7.5YR 5/4) loam, brown (7.5YR 4/3), moist; 25 percent clay; moderate fine and medium angular blocky structure; hard, friable, slightly sticky, slightly plastic; common fine roots; many fine tubular pores; common fine distinct cylindrical weakly cemented carbonate masses; common fine distinct irregular weakly cemented gypsum masses; 5 percent gravel; strongly effervescent; 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Bky2—14 to 32 inches (36 to 81 cm); brown (7.5YR 5/3) silty clay loam, brown (7.5YR 4/3), moist; 32 percent clay; moderate fine and medium angular blocky structure; hard, friable, slightly sticky, slightly plastic; common fine roots; many fine tubular pores; common fine distinct cylindrical weakly cemented carbonate masses; common fine distinct irregular weakly cemented gypsum masses; 5 percent gravel; strongly effervescent; 15 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Bky3—32 to 46 inches (81 to 117 cm); brown (7.5YR 5/3) silt loam, brown (7.5YR 4/3), moist; 27 percent clay; moderate fine and medium angular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine tubular pores; common fine distinct cylindrical weakly cemented carbonate masses; common fine distinct irregular weakly cemented gypsum masses; 5 percent gravel; strongly effervescent; 15 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Bky4—46 to 60 inches (117 to 152 cm); light brown (7.5YR 6/3) fine sandy loam, brown (7.5YR 4/3), moist; 12 percent clay; weak fine and medium angular blocky structure; soft, very friable, nonsticky, nonplastic; many fine interstitial pores; common fine distinct cylindrical weakly cemented carbonate masses; common fine distinct irregular weakly cemented gypsum masses; 5 percent gravel; strongly effervescent; 15 percent calcium carbonate equivalent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: 0 to 10 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)

Average percent clay in the control section: 18 to 35 percent

A horizon
Hue: 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 or 4, dry or moist
Texture: sandy loam

Bky horizons
Hue: 7.5YR, 5YR
Value: 4 to 6 dry, 3 to 6 moist
Chroma: 2 to 4, dry or moist
Texture: loam, silt loam, silty clay loam, sandy clay loam, or fine sandy loam
Gypsum content: 5 to 20 percent
Calcium carbonate equivalent: 1 to 20 percent

Whitecliff as used in this map unit is at the family level because this soil is mapped in the Ustic Aridic moisture regime. Whitecliff series is Fine-silty, mixed, superactive, thermic Leptic Haplogypsids.

Sasabe soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Paleargids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 5 to 10 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 10 percent
woody debris: 10 percent
bare soil: 50 percent
rock fragments
gravel: 35 percent
cobble: 5 percent
stone: 3 percent
Depth to restrictive feature(s): 1 inch to 4 inches to abrupt textural change
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Available water capacity total inches: 0.3 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: medium
Hydrologic group: C
Ecological site name: Loamy Upland 12-16” p.z.
Ecological site number: R041XC313AZ
Present vegetation: beargrass, burroweed, catclaw, juniper, mesquite, snakeweed, tobosagrass, yucca
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Blue Jay Peak; about 225 feet south and 105 feet west of the northeast corner of Section 16, Township 9 S, Range 22 E.

Geographic Coordinate System: 32° 39’ 7.10’’ north, 110° 5’ 46.70’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) loam, brown (7.5YR 4/3), moist; 25 percent clay; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine roots; many fine vesicular pores; 5 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt1—2 to 10 inches (5 to 25 cm); reddish brown (5YR 5/3) clay, brown (7.5YR 4/3), moist; 50 percent clay; strong medium and coarse prismatic parting to moderate fine and medium angular blocky structure; moderately hard, friable, very sticky, very plastic; many fine roots; many fine tubular pores; common discontinuous distinct clay films on faces of peds; 5 percent gravel; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

Bt2—10 to 28 inches (25 to 71 cm); reddish brown (5YR 5/3) clay, brown (7.5YR 4/3), moist; 50 percent clay; moderate fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; many fine tubular pores; common discontinuous distinct clay films on faces of peds; few patchy distinct pressure faces on horizontal faces of peds; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

Btk—28 to 60 inches (71 to 152 cm); reddish brown (5YR 5/3) cobbly clay, reddish brown (5YR 4/4), moist; 45 percent clay; moderate fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; many fine tubular pores; few discontinuous distinct clay films on faces of peds; many fine and medium distinct irregular weakly cemented carbonate masses; 15 percent gravel and 15 percent cobble; strongly effervescent; slightly alkaline, pH 7.4.

Range in Characteristics

Reaction: 6.6 to 8.4 (neutral to moderately alkaline)
Average percent clay in the control section: 40 to 60 percent

A horizon
- Hue: 7.5YR, 5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4 dry, 2 to 4 moist
- Texture: loam

Bt horizons
- Hue: 7.5YR, 5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: clay, clay loam, sandy clay

Btk horizons
- Hue: 7.5YR, 5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: clay, clay loam, sandy clay
- Rock fragments: 15 to 40 percent

16—Delnorte-Nahda complex, 5 to 45 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,000 to 3,770 feet (914 to 1,149 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40–Sonoran Basin and Range
Land Resource Unit: 40–1 Upper Sonoran Desert Shrub

Map Unit Composition

Delnorte and similar soils: 55 percent
Nahda and similar soils: 30 percent

Minor components: Pinaleno, Stagecoach. Other minor components include soils with a petrocalcic horizon above bedrock, loamy soils with a petrocalcic above unconsolidated material, deep soils with an argillic horizon.

Soil Properties and Qualities

Delnorte soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids
Geomorphic position: generally on backslopes and toeslopes
Parent material: mixed fan alluvium
Slope: 5 to 45 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover:25 percent
  - woody debris: 0 percent
  - bare soil: 0 percent
- rock fragments
  - gravel: 70 percent
  - cobble: 10 percent
  - stone: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to petrocalcic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.5 (very low)

Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limy Upland 10-13” p.z.
Ecological site number: R040XA111AZ
Present vegetation: cactus, creosotebush, foothill paloverde, mustard, ocotillo, saguaro, staghorn cholla
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Redington; about 1,450 feet south and 3,125 feet east of the northwest corner of Section 32, Township 11 S, Range 19 E.
Geographic Coordinate System: 32° 26’ 16.90’’ north, 110° 25’ 27.60’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) very gravelly loam, dark brown (7.5YR 3/3), moist; 12 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine and fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 40 percent gravel and 5 percent cobble; violently effervescent, 10 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk—2 to 8 inches (5 to 20 cm); brown (7.5YR 4/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; moderate very fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine and fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel and 5 percent cobble; violently effervescent, 13 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Bkkm—8 to 60 inches (20 to 152 cm); violently effervescent; cemented material, indurated petrocalcic.

Range in Characteristics

Rock fragments: 35 to 60 percent gravel and cobbles
Reaction: 7.9 to 8.4 (moderately alkaline)
Average percent clay in the control section: 7 to 18 percent
Depth to petrocalcic horizon: 5 to 20 inches
Calcium carbonate equivalent: 5 to 20 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 3 to 5 dry, 3 or 4 moist
- Chroma: 3 dry, 3 or 4 moist
- Texture: sandy loam, loam

Bk horizon
- Hue: 7.5YR, 10YR
- Value: 3 to 5 dry, 3 moist
- Chroma: 3 dry, 2 to 4 moist
- Texture: sandy loam, loam

Bkkm horizon
- Cemented: calcium carbonate and silica
- Hardness: extremely hard to indurated
- Thickness: 3 to 5 feet; continuous

Nahda soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Argic Petrocalcids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 5 to 45 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover:25 percent
woody debris: 0 percent
bare soil: 15 percent
rock fragments
gravel: 10 percent
cobble: 20 percent
Depth to restrictive feature(s): 20 to 40 inches to petrocalcic
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 2.5 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Loamy Upland 10-13” p.z.
Ecological site number: R040XA114AZ
Present vegetation: barrel cactus, Christmas cholla, creosotebush, desert zinnia, fiddleneck, foothill paloverde, mesquite, mustard, pricklypear, staghorn cholla, whitethorn
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Redington; about 1,175 feet west and 2,925 feet north of the southeast corner of Section 30, Township 11 S, Range 19 E.
Geographic Coordinate System: 32° 27’ 0.70’’ north, 110° 26’ 18.00’’ west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/4) gravelly sandy loam, dark brown (7.5YR 3/4), moist; 14 percent clay; moderate fine and medium subangular blocky parting to weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine interstitial and vesicular pores; many continuous distinct carbonate coats on rock fragments; 20 percent gravel and 10 percent cobble; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Bt1—1 inch to 12 inches (3 to 30 cm); dark reddish brown (5YR 3/4) very gravelly clay, dark reddish brown (5YR 3/4), moist; 55 percent clay; strong fine and medium subangular blocky structure; hard, friable, very sticky, very plastic; common very fine and fine roots; many very fine tubular pores; many continuous distinct clay films on

faces of peds; 40 percent gravel and 10 percent cobble; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Bt2—12 to 22 inches (30 to 56 cm); reddish brown (5YR 4/4) extremely gravelly clay, reddish brown (5YR 4/4), moist; 55 percent clay; strong fine and medium angular blocky structure; extremely hard, firm, very sticky, very plastic; common very fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds; 50 percent gravel and 10 percent cobble; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Btk—22 to 37 inches (56 to 94 cm); yellowish red (5YR 4/6) extremely gravelly sandy clay, dark reddish brown (5YR 3/4), moist; 45 percent clay; strong very fine and fine subangular blocky structure; hard, friable, very sticky, very plastic; few very fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds; common continuous distinct carbonate coats on rock fragments; 65 percent gravel; strongly effervescent, 8 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Bkkm—37 to 60 inches (94 to 152 cm); violently effervescent; cemented material, indurated petrocalcic.

Range in Characteristics

Rock fragments: 35 to 75 percent gravel and cobbles
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 35 to 60 percent
Depth to petrocalcic horizon: 20 to 40 inches
Calcium carbonate equivalent: 0 to 10 percent

A horizon
- Hue: 7.5YR
- Value: 3 dry, 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, sandy clay loam, clay loam, loam

Bt horizons
- Hue: 5YR, 7.5YR
- Value: 3 to 5 dry, 3 moist
- Chroma: 3 dry, 2 to 4 moist
- Texture: clay, sandy clay, clay loam

Btk horizon
- Hue: 5YR
- Value: 3 or 4, dry or moist
- Chroma: 4 to 6 dry, 3 or 4 moist
- Texture: clay, sandy clay

Bkkm horizon
- Cemented: calcium carbonate and silica
- Hardness: extremely hard to indurated
- Thickness: 3 to 5 feet; continuous

17—Deloro-Andrada complex, 5 to 35 percent slopes

Map Unit Setting

Landform(s): mountains
*Elevation:*3,590 to 4,920 feet (1,094 to 1,500 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Andrada and similar soils: 30 percent
Deloro and similar soils: 40 percent

Minor components: Lampshire, Riverwash, Rock outcrop. Other minor components include shallow soils that are clayey to bedrock.

Soil Properties and Qualities

Deloro soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic, shallow Ustic Haplargids
Geomorphic position: generally on summits
Parent material: alluvium and residuum from quartzite
Slope: 5 to 35 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:40 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 45 percent
cobble: 35 percent
stone: 5 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: high
Hydrologic group: C
Ecological site name: Volcanic Hills, Loamy 12-16” p.z.
Ecological site number: R041XC323AZ
Present vegetation: sideoats grama, pale wolfberry, curly mesquite, slender grama, sprucetop grama, black grama, cane beardgrass, false mesquite, hairy grama, other shrubs, threeawn, vine mesquite
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Soza Mesa; about 1,300 feet west and 400 feet north of the southeast corner of Section 21, Township 12 S, Range 20 E.

Geographic Coordinate System: 32° 22’ 8.90’’ north, 110° 18’ 28.50’’ west

A—0 to 2 inches (0 to 5 cm); dark reddish brown (5YR 3/3) very gravelly loam, dark reddish brown (5YR 3/3), moist; 21 percent clay; moderate medium and thick platy structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine tubular pores; 30 percent gravel and 10 percent cobble; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

Bt1—2 to 6 inches (5 to 15 cm); dark reddish brown (5YR 3/3) very gravelly sandy clay, dark reddish brown (5YR 3/3), moist; 35 percent clay; strong fine and medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common fine and medium roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 40 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.6; abrupt wavy boundary.

Bt2—6 to 17 inches (15 to 43 cm); dark reddish brown (2.5YR 3/4) very gravelly clay, dark red (2.5YR 3/6), moist; 50 percent clay; strong fine and medium subangular blocky structure; extremely hard, firm, very sticky, very plastic; many very fine and fine and few medium roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 40 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.8; abrupt wavy boundary.

2Crt—17 to 60 inches (43 to 152 cm); many continuous distinct clay films on bedrock; weathered quartzite bedrock.

Range in Characteristics

Rock fragments: 40 to 75 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in control section: 35 to 50 percent

A horizon
- Hue: 7.5YR, 5YR
- Value: 3 to 5 dry, 3 or 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: loam, clay loam

Bt horizons
- Hue: 2.5YR, 5YR
- Value: 3 to 6 dry, 3 or 4 moist
- Chroma: 2 to 6, dry or moist
- Texture: clay, clay loam, sandy clay

Andrada soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Ustic Haplocalcids
Geomorphic position: generally on summits
Parent material: slope alluvium and/or residuum weathered from quartzite
Slope: 5 to 35 percent
Surface cover:

Biological crust
- cyanobacteria: 0 percent
- lichen: 0 percent

moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:40 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 55 percent
cobble: 20 percent
stone: 5 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limy Slopes 12-16” p.z.
Ecological site number: R041XC308AZ
Present vegetation: sideoats grama, black grama, wolftail, cane beardgrass, curly mesquite, desert zinnia, other shrubs, range ratany
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Soza Mesa; about 1,400 feet north and 1,200 feet east of the southwest corner of Section 22, Township 12 S, Range 20 E.

Geographic Coordinate System: 32° 22’ 16.50’’ north, 110° 17’ 53.70’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) extremely gravelly loam, dark brown (7.5YR 3/3), moist; 20 percent clay; moderate medium and thick platy parting to weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 50 percent gravel and 20 percent cobble; strongly effervescent, 18 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk—2 to 15 inches (5 to 38 cm); brown (7.5YR 5/2) very gravelly sandy clay loam, brown (7.5YR 4/2), moist; 27 percent clay; weak very fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; many fine and medium and common coarse roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 40 percent gravel and 15 percent cobble; violently effervescent, 25 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt wavy boundary.

2Crk—15 to 60 inches (38 to 152 cm); many continuous distinct carbonate coats on rock fragments; weathered quartzite bedrock.

Range in Characteristics

Rock fragments: 35 to 80 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in control section: 15 to 30 percent
Calcium carbonate equivalent: 10 to 30 percent

A horizon
Hue: 7.5YR, 10YR
Value: 3 to 5 dry, 2 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: loam, sandy loam

Bk horizon
Hue: 10YR, 7.5YR
Value: 3 to 8 dry, 3 to 7 moist
Chroma: 2 to 4, dry or moist
Texture: loam, sandy clay loam

18—Deloro-Schrap-Rock outcrop complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): hills
*Elevation:*4,350 to 5,720 feet (1,326 to 1,743 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Deloro and similar soils: 55 percent
Schrap and similar soils: 20 percent
Rock outcrop, andesite: 15 percent

Minor components: Graham, Lampshire, Pantak

Soil Properties and Qualities

Deloro soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic, shallow Ustic Haplargids
Geomorphic position: generally on backslopes and toeslopes
Parent material: slope alluvium and/or residuum weathered from andesite
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 20 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 55 percent

cobble: 25 percent
stone: 15 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 19.98 inches per hour (0.00 to 141.00 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: high
Hydrologic group: C
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R041XC330AZ
Present vegetation: burroweed, catclaw acacia, Lehmann lovegrass, mesquite, snakeweed, sprucetop grama, tobosagrass
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Greasewood Mountain; about 2,215 feet south and 1,055 feet west of the northeast corner of Section 26, Township 11S, Range 24 E.

Geographic Coordinate System: 32° 27’ 0.80’’ north, 109° 51’ 45.40’’ west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 3/4), moist; 26 percent clay; weak thin platy parting to moderate fine granular structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; 45 percent gravel and 15 percent cobble; noneffervescent; slightly acid, pH 6.2; clear wavy boundary.

Bt—3 to 11 inches (8 to 28 cm); dark brown (7.5YR 3/4) very gravelly clay, dark reddish brown (5YR 3/4), moist; 55 percent clay; strong medium subangular blocky structure; hard, firm, very sticky, very plastic; common very fine roots; common very fine tubular pores; many continuous distinct clay films on faces of peds; 35 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.6; abrupt wavy boundary.

Cr—11 to 60 inches (28 to 152 cm) weathered andesite bedrock.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 40 to 60 percent

A horizon
Hue: 7.5YR, 5YR
Value: 2 to 4, dry or moist
Chroma: 2 to 4, dry or moist
Texture: loam, sandy loam

Bt horizon
Hue: 5YR
Value: 3 or 4, dry or moist
Chroma: 2 to 4 dry, 1 to 4 moist
Texture: clay

Cr horizon
Andesite bedrock

Schrap soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic, shallow Ustic Torriorthents
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from andesite
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 20 percent
woody debris: 0 percent
bare soil: 0 percent
rock fragments
gravel: 30 percent
cobble: 20 percent
stone: 20 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 19.98 inches per hour (0.00 to 141.00 micrometers per second)
Available water capacity total inches: 0.4 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R041XC330AZ
Present vegetation: broom snakeweed, cane beardgrass, Lehmann lovegrass, mesquite, sideoats grama, sprucetop grama
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Greasewood Mountain; about 2,435 feet south and 750 feet west of the northeast corner of Section 26, Township 11S, Range 24 E.
Geographic Coordinate System: 32° 26’ 58.70’’ north, 109° 51’ 41.90’’ west

A1—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/4), moist; 15 percent clay; weak thin platy parting to moderate fine and medium granular structure; soft, very friable, nonsticky, nonplastic; common very fine roots; many very fine pores; 45 percent gravel and 10 percent cobble; noneffervescent; moderately acid, pH 6.0; clear wavy boundary.

A2—1 inch to 5 inches (3 to 13 cm); brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 3/4), moist; 22 percent clay; massive; soft, very friable, nonsticky, nonplastic;

common very fine roots; many very fine pores; 45 percent gravel and 10 percent cobble; noneffervescent; slightly acid, pH 6.4; abrupt wavy boundary.

Cr—5 to 60 inches (13 to 152 cm) weathered andesite bedrock.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in the control section: 18 to 26 percent

A horizon
- Hue: 7.5YR
- Value: 4 or 5 dry, 2 or 3 moist
- Chroma: 2 to 4, dry or moist
- Texture: loam

Cr horizon
- Andesite bedrock

Rock outcrop
Rock outcrop consists of barren rock that occurs as outcroppings of andesite. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near the summits.

19—Eloma-Eskiminzin-Cammerman-Holguin complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): Eloma soils are on fan terraces; Eskiminzin, Cammerman and Holguin soils are on pediments
*Elevation:*3,340 to 4,880 feet (1,018 to 1,487 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Eloma and similar soils: 30 percent
Eskiminzin and similar soils: 15 percent
Cammerman and similar soils: 12 percent
Holguin and similar soils: 10 percent

Minor components: Andrada, Lampshire, Pantak, Saddlebrook, Tombstone. Other minor components include loamy calcareous soils with a lithic contact.

Soil Properties and Qualities

Eloma soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Ustic Haplargids
Geomorphic position: generally on backslopes and toeslopes
Parent material: mixed fan alluvium
Slope: 5 to 60 percent
Surface cover:
- Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:35 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 75 percent
cobble: 10 percent

Drainage class: well drained
Ksat solum: 0.06 to 39.69 inches per hour (0.42 to 280.00 micrometers per second)
Available water capacity total inches: 3.5 (low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: C
Ecological site name: Clayey Slopes 12-16” p.z.
Ecological site number: R038XA108AZ
Present vegetation: aster, burroweed, curly mesquite, hairy grama, mesquite, sideoats grama, spidergrass, western ragweed, whitethorn
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Klondyke; about 1,700 feet south and 795 feet east of the northwest corner of Section 9, Township 8 S, Range 20 E.

Geographic Coordinate System: 32° 45’ 21.80’’ north, 110° 18’ 49.70’’ west

A—0 to 1 inches (0 to 3 cm); brown (7.5YR 4/2) very gravelly sandy loam, dark brown (7.5YR 3/2), moist; 12 percent clay; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine interstitial pores; 45 percent gravel; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt1—1 inch to 12 inches (3 to 30 cm); dark reddish brown (5YR 3/3) gravelly clay, dark reddish brown (5YR 3/2), moist; 58 percent clay; strong fine and medium angular blocky structure; extremely hard, extremely firm, very sticky, very plastic; many very fine and fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 20 percent gravel and 10 percent cobble; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt2—12 to 30 inches (30 to 76 cm); reddish brown (5YR 4/3) very gravelly clay, dark reddish brown (5YR 3/3), moist; 45 percent clay; strong very fine and fine angular blocky structure; hard, firm, very sticky, very plastic; few very fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 45 percent gravel; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

2Bt—30 to 60 inches (76 to 125 cm); reddish brown (5YR 4/4) extremely gravelly loamy coarse sand, dark reddish brown (5YR 3/4), moist; 5 percent clay; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; many very fine interstitial pores; common continuous distinct clay films on faces of peds and rock fragments; 55 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.8.

Range in Characteristics

Rock fragments: more than 35 percent gravels and cobbles in control section
Reaction: 6.1 to 7.8 (slightly acid to slightly alkaline)
Average percent clay in the control section: greater than 35 percent

A horizon
- Hue: 7.5YR
- Value: 4 dry, 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: sandy loam, loam, clay loam

Bt horizons
- Hue: 5YR
- Value: 3 to 6 dry, 2 to 4 moist
- Chroma: 2 to 4 dry, 2 to 6 moist
- Texture: clay, clay loam

Eskiminzin soils
Taxonomic classification: Clayey-skeletal, smectitic, thermic Lithic Ustic Haplargids
Geomorphic position: generally on summits and backslopes
Parent material: mixed fan alluvium
Slope: 5 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:30 percent
  - woody debris: 0 percent
  - bare soil: 15 percent
- rock fragments
  - gravel: 40 percent
  - cobble: 20 percent
  - stone: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 1.2 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R038XA117AZ
Present vegetation: aster, catclaw, mesquite, needle grama, nightshade, pigweed, pricklypear, red brome, spidergrass, western ragweed
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 1,825 feet south and 1,940 feet west of the northeast corner of Section 33, Township 7 S, Range 20 E.
Geographic Coordinate System: 32° 47’ 5.20’’ north, 110° 18’ 17.70’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2), moist; 26 percent clay; weak thin platy parting to weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine tubular and interstitial pores; 20 percent gravel and 5 percent cobble; noneffervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bt—2 to 14 inches (5 to 36 cm); dark reddish brown (5YR 3/3) very gravelly clay, dark reddish brown (5YR 3/3), moist; 50 percent clay; weak fine and medium angular blocky structure; extremely hard, firm, very sticky, very plastic; many very fine and fine and few coarse roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 30 percent gravel and 15 percent cobble; noneffervescent; slightly acid, pH 6.2; abrupt smooth boundary.

R—14 to 60 inches (36 to 152 cm); unweathered conglomerate bedrock.

Range in Characteristics

Rock fragments: more than 35 percent gravels and cobbles in control section
Reaction: 6.1 to 7.8 (slightly acid to slightly alkaline)
Average percent clay in the control section: greater than 35 percent

A horizon
- Hue: 7.5YR
- Value: 4 dry, 3 moist
- Chroma: 2, dry or moist
- Texture: loam, clay loam

Bt horizons
- Hue: 5YR
- Value: 3 or 4 dry, 2 or 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: clay

R horizon
- Conglomerate bedrock

Cammerman soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Ustic Paleargids
Geomorphic position: generally on summits and backslopes
Parent material: mixed fan alluvium
Slope: 5 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:30 percent
  - woody debris: 5 percent

bare soil: 5 percent
rock fragments
gravel: 65 percent
cobble: 10 percent
stone: 5 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 2.4 (very low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R038XA117AZ
Present vegetation: aster, banana yucca, beargrass, curly mesquite, green sprangletop, hairy grama, mesquite, pinyon pine, pricklypear, sideoats grama, snakeweed, spidergrass, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 350 feet south and 1,765 feet east of the northwest corner of Section 4, Township 8 S, Range 20 E.
Geographic Coordinate System: 32° 46’ 27.30’’ north, 110° 18’ 38.50’’ west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/2) gravelly sandy loam, dark brown (7.5YR 3/2), moist; 16 percent clay; weak very fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular and interstitial pores; 20 percent gravel; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt1—1 inch to 13 inches (3 to 33 cm); dark reddish brown (5YR 3/3) gravelly clay, dark reddish brown (5YR 3/2), moist; 50 percent clay; strong fine and medium angular blocky structure; extremely hard, extremely firm, very sticky, very plastic; many very fine roots; many very fine tubular and interstitial pores; many continuous distinct clay films on faces of peds and rock fragments; 15 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

Bt2—13 to 25 inches (33 to 64 cm); reddish brown (5YR 4/4) extremely gravelly clay loam, dark reddish brown (5YR 3/4), moist; 36 percent clay; strong very fine and fine angular blocky structure; hard, firm, very sticky, very plastic; few very fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 45 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.6; abrupt wavy boundary.

R—25 to 60 inches (64 to 152 cm); unweathered conglomerate bedrock.

Range in Characteristics

Rock fragments: more than 35 percent gravels and cobbles in control section
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: greater than 35 percent

A horizon
Hue: 7.5YR

Value: 4 dry, 2 or 3 moist
Chroma: 2 or 3, dry or moist
Texture: sandy loam, loam, clay loam

Bt horizons
Hue: 5YR
Value: 3 or 4 dry, 2 or 3 moist
Chroma: 2 to 4, dry or moist
Texture: clay, clay loam

R horizon
Conglomerate bedrock

Holguin soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, thermic Lithic Ustic Torriorthents
Geomorphic position: generally on summits and toeslopes
Parent material: slope alluvium and/or residuum weathered from conglomerate
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:30 percent
woody debris: 0 percent
bare soil: 60 percent
rock fragments
gravel: 25 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.8 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limy Slopes 12-16” p.z.
Ecological site number: R038XA126AZ
Present vegetation: black grama, bush muhly, juniper, sideoats grama, sotol, spicebush, whitethorn acacia, yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 615 feet north and 1,375 feet east of the southwest corner of Section 30, Township 7 S, Range 20 E.
Geographic Coordinate System: 32° 47’ 29.90’’ north, 110° 20’ 43.20’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 10 percent clay; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine roots; many very fine interstitial pores; 35 percent gravel; slightly effervescent, 2 percent Calcium carbonate equivalent; neutral, pH 7.0; clear smooth boundary.

Ck—2 to 12 inches (5 to 30 cm); brown (7.5YR 4/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel; strongly effervescent, 2 percent Calcium carbonate equivalent; slightly alkaline, pH 7.4; abrupt smooth boundary.

R—12 to 60 inches (30 to 152 cm); unweathered conglomerate bedrock.

Range in Characteristics

Rock fragments: more than 35 percent gravels and cobbles in control section
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 7 to 18 percent
Calcium carbonate equivalent: less than 5 percent

A horizon
- Hue: 7.5YR
- Value: 4 dry, 3 moist
- Chroma: 2, dry or moist
- Texture: loam, clay loam

Ck horizon
- Hue: 5YR
- Value: 3 or 4 dry, 2 or 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: sandy loam

R horizon
- Conglomerate bedrock

20—Eloma-Kimrose-Saddlebrook complex, 1 to 60 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,160 to 4,910 feet (963 to 1,497 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Kimrose and similar soils: 30 percent
Eloma and similar soils: 45 percent
Saddlebrook and similar soils: 5 percent

Minor components: Hooks, Pedregosa, Riverwash, Tombstone, White House. Other minor components include soils that are fine with a calcic horizon below 20 inches,

soils with less than 35 percent rock fragments and a petrocalcic horizon above 20 inches.

Soil Properties and Qualities

Eloma soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Ustic Haplargids
Geomorphic position: generally on backslopes and toeslopes
Parent material: mixed fan alluvium
Slope: 1 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 30 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 50 percent
cobble: 30 percent
stone: 15 percent
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 2.5 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: C
Ecological site name: Clayey Slopes 12-16” p.z.
Ecological site number: R041XC303AZ
Present vegetation: bladderpod, catclaw, mesquite, paloverde, sideoats grama, tasajillo
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Redington; about 360 feet north and 975 feet west of the southeast corner of Section 15, Township 11 S, Range 19 E.
Geographic Coordinate System: 32° 28’ 19.60’’ north, 110° 23’ 11.40’’ west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/3) very gravelly clay loam, very dark brown (7.5YR 2.5/3), moist; 38 percent clay; weak fine granular parting to moderate very fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine interstitial and tubular pores; 40 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt1—2 to 22 inches (5 to 56 cm); dark reddish brown (5YR 3/3) extremely gravelly clay, dark reddish brown (5YR 3/3), moist; 55 percent clay; strong very fine and fine subangular blocky structure; slightly hard, friable, very sticky, very plastic; many very fine and fine and few medium roots; many very fine tubular pores; few continuous

distinct clay films on faces of peds and rock fragments; 50 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.8; abrupt smooth boundary.

Bt2—22 to 47 inches (56 to 119 cm); reddish brown (5YR 4/4) extremely gravelly clay, dark reddish brown (5YR 3/4), moist; 45 percent clay; strong very fine subangular blocky structure; slightly hard, friable, very sticky, very plastic; common very fine roots; many very fine tubular pores; few continuous distinct clay films on faces of peds and rock fragments; 70 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

Btk—47 to 60 inches (119 to 152 cm); yellowish red (5YR 4/6) extremely gravelly clay loam, reddish brown (5YR 4/4), moist; 35 percent clay; massive; soft, friable, moderately sticky, very plastic; common very fine roots; many very fine interstitial pores; very few continuous distinct clay films on rock fragments and few continuous distinct carbonate coats on rock fragments; 75 percent gravel and 10 percent cobble; strongly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Rock fragments: 35 to 90 percent gravel and cobbles
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 35 to 60 percent

A horizon
- Hue: 7.5YR, 5YR
- Value: 3 or 4 dry, 2.5 or 3 moist
- Chroma: 2 or 3 dry, 2 or 3 moist
- Texture: loam, clay loam, sandy loam

Bt horizon
- Hue: 7.5YR, 5YR
- Value: 3 to 5 dry, 2.5 to 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: clay, clay loam, sandy clay

Btk horizon
- Hue: 7.5YR, 5YR
- Value: 3 to 5 dry, 2.5 to 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: clay, clay loam, sandy clay

Kimrose soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids
Geomorphic position: generally on summits and backslopes
Parent material: mixed fan alluvium
Slope: 1 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 20 percent
  - woody debris: 5 percent

bare soil: 5 percent
rock fragments
gravel: 80 percent
cobble: 5 percent
Depth to restrictive feature(s): 5 to 20 inches to petrocalcic
Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.4 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limy Upland 12-16” p.z.
Ecological site number: R041XC309AZ
Present vegetation: catclaw, creosote bush, ocotillo, paperflower, pricklypear, red brome, soaptree yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Redington; about 2,275 feet north and 1,350 feet east of the southwest corner of Section 27, Township 11 S, Range 19 E.
Geographic Coordinate System: 32° 26’ 54.00’’ north, 110° 23’ 45.90’’ west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/3) very gravelly loam, very dark brown (7.5YR 2.5/3), moist; 22 percent clay; weak fine granular structure; soft, very friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine interstitial pores; 45 percent gravel and 10 percent cobble; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk1—2 to 7 inches (5 to 18 cm); dark brown (7.5YR 3/3) very gravelly clay loam, very dark brown (7.5YR 2.5/3), moist; 27 percent clay; moderate very fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine tubular pores; few continuous distinct carbonate coats on rock fragments; 45 percent gravel and 10 percent cobble; strongly effervescent, 15 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Bk2—7 to 16 inches (18 to 41 cm); brown (7.5YR 4/3) very gravelly clay loam, dark brown (7.5YR 3/3), moist; 30 percent clay; moderate very fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; many very fine and fine roots; common very fine tubular pores; few continuous distinct carbonate coats on rock fragments; 35 percent gravel and 20 percent cobble; violently effervescent, 22 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Bkkm—16 to 60 inches (41 to 152 cm); violently effervescent; cemented material, indurated petrocalcic.

Range in Characteristics

Rock fragments: 35 to 80 percent gravel and cobbles
Reaction: 7.4 to 9.0 (slightly to strongly alkaline)
Average percent clay in the control section: 18 to 35 percent
Depth to petrocalcic horizon: 7 to 20 inches

Calcium carbonate equivalent: 5 to 25 percent

A horizon
Hue: 7.5YR
Value: 3 to 5 dry, 2.5 to 4 moist
Chroma: 2 or 3 dry, 1 to 3 moist
Texture: loam, clay loam, sandy loam

Bk horizon
Hue: 7.5YR
Value: 3 to 5 dry, 2.5 to 4 moist
Chroma: 2 or 3 dry, 2 or 3 moist
Texture: clay, clay loam

Bkkm horizon
Cemented: calcium carbonate and silica
Hardness: extremely hard to indurated
Thickness: 3 to 5 feet; continuous

Saddlebrook soils
Taxonomic classification: Clayey, mixed, superactive, thermic, shallow Ustalfic Petrocalcids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 1 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 20 percent
woody debris: 0 percent
bare soil: 55 percent
rock fragments
gravel: 25 percent
Depth to restrictive feature(s): 5 to 20 inches to petrocalcic
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 2.5 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Clay Loam Upland 12-16” p.z.
Ecological site number: R041XC305AZ
Present vegetation: wolfberry, broom snakeweed, burroweed, cactus, cholla, mesquite, peppergrass, redstem filaree, soaptree yucca, tasajillo, Tobias grass, whitethorn
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Redington; about 1,950 feet north and 2,000 feet east of the southwest corner of Section 26, Township 11 S, Range 19 E.

Geographic Coordinate System: 32° 26’ 50.90’’ north, 110° 22’ 18.20’’ west

A—0 to 1 inch (0 to 3 cm); strong brown (7.5YR 4/6) clay loam, dark brown (7.5YR 3/4), moist; 29 percent clay; weak thin platy parting to weak fine granular structure; soft, very firm, moderately sticky, moderately plastic; many very fine roots; many very fine interstitial and vesicular pores; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bt—1 inch to 6 inches (3 to 15 cm); reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/4), moist; 36 percent clay; moderate very fine and fine subangular blocky structure; soft, very friable, very sticky, very plastic; many very fine and few medium roots; many very fine tubular pores; very few continuous distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Btk—6 to 16 inches (15 to 41 cm); reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4), moist; 42 percent clay; strong fine and medium subangular blocky structure; slightly hard, friable, very sticky, very plastic; common very fine roots; many very fine tubular pores; few continuous distinct clay films on faces of peds and rock fragments; few continuous distinct carbonate coats on rock fragments; 10 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Bkkm—16 to 60 inches (41 to 152 cm); violently effervescent; cemented material, indurated petrocalcic.

Range in Characteristics

Rock fragments: less than 35 percent gravel and cobbles in control section
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 35 to 60 percent
Depth to petrocalcic horizon: 8 to 20 inches

A horizon
- Hue: 7.5YR, 5YR
- Value: 3 to 5 dry, 2.5 to 4 moist
- Chroma: 2 to 6 dry, 1 to 4 moist
- Texture: loam, clay loam, sandy loam

Bt horizon
- Hue: 7.5YR, 5YR, 2.5 YR
- Value: 2.5 to 4 dry, 2.5 to 4 moist
- Chroma: 2 to 4 dry, 1 to 4 moist
- Texture: clay, clay loam

Btk horizon
- Hue: 7.5YR, 5YR, 2.5 YR
- Value: 2.5 to 4 dry, 2.5 to 4 moist
- Chroma: 2 to 4 dry, 1 to 4 moist
- Texture: clay, clay loam
- Calcium carbonate equivalent: 0 to 15 percent

Bkkm horizon
- Cemented: calcium carbonate and silica
- Hardness: extremely hard to indurated
- Thickness: 3 to 5 feet; continuous

21—Eloma-Tombstone-White House complex, 3 to 50 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,360 to 5,540 feet (1,024 to 1,689 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Eloma and similar soils: 40 percent
Tombstone and similar soils: 30 percent
White House and similar soils: 20 percent

Minor components: Altar, Bodecker, Caralampi

Soil Properties and Qualities

Eloma soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Ustic Haplargids
Geomorphic position: generally on backslopes
Parent material: mixed fan alluvium
Slope: 3 to 50 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:25 percent
  - woody debris: 15 percent
  - bare soil: 15 percent
- rock fragments
  - gravel: 25 percent
  - cobble: 10 percent
  - stone: 10 percent

Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 4.6 (low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: high
Hydrologic group: C
Ecological site name: Clayey Slopes 12-16” p.z.
Ecological site number: R041XC303AZ
Present vegetation: cactus, catclaw acacia, mesquite
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Blue Jay Peak; about 475 feet north and 995 feet east of the southwest corner of Section 20, Township 8 S, Range 22 E.
Geographic Coordinate System: 32° 43’ 4.90’’ north, 110° 7’ 29.30’’ west

A—0 to 4 inches (0 to 10 cm); dark reddish gray (5YR 4/2) very gravelly clay loam, dark reddish brown (5YR 3/2), moist; 34 percent clay; weak fine granular structure; slightly hard, very friable, moderately sticky, moderately plastic; many fine roots; many fine vesicular pores; 45 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt1—4 to 18 inches (10 to 46 cm); reddish brown (5YR 4/4) very gravelly clay, dark reddish brown (5YR 3/4), moist; 50 percent clay; moderate fine and medium angular blocky structure; moderately hard, friable, very sticky, very plastic; many fine roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 50 percent gravel; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt2—18 to 34 inches (46 to 86 cm); reddish brown (5YR 5/4) very gravelly clay, reddish brown (5YR 4/4), moist; 50 percent clay; moderate fine and medium angular blocky structure; moderately hard, friable, very sticky, very plastic; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 50 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt3—34 to 60 inches (86 to 152 cm); reddish brown (5YR 5/4) very gravelly clay, reddish brown (5YR 4/4), moist; 50 percent clay; moderate fine and medium angular blocky structure; moderately hard, friable, very sticky, very plastic; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 55 percent gravel; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Rock fragments: 35 to 80 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 35 to 60 percent
Calcium carbonate equivalent: 0 to 15 percent

A horizon
- Hue: 5YR or 7.5YR
- Value: 3 to 5, dry or moist
- Chroma: 2 to 4, dry or moist
- Texture: clay loam

Bt horizons
- Hue: 2.5YR, 5YR
- Value: 3 to 5, dry or moist
- Chroma: 2 to 6, dry or moist
- Texture: clay, sandy clay, clay loam

Tombstone soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Ustic Haplocalcids
Geomorphic position: generally on backslopes
Parent material: mixed fan alluvium
Slope: 3 to 50 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent

lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:15 percent
woody debris: 10 percent
bare soil: 40 percent
rock fragments
gravel: 30 percent
cobble: 10 percent
stone: 3 percent

Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Available water capacity total inches: 3.7 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Limy Slopes 12-16” p.z.
Ecological site number: R041XC308AZ
Present vegetation: cactus, catclaw acacia, mesquite
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Eureka Ranch; about 1,005 feet north and 2,500 feet west of the southeast corner of Section 8, Township 8 S, Range 21 E.

Geographic Coordinate System: 32° 44’ 55.90’’ north, 110° 13’ 6.60’’ west

A—0 to 4 inches (0 to 10 cm); dark brown (7.5YR 3/2) very gravelly loam, very dark brown (7.5YR 2/2), moist; 25 percent clay; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine roots; many fine vesicular pores; 40 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bk—4 to 15 inches (10 to 38 cm); brown (7.5YR 4/2) very gravelly loam, dark brown (7.5YR 3/2), moist; 25 percent clay; moderate fine and medium angular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many fine roots; many fine tubular pores; 40 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Bk1—15 to 32 inches (38 to 81 cm); brown (7.5YR 5/4) very gravelly sandy loam, brown (7.5YR 4/4), moist; 12 percent clay; moderate fine and medium angular blocky structure; slightly hard, very friable, nonsticky, nonplastic; many fine tubular pores; 55 percent gravel; strongly effervescent, 12 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bk2—32 to 60 inches (81 to 152 cm); light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4), moist; 12 percent clay; massive; slightly hard, very friable, nonsticky, nonplastic; many fine tubular pores; 55 percent gravel; violently effervescent, 14 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2.

Range in Characteristics

Rock fragments: 35 to 70 percent
Reaction: 7.9 to 8.4 (moderately alkaline)

Average percent clay in the control section: 7 to 18 percent

A horizon
Hue: 7.5YR
Value: 3 or 4 dry, 2 to 4 moist
Chroma: 2 or 3, dry or moist
Texture: loam

Bk horizons
Hue: 7.5YR or 5YR
Value: 4 to 8 dry, 3 to 7 moist
Chroma: 2 to 4, dry or moist
Texture: sandy loam, loam
Calcium carbonate equivalent: 5 to 15 percent

White House soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Haplargids
Geomorphic position: generally on summits and backslopes
Parent material: mixed fan alluvium
Slope: 3 to 50 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:30 percent
woody debris: 10 percent
bare soil: 5 percent
rock fragments
gravel: 60 percent
cobble: 30 percent
stone: 1 percent
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 6.7 (moderate)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: high
Hydrologic group: C
Ecological site name: Clayey Slopes 12-16” p.z.
Ecological site number: R041XC303AZ
Present vegetation: cactus, catclaw acacia, mesquite
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Cobre Grande Mountain; about 1,330 feet north and 1,930 feet west of the southeast corner of Section 11, Township 6 S, Range 19 E.
Geographic Coordinate System: 32° 55’ 25.60’’ north, 110° 22’ 25.60’’ west

A—0 to 1 inch (0 to 3 cm); reddish brown (2.5YR 5/3) very gravelly sandy clay loam, dark reddish brown (2.5YR 3/3), moist; 22 percent clay; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many fine roots; many fine vesicular pores; 30 percent gravel and 15 percent cobble; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Bt1—1 inch to 6 inches (3 to 15 cm); reddish brown (2.5YR 4/4) gravelly clay, dark red (2.5YR 3/6), moist; 50 percent clay; moderate fine and medium angular blocky structure; moderately hard, firm, very sticky, very plastic; many fine roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 15 percent gravel and 2 percent cobble; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

Bt2—6 to 18 inches (15 to 46 cm); red (2.5YR 5/6) gravelly clay, red (2.5YR 4/6), moist; 55 percent clay; moderate fine and medium angular blocky structure; very hard, very firm, very sticky, very plastic; many fine and medium roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 15 percent gravel; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt3—18 to 32 inches (46 to 81 cm); red (2.5YR 5/6) gravelly clay, red (2.5YR 4/6), moist; 50 percent clay; moderate fine and medium angular blocky structure; very hard, very firm, very sticky, very plastic; many medium and coarse roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 15 percent gravel and 5 percent cobble; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

Bt4—32 to 60 inches (81 to 152 cm); red (2.5YR 5/6) very cobbly clay, red (2.5YR 4/6), moist; 45 percent clay; moderate fine and medium angular blocky structure; hard, firm, moderately sticky, moderately plastic; many medium and coarse roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 20 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.6.

Range in Characteristics

Rock fragments: 10 to 35 percent
Reaction: 6.1 to 7.8 (slightly acid to slightly alkaline)
Average percent clay in the control section: 35 to 60 percent

A horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 3 to 5, dry or moist
- Chroma: 2 to 3 dry, 2 to 6 moist
- Texture: clay loam, sandy clay loam, loam, sandy loam

Bt horizons
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 3 to 5, dry or moist
- Chroma: 2 to 6, dry or moist
- Texture: clay, sandy clay loam, clay loam

22—Eskiminzin-Rock outcrop-Sontag complex, tuff, 5 to 45 percent slopes

Map Unit Setting

Landform(s): hills
*Elevation:*3,660 to 4,400 feet (1,116 to 1,341 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)

Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Eskiminzin and similar soils: 35 percent
Rock outcrop, tuff: 30 percent
Sontag and similar soils: 20 percent

Minor components: Lampshire, Pantak, Riverwash. Other minor components include very deep soils containing greater than 35 percent clay and rock fragments, clayey-skeletal and very deep soils, loamy-skeletal soils shallow and very shallow to bedrock.

Soil Properties and Qualities

Eskiminzin soils
Taxonomic classification: Clayey-skeletal, smectitic, thermic Lithic Ustic Haplargids
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from welded tuff
Slope: 5 to 45 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:50 percent
  - woody debris: 5 percent
  - bare soil: 5 percent
- rock fragments
  - gravel: 30 percent
  - cobble: 20 percent
  - stone: 10 percent

Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R041XC330AZ
Present vegetation: Eriastrum, annual grasses, shrubby buckwheat, curly mesquite, sideoats grama, snakeweed, catclaw acacia, mesquite, pricklypear, sacahuista, oneseed juniper, banana yucca
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Booger Canyon; about 1,400 feet east and 1,000 feet south of the northwest corner of Section 2, Township 6 S, Range 18 E.

Geographic Coordinate System: 32° 56’ 47.00’’ north, 110° 28’ 42.00’’ west

A—0 to 4 inches (0 to 10 cm); brown (10YR 4/3) very gravelly sandy clay loam, very dark grayish brown (10YR 3/2), moist; 21 percent clay; moderate fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common fine roots; common fine tubular pores; 40 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

Bt—4 to 14 inches (10 to 36 cm); brown (10YR 4/3) very gravelly clay, very dark grayish brown (10YR 3/2), moist; 40 percent clay; strong fine and medium subangular blocky structure; hard, firm, very sticky, very plastic; common very fine roots; few fine tubular pores; common continuous distinct clay films on faces of peds and rock fragments; 40 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.0; abrupt wavy boundary.

R—14 to 60 inches (36 to 152 cm); unweathered tuff bedrock.

Range in Characteristics

Rock fragments: 35 to 65 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 35 to 55 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 3 to 5 dry, 2 to 4 moist
- Chroma: 3 or 4 dry, 2 or 3 moist
- Texture: loam, sandy clay loam, clay loam, sandy loam

Bt horizon
- Hue: 10YR, 7.5YR
- Value: 3 or 4 dry, 2 or 3 moist
- Chroma: 2 to 4 dry, 2 or 3 moist
- Texture: clay loam, clay

R horizon
- Welded tuff bedrock

Rock outcrop

Rock outcrop consists of barren rock that occurs as ledges and shelves of welded tuff and volcanic breccia. Rock outcrop also includes areas where the depth to bedrock is less than four inches.

Sontag soils

Taxonomic classification: Fine, smectitic, thermic Ustertic Haplargids
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from welded tuff
Slope: 5 to 25 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust

salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:70 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 25 percent
cobble: 20 percent
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Available water capacity total inches: 8.7 (high)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Clayey Slopes 12-16” p.z.
Ecological site number: R041XC303AZ
Present vegetation: little barley, Eriastrum, curly mesquite, mesquite, oneseed juniper, sacahuista, threeawn, sideoats grama, catclaw acacia, pricklypear, yerba de pasmo
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Booger Canyon; about 500 feet east and100 feet south of the northwest corner of Section 2, Township 6 S, Range 18 E.
Geographic Coordinate System: 32° 56’ 52.00’’ north, 110° 28’ 53.00’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) sandy clay loam, very dark brown (7.5YR 2.5/3), moist; 33 percent clay; moderate fine and medium granular structure; soft, very friable, nonsticky, slightly plastic; many very fine roots; few fine irregular pores; common distinct organic stains on faces of peds; 10 percent gravel; noneffervescent; neutral, pH 6.8; abrupt smooth boundary.

Bt1—2 to 21 inches (5 to 53 cm); dark brown (7.5YR 3/3) clay, very dark brown (7.5YR 2.5/3), moist; 55 percent clay; strong medium wedge parting to strong fine and medium angular blocky structure; hard, firm, very sticky, very plastic; common fine and few medium roots; common fine tubular pores; common continuous distinct clay films on faces of peds; common pressure faces; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.4; clear smooth boundary.

Bt2—21 to 39 inches (53 to 99 cm); dark brown (7.5YR 3/3) clay, very dark brown (7.5YR 2.5/3), moist; 51 percent clay; moderate medium wedge parting to strong fine and medium angular blocky structure; hard, firm, very sticky, very plastic; common fine and medium roots; common fine tubular pores; common continuous distinct clay films on faces of peds; common pressure faces; 10 percent gravel; slightly effervescent; slightly alkaline, pH 7.4; clear smooth boundary.

Btk—39 to 48 inches (99 to 122 cm); dark brown (7.5YR 3/3) gravelly clay, very dark brown (7.5YR 2.5/3), moist; 53 percent clay; strong fine and medium angular blocky structure; hard, firm, very sticky, very plastic; common fine roots; common fine tubular pores; common continuous distinct clay films on faces of peds and rock fragments; few continuous distinct carbonate coats on rock fragments; 20 percent gravel and 5 percent cobble; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bt'—48 to 60 inches (122 to 152 cm); dark brown (7.5YR 3/3) clay, very dark brown (7.5YR 2.5/3), moist; 45 percent clay; strong fine and medium angular blocky structure; hard, firm, very sticky, very plastic; few fine roots; common fine tubular pores; common continuous distinct clay films on faces of peds and rock fragments; 10 percent gravel; slightly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Soil cracks: many vertical cracks 0.5 inch to 2 inches wide from the surface to a depth of 30 inches or more
Rock fragments: 0 to 25 percent
Reaction: 6.6 to 8.4 (neutral to moderately alkaline)
Average percent clay in the control section: 40 to 60 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 3 or 4 dry, 2 or 3 moist
- Chroma: 2 or 3 dry, 1 to 3 moist
- Texture: loam, sandy clay loam, clay loam

Bt and Btk horizons
- Hue: 10YR, 7.5YR
- Value: 3 or 4 dry, 2 or 3 moist
- Chroma: 2 or 3 dry, 1 to 3 moist
- Texture: clay loam, clay

23—Graham-Lampshire-Rock outcrop complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): mountains
*Elevation:*3,030 to 4,670 feet (924 to 1,423 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Graham and similar soils: 40 percent
Lampshire and similar soils: 30 percent
Rock outcrop, welded tuff, andesite, and rhyolite: 20 percent

Minor components: Bodecker, Riverwash

Soil Properties and Qualities

Graham soils
Taxonomic classification: Clayey, smectitic, thermic Lithic Ustic Haplargids
Geomorphic position: generally on backslopes
Parent material: slope alluvium derived from welded tuff
Slope: 5 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent

lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:50 percent
woody debris: 0 percent
bare soil: 35 percent
rock fragments
gravel: 55 percent
cobble: 10 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 1.9 (very low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R041XC330AZ
Present vegetation: sideoats grama, cane beardgrass, perennial forbs, green sprangletop, other annual forbs, mimosa, mintbush lippia, snakeweed, tanglehead, mesquite
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Cherry Springs Peak; about 2,100 feet west and 2,000 feet south of the northeast corner of Section 16, Township 12 S, Range 20 E.

Geographic Coordinate System: 32° 23’ 31.40’’ north, 110° 18’ 33.30’’ west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/2) gravelly sandy clay loam, very dark brown (7.5YR 2.5/2), moist; 28 percent clay; moderate very fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine tubular pores; 20 percent gravel and 5 percent cobble; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt1—1 inch to 9 inches (3 to 23 cm); dark brown (7.5YR 3/2) clay, very dark brown (7.5YR 2.5/2), moist; 55 percent clay; strong fine and medium angular blocky structure; very hard, very firm, very sticky, very plastic; common very fine and few medium roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Bt2—9 to 14 inches (23 to 36 cm); dark brown (7.5YR 3/2) clay, dark brown (7.5YR 3/2), moist; 50 percent clay; strong fine and medium subangular blocky structure; very hard, very firm, very sticky, very plastic; common very fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

R—14 to 60 inches (36 to 152 cm); unweathered welded tuff bedrock.

Range in Characteristics

Cracks: many vertical cracks 0.25 to 0.5 inch wide from surface to 10 inches
Rock fragments: 5 to 35 percent
Reaction: 6.1 to 7.8 (slightly acid to slightly alkaline)
Average percent clay in the control section: 40 to 60 percent

A horizon
- Hue: 7.5YR
- Value: 2 to 4, dry or moist
- Chroma: 2 or 3, dry or moist
- Texture: loam, sandy clay loam
- Reaction: 6.1 to 6.5 (slightly acid)

Bt horizons
- Hue: 5YR, 7.5YR
- Value: 2.5 to 4, dry or moist
- Chroma: 1 to 3, dry or moist
- Texture: clay, clay loam
- Reaction: 6.6 to 7.8 (neutral to slightly alkaline)

Lampshire soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic Lithic Ustic Torriorthents
Geomorphic position: generally on backslopes
Parent material: slope alluvium derived from rhyolite and/or slope alluvium derived from andesite
Slope: 5 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:10 percent
  - woody debris: 0 percent
  - bare soil: 15 percent
- rock fragments
  - gravel: 65 percent
  - cobble: 10 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.6 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Loamy 12-16” p.z.
Ecological site number: R041XC323AZ

Present vegetation: sideoats grama, hairy grama, annual grasses, black grama, false mesquite, snakeweed, cane beardgrass, oneseed juniper, other annual forbs, perennial forbs, plains lovegrass, tanglehead
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Cherry Spring Peak; about 2,100 feet west and 2,300 feet south of the northeast corner of Section 16, Township 12 S, Range 20 E.
Geographic Coordinate System: 32° 23’ 28.20’’ north, 110° 18’ 32.60’’ west

A1—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/2) very gravelly sandy loam, dark brown (7.5YR 3/2), moist; 13 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine irregular pores; 55 percent gravel; noneffervescent; neutral, pH 6.8; abrupt smooth boundary.

A2—1 inch to 10 inches (3 to 25 cm); brown (7.5YR 4/2) very gravelly sandy loam, dark brown (7.5YR 3/2), moist; 17 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine irregular pores; 50 percent gravel; noneffervescent; neutral, pH 6.8; abrupt wavy boundary.

R—10 to 60 inches (25 to 152 cm); unweathered andesite/ rhyolite bedrock.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in the control section: 10 to 20 percent

A horizon
Hue: 7.5YR, 10YR
Value: 4 or 5 dry, 2 to 4 moist
Chroma: 2 or 3, dry or moist
Texture: loam, sandy loam

Rock outcrop
Rock outcrop consists of barren rock that occurs as ledges, massive boulder piles, and nearly vertical cliffs of andesite, rhyolite, and welded tuff. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near summits.

24—Graham-Paramore-Rock outcrop complex, 5 to 50 percent slopes

Map Unit Setting

Landform(s): mountains
*Elevation:*3,940 to 5,340 feet (1,201 to 1,628 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)
Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)
Frost-free period: 170 to 220 days
Major Land Resource Area: 38–Mogollon Transition
Land Resource Unit: 38–1 Lower Interior Chaparral

Map Unit Composition

Graham and similar soils: 60 percent
Paramore and similar soils: 25 percent
Rock outcrop, rhyolite: 15 percent

Minor components: Deloro. Other minor components include deep soils to bedrock, loamy-skeletal soils shallow to bedrock.

Soil Properties and Qualities

Graham soils
Taxonomic classification: Clayey, smectitic, thermic Lithic Ustic Haplargids
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium over residuum weathered from basalt
Slope: 5 to 50 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 20 percent
woody debris: 10 percent
bare soil: 10 percent
rock fragments
gravel: 50 percent
cobble: 10 percent
stone: 3 percent
Depth to restrictive feature(s): 10 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.7 (very low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R041XC330AZ
Present vegetation: agave, burroweed, catclaw, juniper, mesquite, oak, whitethorn
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Buford Hill; about 1,880 feet south and 1,325 feet west of the northeast corner of Section 12, Township 8 S, Range 21 E.
Geographic Coordinate System: 32° 45’ 17.70’’ north, 110° 8’ 59.30’’ west

A—0 to 2 inches (0 to 5 cm); reddish brown (5YR 4/3) gravelly clay loam, dark reddish brown (5YR 3/3), moist; 38 percent clay; weak fine granular structure; slightly hard,

very friable, moderately sticky, moderately plastic; many fine roots; many fine vesicular pores; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt1—2 to 8 inches (5 to 20 cm); dark reddish gray (5YR 4/2) gravelly clay, dark reddish brown (5YR 2/2), moist; 45 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; many fine roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 25 percent gravel; noneffervescent; neutral, pH 7.0; clear wavy boundary.

Bt2—8 to 14 inches (20 to 36 cm); reddish brown (5YR 5/4) gravelly clay, reddish brown (5YR 4/4), moist; 45 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; common fine roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 25 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

R—14 to 60 inches (36 to 152 cm); unweathered basalt bedrock.

Range in Characteristics

Rock fragments: 15 to 30 percent
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in the control section: 40 to 60 percent

A horizon
- Hue: 5YR
- Value: 2 to 4 dry, 2 to 4 moist
- Chroma: 2 or 3, dry or moist
- Texture: clay loam

Bt horizons
- Hue: 5YR
- Value: 3 to 5 dry, 2 to 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: clay

R horizon
- Basalt bedrock

Paramore soils
Taxonomic classification: Fine, smectitic, thermic Leptic Haplotorrerts
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium over residuum weathered from rhyolite
Slope: 5 to 50 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 25 percent
  - woody debris: 10 percent
  - bare soil: 10 percent
- rock fragments
  - gravel: 45 percent
  - cobble: 10 percent
  - stone: 3 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 3.0 (low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R041XC330AZ
Present vegetation: agave, burroweed, catclaw, juniper, mesquite, oak, whitethorn
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Buford Hill; about 1,570 feet south and 1,280 feet west of the northeast corner of Section 12, Township 8 S, Range 21 E.
Geographic Coordinate System: 32° 45’ 20.80’’ north, 110° 8’ 58.70’’ west

A—0 to 2 inches (0 to 5 cm); dark reddish gray (5YR 4/2) clay loam, dark reddish brown (5YR 2/2), moist; 38 percent clay; weak fine granular structure; slightly hard, very friable, moderately sticky, moderately plastic; common fine roots; common fine vesicular pores; 10 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt1—2 to 14 inches (5 to 36 cm); reddish brown (5YR 4/3) gravelly clay, dark reddish brown (5YR 3/3), moist; 45 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; common fine roots; few fine tubular pores; few discontinuous distinct clay films on faces of peds; 25 percent gravel; noneffervescent; neutral, pH 7.0; gradual wavy boundary.

Bt2—14 to 26 inches (36 to 66 cm); reddish brown (5YR 4/4) gravelly clay, dark reddish brown (5YR 3/4), moist; 45 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; common fine roots; few fine tubular pores; few discontinuous distinct clay films on faces of peds; 25 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

R—26 to 60 inches (66 to 152 cm); unweathered basalt bedrock.

Range in Characteristics

Soil cracks: common vertical cracks 0.25 inch to 1.5 inches wide from the surface to a depth of 14 inches or more
Rock fragments: 10 to 30 percent
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in the control section: 40 to 60 percent

A horizon
- Hue: 5YR
- Value: 2 to 4 dry, 2 to 4 moist
- Chroma: 2 or 3, dry or moist
- Texture: clay loam

Bt horizons
- Hue: 5YR
- Value: 3 to 5 dry, 3 or 4 moist

Chroma: 2 to 4, dry or moist
Texture: clay

R horizon
Basalt bedrock

Rock outcrop
Rock outcrop consists of barren rock that occurs as outcroppings and boulder piles of basalt. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near summits.

25—Guest silty clay loam, 0 to 1 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*3,350 to 4,160 feet (1,021 to 1,268 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Guest and similar soils: 90 percent

Minor components: Riveroad

Soil Properties and Qualities

Guest soils
Taxonomic classification: Fine, mixed, superactive, calcareous, thermic Ustertic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 1 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 0 percent
woody debris: 0 percent
bare soil: 100 percent
rock fragments
gravel: 5 percent
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 10.2 (very high)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: occasional

Runoff class: low
Hydrologic group: C
Present vegetation: forbs, annuals
Land capability (irrigated): 3w
Land capability (non-irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 870 feet north and 380 feet west of the southeast corner of Section 27, Township 7 S, Range 20 E.
Geographic Coordinate System: 32° 47’ 31.60’’ north, 110° 16’ 57.40’’ west

C—0 to 6 inches (0 to 15 cm); brown (7.5YR 5/3) silty clay loam, dark brown (7.5YR 3/3), moist; 32 percent clay; weak thin platy parting to weak fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; few very fine roots; many very fine tubular pores; slightly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Ck1—6 to 20 inches (15 to 51 cm); brown (7.5YR 5/3) silty clay, dark brown (7.5YR 3/3), moist; 48 percent clay; strong fine and medium angular blocky structure; extremely hard, firm, very sticky, very plastic; few very fine roots; many very fine tubular pores; very few carbonate coats; strongly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Ck2—20 to 35 inches (51 to 89 cm); brown (7.5YR 5/3) silty clay loam, dark brown (7.5YR 3/3), moist; 38 percent clay; moderate fine subangular blocky structure; hard, friable, very sticky, very plastic; few very fine roots; many very fine tubular pores; few carbonate coats; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Ck3—35 to 60 inches (89 to 152 cm); brown (7.5YR 4/3) clay, dark brown (7.5YR 3/2), moist; 50 percent clay; strong fine and medium angular blocky structure; extremely hard, firm, very sticky, very plastic; few very fine roots; many very fine tubular pores; few carbonate coats; common very fine carbonate masses; strongly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Rock fragments: up to 5 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 35 to 60 percent

Ap horizon
- Hue: 7.5YR
- Value: 4 or 5 dry, 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: silty clay loam, silty clay, silt loam
- Rock fragments: 5 percent gravel

Ck horizons
- Hue: 7.5YR
- Value: 3 to 5 dry, 3 or 4 moist
- Chroma: 4 or 5 dry, 3 or 4 moist
- Texture: silty clay loam, silty clay, clay, loam

26—Kimrose-Sasabe complex, 3 to 45 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,970 to 4,770 feet (1,210 to 1,454 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Kimrose and similar soils: 40 percent
Sasabe and similar soils: 30 percent

Minor components: Tombstone. Other minor components include soils containing greater than 35 percent clay and rock fragments, clayey soils shallow to hardpan.

Soil Properties and Qualities

Kimrose soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids
Geomorphic position: generally on backslopes
Parent material: mixed fan alluvium
Slope: 3 to 45 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:50 percent
  - woody debris: 5 percent
  - bare soil: 10 percent
- rock fragments
  - gravel: 50 percent
  - cobble: 10 percent

Depth to restrictive feature(s): 7 to 20 inches to petrocalcic
Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limy Upland 12-16” p.z.
Ecological site number: R041XC309AZ

Present vegetation: whitethorn, ocotillo, black grama, perennial forbs, other annual forbs, bush muhly, Lehmann lovegrass, fluffgrass, pricklypear, tanglehead
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Campo Bonito; about 2,400 feet south and 2,000 feet west of the northeast corner of Section 35, Township 10 S, Range 16 E.

Geographic Coordinate System: 32° 31’ 17.40’’ north, 110° 40’ 39.50’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 18 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, nonsticky, slightly plastic; many very fine and fine roots; many fine irregular pores; 45 percent gravel and 10 percent cobble; violently effervescent, 15 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Bk—2 to 13 inches (5 to 33 cm); brown (7.5YR 5/3) very gravelly loam, dark brown (7.5YR 3/3), moist; 24 percent clay; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky, slightly plastic; many very fine and few medium roots; many fine irregular pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel and 10 percent cobble; violently effervescent, 18 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bkm—13 to 60 inches (33 to 152 cm); cemented material, indurated; petrocalcic.

Range in Characteristics

Rock fragments: 40 to 70 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 18 to 35 percent
Calcium carbonate equivalent: 15 to 25 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 3 to 5 dry, 2 or 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: sandy loam, loam

Bk horizons
- Hue: 10YR, 7.5YR
- Value: 3 to 5 dry, 2 or 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: sandy loam, loam

Bkm horizon
- Cemented: calcium carbonate
- Hardness: indurated
- Thickness: 1 foot to 5 feet; continuous

Sasabe soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Paleargids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 3 to 20 percent
Surface cover:
Biological crust
- cyanobacteria: 0 percent

lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:20 percent
woody debris: 5 percent
bare soil: 30 percent
rock fragments
gravel: 35 percent
cobble: 15 percent
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Available water capacity total inches: 4.9 (low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: medium
Hydrologic group: C
Ecological site name: Loamy Upland 12-16” p.z.
Ecological site number: R041XC313AZ
Present vegetation: mesquite, curly mesquite, pricklypear, perennial forbs, other annual forbs, false mesquite, sand dropseed
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Campo Bonito; about 1,850 feet east and 175 feet north of the southwest corner of Section 35, Township 10 S, Range 16 E.
Geographic Coordinate System: 32° 30’ 50.90’’ north, 110° 40’ 55.40’’ west

A—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 4/6) gravelly loam, dark brown (7.5YR 3/3), moist; 24 percent clay; moderate fine and medium platy parting to weak very fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; many very fine roots; many fine irregular pores; 20 percent gravel; noneffervescent; moderately acid, pH 6.0; abrupt smooth boundary.

Bt1—2 to 20 inches (5 to 51 cm); dark reddish brown (2.5YR 3/3) clay, dark reddish brown (2.5YR 3/3), moist; 60 percent clay; strong medium and coarse angular blocky structure; extremely hard, extremely firm, very sticky, very plastic; few very fine and medium roots; many very fine and fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; common distinct pressure faces; 5 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bt2—20 to 60 inches (51 to 152 cm); reddish brown (5YR 4/4) extremely cobbly clay, reddish brown (5YR 4/4), moist; 55 percent clay; strong fine and medium angular blocky structure; extremely hard, extremely firm, very sticky, very plastic; few very fine roots; many very fine and fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; common distinct pressure faces; 15 percent gravel and 45 percent cobble; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Rock fragments: 0 to 5 percent in the control section
Reaction: 5.6 to 7.8 (slightly acid to slightly alkaline)
Average percent clay in the control section: 35 to 60 percent

A horizon
Hue: 10YR, 7.5YR
Value: 3 or 4, dry or moist
Chroma: 4 to 6 dry, 3 or 4 moist
Texture: sandy loam, loam
Reaction: 5.6 to 6.5 (slightly to moderately acid)

Bt horizons
Hue: 5YR, 2.5YR
Value: 3 or 4, dry or moist
Chroma: 3 or 4, dry or moist
Texture: clay loam, clay
Rock fragments: 5 to 60 percent, averages less than 35 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)

27—Mallet-Hooks complex, 1 to 8 percent slopes

Map Unit Setting

Landform(s): alluvial fans
*Elevation:*4,360 to 5,500 feet (1,329 to 1,676 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Mallet and similar soils: 50 percent
Hooks and similar soils: 30 percent

Minor components: Altar, Baboquivari, Bodecker, Combate, Sasabe

Soil Properties and Qualities

Mallet soils
Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Ustic Haplocambids
Geomorphic position: proximal and distal
Parent material: mixed fan alluvium
Slope: 1 to 8 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 5 percent
woody debris: 5 percent
bare soil: 85 percent
rock fragments
gravel: 5 percent

Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 5.9 (moderate)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: B
Ecological site name: Sandy Loam, Deep 12-16” p.z.
Ecological site number: R041XC318AZ
Present vegetation: cholla, filaree, annual forbs, perennial forbs, Lehmann lovegrass, mesquite, soaptree yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 1,375 feet south and 1,600 feet east of the northwest corner of Section 32, Township 9 S, Range 23 E.
Geographic Coordinate System: 32° 36’ 43.60’’ north, 110° 1’ 12.00’’ west

A—0 to 1 inch (0 to 3 cm); dark yellowish brown (10YR 4/4) sandy loam, dark yellowish brown (10YR 3/4), moist; 7 percent clay; weak thin platy parting to weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine irregular pores; noneffervescent; neutral, pH 6.8; abrupt smooth boundary.

Bw1—1 inch to 13 inches (3 to 33 cm); dark yellowish brown (10YR 4/4) fine sandy loam, dark yellowish brown (10YR 3/4), moist; 8 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine irregular pores; noneffervescent; slightly alkaline, pH 7.4; clear smooth boundary.

Bw2—13 to 42 inches (33 to 107 cm); dark yellowish brown (10YR 4/4) sandy loam, brown (10YR 4/3), moist; 8 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; many very fine irregular pores; noneffervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

C—42 to 60 inches (107 to 152 cm); dark yellowish brown (10YR 4/4) fine sandy loam, brown (10YR 4/3), moist; 10 percent clay; massive; loose, loose, nonsticky, nonplastic; few very fine roots; many very fine irregular pores; very slightly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Rock fragments: 0 to 35 percent
Reaction: 6.0 to 7.8 (moderately acid to slightly alkaline)
Average percent clay in the control section: 7 to 18 percent

A horizon
Hue: 7.5YR, 10YR
Value: 4 or 5 dry, 2.5 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: fine sandy loam, sandy loam, loam, loamy fine sand

Bw horizons
Hue: 5YR, 7.5YR, 10YR
Value: 3 to 5 dry, 2.5 to 4 moist
Chroma: 2 to 4 dry, 1 to 4 moist

Texture: fine sandy loam, sandy loam, loam, sandy clay loam, clay loam

C horizon
Hue: 5YR, 7.5YR, 10YR
Value: 3 or 4, dry or moist
Chroma: 3 or 4 dry, 2 to 4 moist
Texture: fine sandy loam, sandy loam, loam, loamy coarse sand, sand, sandy clay loam

Hooks soils
Taxonomic classification: Fine-loamy, mixed, superactive, thermic Ustic Haplocambids
Geomorphic position: proximal and distal
Parent material: mixed fan alluvium
Slope: 1 to 8 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 5 percent
woody debris: 0 percent
bare soil: 95 percent
rock fragments
gravel: 2 percent
Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Available water capacity total inches: 10.0 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: B
Ecological site name: Sandy Loam, Deep 12-16” p.z.
Ecological site number: R041XC318AZ
Present vegetation: cholla, filaree, forb, annual, Lehmann lovegrass, mesquite, soaptree yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 2,050 feet north and 925 feet east of the southwest corner of Section 32, Township 9 S, Range 23 E.
Geographic Coordinate System: 32° 36’ 25.80’’ north, 110° 1’ 19.70’’ west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4), moist; 10 percent clay; weak thin and medium platy structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine irregular pores; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

Bw1—4 to 18 inches (10 to 46 cm); brown (7.5YR 4/3) loam, very dark brown (7.5YR 2.5/3), moist; 20 percent clay; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine irregular pores; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bw2—18 to 35 inches (46 to 89 cm); brown (7.5YR 4/3) loam, very dark brown (7.5YR 2.5/3), moist; 24 percent clay; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine and few medium roots; many very fine irregular pores; noneffervescent; neutral, pH 7.2; clear smooth boundary.

Bw3—35 to 60 inches (89 to 152 cm); brown (7.5YR 4/4) loam, dark brown (7.5YR 3/2), moist; 24 percent clay; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine roots; many very fine irregular pores; few distinct carbonate coats on surfaces along root channels and pores; very slightly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Rock fragments: 0 to 30 percent
Reaction: 6.2 to 8.2 (slightly acid to moderately alkaline)
Average percent clay in the control section: 18 to 27 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 4 or 5 dry, 2.5 to 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: fine sandy loam, sandy loam, loam, loamy fine sand
- Reaction: 6.2 to 8.0 (slightly acid to moderately alkaline)

Bw horizons
- Hue: 5YR, 7.5YR, 10YR
- Value: 3 to 5 dry, 2.5 to 4 moist
- Chroma: 2 to 6 dry, 1 to 4 moist
- Texture: loam, sandy clay loam, clay loam, sandy loam
- Reaction: 6.6 to 8.2 (neutral to moderately alkaline)

28—Nahda-Delnorte complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,240 to 3,470 feet (988 to 1,058 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40–Sonoran Basin and Range
Land Resource Unit: 40–1 Upper Sonoran Desert Shrub

Map Unit Composition

Nahda and similar soils: 60 percent
Delnorte and similar soils: 30 percent

Minor components: Nahda soils with less than 35 percent rock fragments, Nahda soils that have pans above 20 inches. Riverwash, Stagecoach, Whitecliff, Queencreek. Other minor components include loamy-skeletal soils that are deep.

Soil Properties and Qualities

Nahda soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Argic Petrocalcids

Geomorphic position: generally on backslopes and summits
Parent material: mixed fan alluvium
Slope: 1 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:30 percent
woody debris: 5 percent
bare soil: 10 percent
rock fragments
gravel: 70 percent
cobble: 20 percent
Depth to restrictive feature(s): 20 to 40 inches to petrocalcic
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 2.6 (low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: medium
Hydrologic group: D
Ecological site name: Loamy Upland 10-13” p.z.
Ecological site number: R040XA114AZ
Present vegetation: creosotebush, whitethorn, false mesquite, pricklypear, foothill paloverde, annual grasses, other annual forbs, ratany, mesa threeawn, Rothrock’s grama, saguaro
Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Peppersauce Wash; about 1,900 feet north and 500 feet west of the southeast corner of Section 26, Township 10 S, Range 17 E.

Geographic Coordinate System: 32° 32’ 13.00’’ north, 110° 34’ 9.00’’ west

A—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) very gravelly clay loam, brown (7.5YR 4/4), moist; 29 percent clay; weak thin platy parting to moderate fine granular structure; soft, very friable, moderately sticky, moderately plastic; common very fine and few medium roots; common fine irregular pores; 40 percent gravel and 2 percent cobble; noneffervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bt1—2 to 16 inches (5 to 41 cm); dark red (2.5YR 3/6) extremely gravelly clay, yellowish red (5YR 4/6), moist; 50 percent clay; moderate very fine, fine and medium subangular blocky structure; slightly hard, friable, very sticky, very plastic; many very fine and few medium roots; few very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 40 percent gravel and 20 percent cobble; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Bt2—16 to 27 inches (41 to 69 cm); dark red (2.5YR 3/6) clay, yellowish red (5YR 4/6), moist; 52 percent clay; strong medium prismatic parting to strong fine and medium angular blocky structure; hard, firm, very sticky, very plastic; many very fine roots; few very fine tubular pores; many continuous distinct clay films on faces of peds, rock fragments and lining pores; many distinct pressure faces; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

Bkm—27 to 60 inches (69 to 152 cm); violently effervescent; cemented material, thin laminar; indurated; petrocalcic.

Range in Characteristics

Rock fragments: 5 to 60 percent, averages more than 35 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 40 to 65 percent

A horizon
- Hue: 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 to 6 dry, 3 or 4 moist
- Texture: sandy loam, clay loam, loam

Bt horizons
- Hue: 5YR, 2.5YR
- Value: 3 to 5 dry, 3 or 4 moist
- Chroma: 4 to 6 dry, 3 to 6 moist
- Texture: clay, sandy clay, clay loam, sandy clay loam
- Calcium carbonate equivalent: 0 to 10 percent

Bkm horizon
- Cemented: calcium carbonate
- Hardness: indurated
- Thickness: 1 foot to 6 feet; continuous

Some pedons are underlain by consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials above 60 inches.

Delnorte soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids
Geomorphic position: generally on backslopes and summits
Parent material: mixed fan alluvium
Slope: 1 to 10 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:30 percent
  - woody debris: 5 percent
  - bare soil: 10 percent

rock fragments
gravel: 70 percent
cobble: 20 percent
Depth to restrictive feature(s): 7 to 20 inches to petrocalcic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.6 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: medium
Hydrologic group: D
Ecological site name: Limy Upland 10-13” p.z.
Ecological site number: R040XA111AZ
Present vegetation: creosotebush, pricklypear, foothill paloverde, annual grasses, ratany, barrel cactus, Engelmann hedgehog cactus, ocotillo, saguaro
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Peppersauce Wash; about 1,900 feet north and 1,300 feet west of the southeast corner of Section 26, Township 10 S, Range 17 E.
Geographic Coordinate System: 32° 32’ 11.00’’ north, 110° 34’ 14.00’’ west

A—0 to 1 inch (0 to 3 cm); pale brown (10YR 6/3) very gravelly sandy loam, dark yellowish brown (10YR 4/4), moist; 10 percent clay; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; few very fine roots; few fine irregular pores; 40 percent gravel; violently effervescent, 15 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk—1 inch to 9 inches (3 to 23 cm); pale brown (10YR 6/3) very gravelly sandy loam, dark yellowish brown (10YR 4/4), moist; 12 percent clay; moderate fine and medium subangular blocky structure; soft, friable, nonsticky, nonplastic; common very fine and few medium roots; few fine tubular pores; many continuous distinct carbonate coats on rock fragments; many fine and medium carbonate masses; 40 percent gravel and 10 percent cobble; violently effervescent, 13 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bkm—9 to 60 inches (23 to 152 cm); extremely hard; violently effervescent; cemented material, indurated; thin laminar cap; petrocalcic; abrupt wavy boundary.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 5 to 18 percent

A horizon
Hue: 10YR, 7.5YR
Value: 5 to 6 dry, 3 or 4 moist
Chroma: 3 or 4, dry or moist
Texture: sandy loam, fine sandy loam

Bk horizon
Hue: 10YR, 7.5YR

Value: 4 to 6 dry, 4 or 5 moist
Chroma: 3 or 4, dry or moist
Texture: sandy loam, loam
Calcium carbonate equivalent: 5 to 30 percent

Bkm horizon
Cemented: calcium carbonate
Hardness: indurated
Thickness: 1 foot to 6 feet; continuous

Some pedons are underlain by consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials above 60 inches.

29—Nugget-Rock outcrop complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains
*Elevation:*4,510 to 6,160 feet (1,374 to 1,877 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)
Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)
Frost-free period: 150 to 200 days
Major Land Resource Area: 38–Mogollon Transition
Land Resource Unit: 38–2 Interior Chaparral–Woodland

Map Unit Composition

Nugget and similar soils: 55 percent
Rock outcrop, Diabase: 25 percent

Minor components: Lutzcan, Turquoise. Other minor components include clayey soils with a lithic contact.

Soil Properties and Qualities

Nugget soils
Taxonomic classification: Loamy, mixed, superactive, thermic, shallow Aridic Argiustolls
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from diabase
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover:45 percent
woody debris: 5 percent
bare soil: 45 percent
rock fragments

gravel: 2 percent
cobble: 2 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 3.0 (low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: C
Ecological site name: Granitic Hills 16-20” p.z.
Ecological site number: R038XB204AZ
Present vegetation: banana yucca, beargrass, buckbrush, manzanita, mountain mahogany, pinyon pine, sugar sumac, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Cobre Grande Mountain; about 875 feet north and 1,870 feet east of the southwest corner of Section 18, Township 5 S, Range 20 E.
Geographic Coordinate System: 32° 59’ 35.90’’ north, 110° 20’ 24.10’’ west

A—0 to 2 inches (0 to 5 cm); reddish brown (5YR 5/3) clay loam, dark reddish brown (5YR 3/3), moist; 26 percent clay; weak fine granular structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; many fine and medium vesicular pores; 5 percent gravel; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Bt1—2 to 10 inches (5 to 25 cm); light reddish brown (5YR 6/3) gravelly clay loam, reddish brown (5YR 4/3), moist; 32 percent clay; moderate medium subangular blocky structure; very hard, very firm, slightly sticky, slightly plastic; few fine and medium roots; common very fine and fine dendritic tubular pores; common patchy faint clay films on faces of peds and rock fragments; 35 percent gravel; noneffervescent; moderately acid, pH 6.0; clear smooth boundary.

Bt2—10 to 19 inches (25 to 48 cm); reddish brown (2.5YR 5/4) gravelly clay loam, dark reddish brown (2.5YR 3/4), moist; 36 percent clay; moderate medium subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; few fine and medium roots; common very fine and fine dendritic tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 15 percent gravel; noneffervescent; moderately acid, pH 6.0; clear smooth boundary.

Cr—19 to 60 inches (48 to 152 cm) weathered diabase bedrock.

Range in Characteristics

Rock fragments: 15 to 35 percent in control section
Organic matter: 1 to 3 percent
Reaction: 5.6 to 7.3 (moderately acid to neutral)
Average percent clay in the control section: 18 to 35 percent

A horizon
Hue: 5YR, 2.5YR
Value: 3, dry or moist
Chroma: 2 or 3, dry or moist

Texture: clay loam, sandy loam, sandy clay loam

Bt horizons
Hue: 2.5YR, 5YR
Value: 3 or 4, dry or moist
Chroma: 3 or 4, dry or moist
Texture: clay loam, sandy clay loam

Cr horizon
Diabase bedrock

30—Oxyaquic Torrifluvents-Riverwash complex, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*4,040 to 4,280 feet (1,231 to 1,305 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Stream Segment Properties and Qualities

Segment length: less than 0.25 mile of unnamed stream channel.
Active flood plain width: 80 to 525 feet
Stream flow: perennial in places, but intermittent in drought years
Flooding hazard: frequent, brief; 2 to 7 days
Flood month: July – September and January – March
Bank entrenchment:
percent cut: 90
percent uncut:10
vertical cut: 0.5 to 40 feet; averages about 24 inches
Depositional bar features: dynamic system of interbraided bars and channels that relocate with each major flood event
Meander pattern: irregular meander, within rock canyon walls
Bank channel composition:
percent bedrock: 45
percent cobbles: 20
percent gravel: 20
percent sand: 10
percent silt and clay: 5
Stability: a dynamic system of interbraided components that aggrade and degrade seasonally

Map Unit Composition

Oxyaquic Torrifluvents and similar soils: 60 percent
Riverwash: 30 percent

Minor components: Combate, Water. Other minor components include shallow and moderately deep soils to bedrock, soils that have high water tables.

Soil Properties and Qualities

Oxyaquic Torrifluvents soils
Taxonomic classification: Oxyaquic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 10 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:80 percent
woody debris: 10 percent
bare soil: 10 percent
rock fragments
gravel: 55 percent
cobble: 35 percent
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)
Available water capacity total inches: 1.4 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: frequent
Seasonal water table minimum depth: about 20 to 60 inches
Runoff class: low
Hydrologic group: B
Ecological site name: Sandy Bottom 12-16'' p.z.
Ecological site number: F041XC317AZ
Present vegetation: Bermuda grass, seepwillow baccharis, cottonwood, mesquite, willow
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Oak Grove Canyon; about 2,900 feet south and 1,900 feet east of the northwest corner of Section 10, Township 8 S, Range 18 E.
Geographic Coordinate System: 32° 44' 54.00'' north, 110° 30' 0.00'' west

A—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) very cobbly sandy loam, very dark grayish brown (10YR 3/2), moist; 8 percent clay; weak thin platy structure; soft, very friable, nonsticky, nonplastic; few very fine roots; many very fine interstitial pores; 50 percent cobble; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C1—2 to 17 inches (5 to 43 cm); yellowish brown (10YR 5/4) extremely cobbly loamy fine sand, dark brown (10YR 3/3), moist; 7 percent clay; massive; loose, very friable, nonsticky, nonplastic; many very fine and common medium roots; many very fine interstitial pores; 25 percent gravel and 45 percent cobble; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C2—17 to 60 inches (43 to 152 cm); yellowish brown (10YR 5/4) extremely gravelly coarse sand, dark brown (10YR 3/3), moist; 4 percent clay; single grain; loose, loose, nonsticky, nonplastic; many very fine roots; many very fine interstitial pores; 55 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Rock fragments: 35 to 70 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 2 to 10 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 5 or 6 dry, 3 to 5 moist
- Chroma: 2 to 4, dry or moist
- Texture: sandy loam, coarse sand, fine sand, silt loam, fine sandy loam

C horizons
- Hue: 7.5YR, 10YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: coarse sand, loamy fine sand, sand with thin strata of sandy loam, silt loam, clay

Redoximorphic features: few to common redoximorphic concentrations occurring as masses and linings along root channels (7.5YR 8/8, 7.5YR 6/6); few to common redoximorphic depletions (5BG 3/1, 10BG 3/1, 5B 3/1 10B 3/1); usually occur in strata finer than loamy fine sand

Riverwash
- Width: 2 to 25 feet
- Depth of water when present: 3 to 36 inches

Riverwash consists of shallow to very deep, excessively drained, stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic interbraided system of bars and channels, commonly bordered by shallow to steep vertical banks cut into the alluvium. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years surface water is present for part of the year. Riverwash is replaced with water. This material does not support vegetation because it undergoes constant scouring and shifting.

31—Oxyaquic Torrifluvents-Water complex, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*3,020 to 5,250 feet (920 to 1,600 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Stream Segment Properties and Qualities

Segment length: about 8 miles in Redfield canyon, with other segments along Grant Creek, Goudy Canyon Wash, Aravaipa Creek, Turkey Creek, and Oak Grove Canyon.
Active flood plain width: 40 to 2,000 feet
Stream flow: perennial in places, but intermittent in drought years
Flooding hazard: very frequent, very long; 7 to greater than 30 days
Flooding month: July – April
Bank Entrenchment:
- percent cut: 30%
- percent uncut:70%
- vertical cut: 0.5 to 10 feet; averages about 24 inches

Depositional bar features: dynamic system of interbraided bars and channels that relocate with each major flood event
Meander patter: irregular meander
Channel composition:
- Bedrock percent: 5
- Cobbles percent: 10
- Gravel percent: 50
- Sand percent: 30
- Silt and clay percent: 5

Stability: a dynamic system of interbraided components that aggrade and degrade seasonally

Map Unit Composition

Oxyaquic torrifluvents and similar soils: 65 percent
Water: 20 percent

Minor components: Riverwash

Soil Properties and Qualities

Oxyaquic torrifluvents soils
Taxonomic classification: Oxyaquic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 3 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 70 percent
  - woody debris: 10 percent
  - bare soil: 0 percent
- rock fragments
  - gravel: 30 percent
  - cobble: 50 percent
  - stone: 20 percent

Drainage class: somewhat poorly drained
Ksat solum: 5.95 to 39.69 inches per hour (42.00 to 280.00 micrometers per second)

Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: very frequent
Runoff class: very low
Hydrologic group: A
Ecological site name: Sandy Bottom 12-16'' p.z.
Ecological site number: F041XC317AZ
Present vegetation: alder, ash, Bermuda grass, canyon ragweed, sycamore, willow
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Redington; about 1,800 feet north and 425 feet east of the southwest corner of Section 35, Township 11 S, Range 19 E.
Geographic Coordinate System: 32° 25' 58.20'' north, 110° 22' 54.50'' west

C1—0 to 7 inches (0 to 18 cm); brown (7.5YR 4/3) very cobbly loamy sand, dark brown (7.5YR 3/2), moist; 3 percent clay; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine irregular pores; 50 percent gravel, 25 percent cobble, and 15 percent stone; noneffervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—7 to 48 inches (18 to 122 cm); brown (7.5YR 5/3) extremely cobbly coarse sand, dark brown (7.5YR 3/3), moist; 3 percent clay; massive; loose, loose, nonsticky, nonplastic; common fine and medium roots; many very fine irregular pores; common coarse distinct carbonate masses; strongly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

C3—48 to 60 inches (122 to 152 cm); extremely cobbly coarse sand, dark brown (7.5YR 3/3), moist; 3 percent clay; massive; loose, loose, nonsticky, nonplastic; few coarse roots; many very fine irregular pores; noneffervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Rock fragments: 35 to 80 percent
Reaction: 7.4 to 8.4 (mildly to moderately alkaline)
Average percent clay in the control section: 1 to 8 percent

C horizons
Hue: 7.5YR
Value: 4 or 5 dry, 2 or 3 moist
Chroma: 2 to 3, dry or moist
Texture: coarse sand, loamy sand, sand

Water
Width: 1 foot to 3 feet
Depth of water when present: 0 to 24 inches

32—Pantak-Leyte-Rock outcrop complex, 5 to 45 percent slopes

Map Unit Setting

Landform(s): pediments
*Elevation:*3,090 to 4,660 feet (942 to 1,420 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Pantak and similar soils: 45 percent
Leyte and similar soils: 35 percent
Rock outcrop, sandstone: 20 percent

Minor components: Cammerman, Eskiminzin, Lampshire. Other minor components include loamy soils that are lithic with a cambric horizon.

Soil Properties and Qualities

Pantak soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Lithic Ustic Haplargids
Geomorphic position: generally on backslopes and summits

Parent material: slope alluvium and/or residuum weathered from sandstone
Slope: 5 to 45 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover:25 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 80 percent
cobble: 10 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R038XA117AZ
Present vegetation: agave, barrel cactus, beardgrass, blue grama, burroweed, globemallow, green sprangletop, mesquite, pinyon pine, spidergrass, sprucetop grama, turbinella oak, whitethorn acacia
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Oak Grove Canyon; about 1,215 feet south and 550 feet west of the northeast corner of Section 15, Township 7 S, Range 19 E.
Geographic Coordinate System: 32° 49’ 44.50’’ north, 110° 23’ 9.50’’ west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/2) very gravelly sandy clay loam, dark brown (7.5YR 3/2), moist; 24 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine interstitial and many fine vesicular pores; 45 percent gravel; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt—1 inch to 12 inches (3 to 30 cm); dark reddish brown (5YR 3/3) extremely gravelly clay loam, dark reddish brown (5YR 3/3), moist; 32 percent clay; weak fine and medium subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine tubular pores; common continuous distinct clay films on faces of peds and rock fragments; 55 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; abrupt wavy boundary.

R—12 to 60 inches (30 to 152 cm); unweathered sandstone bedrock.

Range in Characteristics

Rock fragments: 35 to 60 percent gravels and cobbles
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 18 to 35 percent

A horizon
- Hue: 5YR, 7.5YR
- Value: 3 or 4, dry or moist
- Chroma: 2 or 3, dry or moist
- Texture: sandy clay loam, loam, sandy loam

Bt horizon
- Hue: 5YR
- Value: 2.5 to 4, dry or moist
- Chroma: 2 or 3, dry or moist
- Texture: clay loam, sandy clay loam

R horizon
- Sandstone bedrock

Leyte soils
Taxonomic classification: Clayey, mixed, superactive, thermic Lithic Ustic Haplargids
Geomorphic position: generally on backslopes and summits

Parent material: slope alluvium and/or residuum weathered from sandstone
Slope: 5 to 45 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 25 percent

woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 80 percent
cobble: 5 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 2.1 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R038XA117AZ
Present vegetation: agave, burroweed, curly mesquite, mesquite, mustard, whitethorn acacia, yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Oak Grove Canyon; about 2,410 feet south and 1,630 feet east of the northwest corner of Section 10, Township 7 S, Range 19 E.
Geographic Coordinate System: 32° 50’ 25.80’’ north, 110° 23’ 45.10’’ west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/2) gravelly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; weak very fine granular structure; soft, very friable, moderately sticky, moderately plastic; few very fine roots; many very fine interstitial pores; 30 percent gravel; noneffervescent; slightly acid, pH 6.2; abrupt smooth boundary.

Bt1—1 inch to 8 inches (3 to 20 cm); dark reddish brown (5YR 3/3) gravelly clay, dark reddish brown (5YR 3/3), moist; 55 percent clay; strong fine and medium angular blocky structure; slightly hard, friable, very sticky, very plastic; few coarse roots throughout and common very fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 20 percent gravel and 10 percent cobble; noneffervescent; slightly acid, pH 6.2; abrupt smooth boundary.

Bt2—8 to 16 inches (20 to 41 cm); dark reddish brown (5YR 3/4) clay, dark reddish brown (5YR 3/4), moist; 55 percent clay; strong medium and coarse angular blocky structure; extremely hard, very firm, very sticky, very plastic; common very fine and fine roots; many very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 10 percent gravel; noneffervescent; slightly acid, pH 6.4; abrupt wavy boundary.

R—16 to 60 inches (41 to 152 cm); unweathered sandstone bedrock.

Range in Characteristics

Rock fragments: less than 35 percent gravels and cobbles
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 35 to 60 percent

A horizon
Hue: 7.5YR
Value: 3 or 4, dry or moist

Chroma: 2 or 3, dry or moist
Texture: sandy clay loam, loam, sandy loam

Bt horizons
Hue: 2.5YR, 5YR
Value: 3 or 4, dry or moist
Chroma: 2 to 4, dry or moist
Texture: clay

R horizon
Sandstone bedrock

Rock outcrop
Rock outcrop consists of barren rock that occurs as outcroppings of Tertiary sandstone. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near summits.

33—Pedregosa-Tombstone complex, 5 to 45 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,190 to 4,140 feet (972 to 1,262 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Pedregosa and similar soils: 50 percent
Tombstone and similar soils: 40 percent

Minor components: Caralampi, Eloma. Other minor components include loamy-skeletal soils with a calico horizon.

Soil Properties and Qualities

Pedregosa soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calico Petrocalcids
Geomorphic position: generally on shoulders
Parent material: mixed calcareous fan alluvium
Slope: 5 to 20 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:35 percent

woody debris: 5 percent
bare soil: 30 percent
rock fragments
gravel: 45 percent
cobble: 15 percent
Depth to restrictive feature(s): 10 to 20 inches to petrocalcic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limy Upland 12-16” p.z.
Ecological site number: R041XC309AZ
Present vegetation: whitethorn acacia, black grama, creosotebush, mesquite, ocotillo, annual grasses, false mesquite, mariola, desert zinnia, fluffgrass, other annual forbs, bush muhly, perennial forbs
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle San Pedro Ranch; 2,150 feet north and 300 feet east of the southwest corner of Section 26, Township 15 S, Range 21 E.
Geographic Coordinate System: 32° 6’ 2.40’’ north, 110° 10’ 49.20’’ west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/3) very gravelly sandy loam, brown (7.5YR 4/3), moist; 12 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine interstitial pores; common continuous distinct carbonate coats on rock fragments; 45 percent gravel and 10 percent cobble; violently effervescent, 10 percent Calcium carbonate equivalent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bk—1 inch to 13 inches (3 to 33 cm); brown (7.5YR 5/3) extremely gravelly loam, brown (7.5YR 4/3), moist; 14 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 50 percent gravel and 10 percent cobble; violently effervescent, 20 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Bkm—13 to 60 inches (33 to 152 cm); cemented material, indurated (1/8- to 1/4- inch-thick laminar cap); strongly cemented by calcium carbonates and silica.

Range in Characteristics

Rock fragments: 40 to 60 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in control section: 5 to 18 percent

A horizon
Hue: 7.5YR, 10YR
Value: 3 to 5 dry, 2 to 4 moist
Chroma: 2 to 4, dry or moist

Texture: loam, sandy loam
Calcium carbonate equivalent: 0 to 15 percent

Bk horizon
Hue: 7.5YR, 10YR
Value: 3 to 6 dry, 2 to 5 moist
Chroma: 2 to 4, dry or moist
Texture: loam, sandy loam
Calcium carbonate equivalent: 5 to 25 percent

Bkm horizon
Cemented: calcium carbonate
Hardness: very strongly cemented to indurated
Thickness: 1 foot to 5 feet; continuous

Tombstone soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Ustic Haplocalcids
Geomorphic position: generally on footslopes
Parent material: mixed calcareous fan alluvium
Slope: 5 to 45 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:35 percent
woody debris: 5 percent
bare soil: 30 percent
rock fragments
gravel: 45 percent
cobble: 25 percent
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 3.8 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: A
Ecological site name: Limy Slopes 12-16” p.z.
Ecological site number: R041XC308AZ
Present vegetation: whitethorn acacia, creosotebush, bush muhly, sideoats grama, mariola, black grama, desert zinnia, false mesquite, mintbush lippia, other annual forbs, perennial forbs, whitestem paperflower
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle San Pedro Ranch; about 2,000 feet north and 300 feet east of the southwest corner of Section 26, Township 15 S, Range 21 E.
Geographic Coordinate System: 32° 6’ 2.30’’ north, 110° 10’ 49.30’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and few coarse roots; many very fine interstitial pores; 35 percent gravel and 10 percent cobble; violently effervescent, 3 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk1—2 to 20 inches (5 to 51 cm); brown (7.5YR 4/3) very gravelly loam, dark brown (7.5YR 3/3), moist; 14 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, moderately plastic; many very fine and common medium roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel and 10 percent cobble; violently effervescent, 14 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk2—20 to 33 inches (51 to 84 cm); brown (7.5YR 5/3) extremely gravelly sandy loam, brown (7.5YR 4/3), moist; 12 percent clay; weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and few coarse roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 50 percent gravel and 10 percent cobble; violently effervescent, 24 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk3—33 to 60 inches (84 to 152 cm); light brown (7.5YR 6/3) very gravelly sandy loam, brown (7.5YR 5/3), moist; 12 percent clay; massive; soft, very friable, nonsticky, nonplastic; common very fine roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 50 percent gravel; violently effervescent, 25 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in control section: 5 to 18 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 3 to 5 dry, 2 to 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: sandy loam, loam
- Calcium carbonate equivalent: 1 to 10 percent

Bk horizons
- Hue: 7.5YR, 10YR
- Value: 4 to 7 dry, 2 to 5 moist
- Chroma: 2 or 3, dry or moist
- Texture: loam, sandy loam
- Calcium carbonate equivalent: 15 to 40 percent

34—Queencreek soils and Riverwash, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*2,990 to 3,760 feet (911 to 1,146 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)

Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40–Sonoran Basin and Range
Land Resource Unit: 40–1 Upper Sonoran Desert Shrub

Stream Segment Properties and Qualities

Segment length: about 4 miles along Redfield Canyon with other segments along Bollen Wash, Rhodes Canyon, Peters Wash, Kielberg Canyon, and Cement Dam Canyon.
Active flood plain width: 50 to 1,600 feet
Stream flow: intermittent stream; usually dry but can flow seasonally with rainfall events
Flooding hazard: frequent, brief; 2 to 7 days
Flooding month: July – September
Bank Entrenchment:
- percent cut: 80
- percent uncut: 20
- vertical cut: 0.5 to 10 feet; averages about 1 foot to 3 feet

Depositional bar features: dynamic system of interbraided bars and channels that relocate with each major flood event
Channel composition:
- Bedrock percent: 0
- Cobbles percent: 25
- Gravel percent: 45
- Sand percent: 25
- Silt and clay percent: 5

Stability: a dynamic system of interbraided components that aggrade and degrade seasonally

Map Unit Composition

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic interbraided system of bars and channels. The active stream dynamics will cause these components to shift*Location*s. During severe rainfall events the channel will cut and fill throughout its length.

Minor components: Bodecker

Soil Properties and Qualities

Queencreek soils
Taxonomic classification: Sandy-skeletal, mixed, thermic Typic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 5 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent

Physical cover
plant cover: 35 percent
woody debris: 5 percent
bare soil: 25 percent
rock fragments
gravel: 40 percent
cobble: 20 percent
stone: 5 percent
Drainage class: excessively drained
Ksat solum: 0.57 to 39.69 inches per hour (4.00 to 280.00 micrometers per second)
Available water capacity total inches: 1.3 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: very low
Hydrologic group: A
Ecological site name: Sandy Wash 10-13” p.z.
Ecological site number: R040XA115AZ
Present vegetation: burrobrush, annual forbs, perennial forbs, mustard, peppergrass, redstem filaree
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Redington; about 1,025 feet north and 1,625 feet east of the southwest corner of Section 31, Township 11 S, Range 19 E.
Geographic Coordinate System: 32° 25’ 49.10’’ north, 110° 26’ 45.90’’ west

C1—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) very fine sand, dark brown (7.5YR 3/4), moist; 5 percent clay; strong thin, medium and thick platy parting to single grain structure; soft, very friable, nonsticky, nonplastic; few very fine roots; many very fine irregular pores; 15 percent gravel and 5 percent cobble; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

C2—2 to 17 inches (5 to 43 cm); brown (7.5YR 5/3) extremely gravelly coarse sand, dark brown (7.5YR 3/4), moist; 5 percent clay; massive; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; many very fine irregular pores; 50 percent gravel and 20 percent cobble; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

C3—17 to 60 inches (43 to 152 cm); brown (7.5YR 5/3) extremely cobbly loamy sand, dark brown (7.5YR 3/4), moist; 5 percent clay; massive; soft, very friable, nonsticky, nonplastic; common very fine roots; many very fine irregular pores; 40 percent gravel and 30 percent cobble; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Rock fragments: 15 to 70 percent gravel, and 5 to 30 percent cobbles
Reaction: 7.6 to 7.8 (slightly alkaline)
Average percent clay in the control section: 5 to 15 percent

C horizon
Hue: 7.5YR
Value: 5 dry, 3 moist
Chroma: 3 dry, 4 moist
Texture: very fine sand, coarse sand, loamy sand, sand

Riverwash

Width: 2 to 100 feet
Depth of water when present: 0 to 36 inches

Riverwash consists of very deep, excessively drained, stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic interbraided system of bars and channels, commonly bordered by shallow to steep vertical banks cut into the alluvium. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. This material does not support vegetation because it undergoes constant scouring and shifting.

35—Rafter and Stanford soils and Riverwash, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*4,430 to 5,230 feet (1,350 to 1,594 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–1 Mexican Oak–Pine Woodland and Oak Savannah

Stream Segment Properties and Qualities

Segment length: about 8 miles of Ash Creek, 7 miles of Oak Creek, 6 miles of Box Spring Creek, 6 miles of Mud Springs Wash, and smaller segments of Low Creek, Kelley Creek, Harrison Canyon, Black Canyon, and Wood Canyon.
Active flood plain width: 40 to 4,200 feet
Stream flow: intermittent; usually dry but can flow seasonally with rainfall events
Flooding hazard: very frequent, long; 7 to 30 days
Flood month: July – September and December – January
Bank entrenchment:
- percent cut: 90
- percent uncut: 10
- vertical cut: 1 foot to 10 feet; averages about 1 foot to 3 feet

Depositional bar features: dynamic system of interbraided bars and channels that relocate with each major flood event
Channel composition:
- percent bedrock: 10
- percent cobbles: 10
- percent gravel: 30
- percent sand: 50
- percent silt and clay: 5

Stability: a dynamic system of interbraided components that aggrade and degrade seasonally

Map Unit Composition

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic

interbraided system of bars and channels. The active stream dynamics will cause these components to shift*Location*s. During severe rainfall events the channel will cut and fill throughout its length.

Minor components: soils that are sandy-skeletal and coarse-loamy.

Soil Properties and Qualities

Rafter soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Cumulic Haplustolls
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 35 percent
woody debris: 5 percent
bare soil: 10 percent
rock fragments
gravel: 55 percent
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 2.9 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: frequent
Runoff class: low
Hydrologic group: B
Ecological site name: Sandy Bottom 16-20'' p.z.
Ecological site number: F041XA112AZ
Present vegetation: Apache plume, annual forbs, annual, mesquite, rabbitbrush, snakeweed, sunflower, sycamore
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 400 feet south and 2,125 feet east of the northwest corner of Section 5, Township 11 S, Range 22 E.
Geographic Coordinate System: 32° 30' 47.60'' north, 110° 7' 32.30'' west

A—0 to 6 inches (0 to 15 cm); brown (7.5YR 4/3) loam, dark brown (7.5YR 3/2), moist; 15 percent clay; massive; soft, very friable, nonsticky, nonplastic; many very fine and few medium roots; many very fine interstitial pores; 5 percent gravel; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

C1—6 to 35 inches (15 to 89 cm); brown (7.5YR 4/2) extremely gravelly sandy loam, dark brown (7.5YR 3/2), moist; 12 percent clay; massive; soft, very friable, nonsticky, nonplastic; many very fine and few medium roots; many very fine interstitial pores; 50

percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

C2—35 to 60 inches (89 to 152 cm); dark brown (7.5YR 3/2) extremely gravelly coarse sandy loam, very dark gray (7.5YR 3/1), moist; 10 percent clay; massive; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine interstitial pores; 65 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.6.

Range in Characteristics

Rock fragments: 35 to 75 percent
Organic matter: 1 to 3 percent
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 7 to 18 percent

A horizon
- Hue: 7.5YR
- Value: 3 or 4 dry, 2 or 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: loam, sandy loam, fine sandy loam

C horizons
- Hue: 7.5YR
- Value: 3 or 4 dry, 2.5 or 3 moist
- Chroma: 2 or 3 dry, 1 to 3 moist
- Texture: sandy loam, coarse sandy loam, loam

Stanford soils
Taxonomic classification: Fine-loamy, mixed, superactive, thermic Cumulic Haplustolls
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 5 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 40 percent
  - woody debris: 5 percent
  - bare soil: 55 percent
- rock fragments: 0 percent

Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 10.4 (very high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: frequent
Runoff class: low
Hydrologic group: B
Ecological site name: Loamy Bottom 16-20” p.z.
Ecological site number: R041XA114AZ
Present vegetation: annual forbs, annual, giant sacaton, mesquite, rabbitbrush
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 340 feet south and 2,421 feet east of the northwest corner of Section 5, Township 11 S, Range 22 E.

Geographic Coordinate System: 32° 30’ 48.00’’ north, 110° 7’ 28.60’’ west

A—0 to 5 inches (0 to 13 cm); brown (7.5YR 4/3) loam, very dark gray (7.5YR 3/1), moist; 22 percent clay; weak thin platy parting to weak very fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine interstitial and tubular pores; 3 percent gravel; noneffervescent; neutral, pH 7.2; clear smooth boundary.

C1—5 to 35 inches (13 to 89 cm); brown (7.5YR 4/3) loam, dark brown (7.5YR 3/2), moist; 24 percent clay; massive; soft, very friable, slightly sticky, slightly plastic; many very fine and few medium roots; many very fine interstitial and tubular pores; 5 percent gravel; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

C2—35 to 44 inches (89 to 112 cm); dark brown (7.5YR 3/4) silty clay loam, very dark brown (7.5YR 2.5/2), moist; 38 percent clay; massive; slightly hard, friable, moderately sticky, very plastic; many very fine roots; many very fine tubular pores; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

C3—44 to 60 inches (112 to 152 cm); dark brown (7.5YR 3/2) loam, black (7.5YR 2.5/1), moist; 26 percent clay; massive; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; 5 percent gravel; noneffervescent; neutral, pH 6.6.

Range in Characteristics

Rock fragments: 0 to 15 percent
Organic matter: 1 to 3 percent
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 18 to 35 percent

A horizon

- Hue: 7.5YR
- Value: 4 dry, 3 moist
- Chroma: 3 dry, 1 to 3 moist
- Texture: sandy loam, fine sandy loam, loam, clay loam, sandy clay loam, silt loam

C horizons

- Hue: 7.5YR
- Value: 3 or 4 dry, 2 or 3 moist
- Chroma: 2 or 3 dry, 1 to 3 moist
- Texture: loam, clay loam, silty clay loam

Riverwash

- Width: 2 to 400 feet
- Depth of water when present: 0 to 36 inches

Riverwash consists of very deep, excessively drained, stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic interbraided system of bars and channels, commonly bordered by shallow to steep vertical banks cut into the alluvium. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. This material does not support vegetation because it undergoes constant scouring and shifting.

36—Riveroad-Guest complex, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*3,330 to 4,460 feet (1,015 to 1,359 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Guest and similar soils: 25 percent
Riveroad and similar soils: 50 percent

Minor components: Bodecker, Combate, Contention, Hooks, Sasabe. Other minor components include loamy-skeletal fluventic soils.

Soil Properties and Qualities

Riveroad soils
Taxonomic classification: Fine-silty, mixed, superactive, nonacid, thermic Ustic Torrifluvents
Geomorphic position: generally on drainageways and alluvial plains
Parent material: mixed stream alluvium
Slope: 0 to 3 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover:0 percent
  - woody debris: 0 percent
  - bare soil: 100 percent
- rock fragments: 0 percent

Drainage class: well drained
Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)
Available water capacity total inches: 12.0 (very high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: frequent
Runoff class: low
Hydrologic group: C
Ecological site name: Loamy Bottom 12-16” p.z.
Ecological site number: R041XC312AZ
Present vegetation: annual forbs, perennial forbs, cocklebur, feather fingergrass, giant sacaton
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 90 feet south and 2,550 feet west of the northeast corner of Section 25, Township 10 S, Range 22 E.
Geographic Coordinate System: 32° 32’ 35.30’’ north, 110° 3’ 1.20’’ west

C1—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3), moist; 30 percent clay; strong thin and thick platy structure; soft, very friable, moderately sticky, moderately plastic; many very fine roots; many very fine tubular pores; noneffervescent; neutral, pH 7.0; clear wavy boundary.

C2—4 to 23 inches (10 to 58 cm); brown (7.5YR 4/3) silty clay loam, very dark brown (7.5YR 2.5/2), moist; 32 percent clay; weak medium subangular blocky structure; slightly hard, friable, very sticky, very plastic; common very fine roots; many very fine tubular pores; noneffervescent; neutral, pH 7.0; clear wavy boundary.

C3—23 to 33 inches (58 to 84 cm); brown (7.5YR 4/4) silty clay loam, dark brown (7.5YR 3/3), moist; 32 percent clay; weak medium subangular blocky structure; hard, firm, very sticky, very plastic; common very fine roots; common very fine tubular pores; noneffervescent; neutral, pH 7.0; clear wavy boundary.

C4—33 to 60 inches (84 to 152 cm); light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 4/3), moist; 32 percent clay; weak medium subangular blocky structure; hard, firm, very sticky, very plastic; few very fine roots; common very fine tubular pores; noneffervescent; neutral, pH 6.6.

Range in Characteristics

Rock fragments: less than 15 percent in control section
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in the control section: 18 to 35 percent

C horizons
Hue: 5YR, 7.5YR
Value: 3 to 6 dry, 2.5 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: silty clay loam, silt loam, silty clay, clay loam, fine sandy loam, loam

Riveroad as used in this survey is a taxadjunct to the series because it is non-effervescent throughout. Riveroad series is a Fine-silty, mixed, superactive, calcareous, thermic Ustic Torrifluvents.

Guest soils
Taxonomic classification: Fine, mixed, superactive, nonacid, thermic Ustertic Torrifluvents
Geomorphic position: generally on drainageways and alluvial plains
Parent material: mixed stream alluvium
Slope: 0 to 3 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent

Physical cover
plant cover:0 percent
woody debris: 0 percent
bare soil: 100 percent
rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)
Available water capacity total inches: 11.6 (very high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: frequent
Runoff class: low
Hydrologic group: B
Ecological site name: Loamy Bottom 12-16” p.z.
Ecological site number: R041XC312AZ
Present vegetation: nightshade, blue grama, cocklebur, giant sacaton, sedge, sunflower
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 10 feet north and 1,890 feet west of the southeast corner of Section 24, Township 10 S, Range 22 E.
Geographic Coordinate System: 32° 32’ 36.30’’ north, 110° 2’ 52.30’’ west

C1—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3), moist; 30 percent clay; weak fine subangular blocky parting to weak fine granular structure; soft, very friable, very sticky, moderately plastic; many very fine roots; many very fine tubular pores; noneffervescent; neutral, pH 6.8; clear smooth boundary.

C2—4 to 24 inches (10 to 61 cm); dark brown (7.5YR 3/3) silty clay loam, very dark brown (7.5YR 2.5/2), moist; 36 percent clay; weak fine subangular blocky structure; slightly hard, firm, very sticky, moderately plastic; many very fine roots; many very fine tubular pores; 1 percent medium mottles; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C3—24 to 60 inches (61 to 152 cm); dark brown (7.5YR 3/4) clay loam, dark brown (7.5YR 3/3), moist; 38 percent clay; weak fine subangular blocky structure; slightly hard, friable, very sticky, moderately plastic; few very fine roots; many very fine tubular pores; 5 percent gravel; 1 percent medium mottles; noneffervescent; slightly alkaline, pH 7.4.

Range in Characteristics

Rock fragments: less than 15 percent in control section
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 35 to 60 percent

C horizons
Hue: 7.5YR
Value: 3 to 5 dry, 2.5 or 3 moist
Chroma: 3 or 4 dry, 2 or 3 moist
Texture: silty clay loam, silty clay, clay, loam, silt loam

Guest as used in this survey is a taxadjunct to the series because it is non-effervescent throughout. Guest series is a Fine, mixed, superactive, calcareous, thermic Ustertic Torrifluvents.

37—Rock outcrop-Budlamp-Magoffin complex, 5 to 70 percent slopes

Map Unit Setting

Landform(s): mountains
*Elevation:*3,580 to 6,250 feet (1,091 to 1,905 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–1 Mexican Oak–Pine Woodland and Oak Savannah

Map Unit Composition

Rock outcrop, welded tuff: 35 percent
Budlamp and similar soils: 35 percent
Magoffin and similar soils: 25 percent

Minor components: Altar, Eloma. Other minor components include soils that are shallow or lithic with an argillic, loamy soils shallow to bedrock, loamy-skeletal soils very shallow and shallow to bedrock.

Soil Properties and Qualities

Rock outcrop
Rock outcrop consists of barren rock that occurs as outcroppings of welded tuff. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near summits.

Budlamp soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic Haplustolls
Geomorphic position: generally on backslopes
Parent material: slope alluvium and/or residuum weathered from welded tuff
Slope: 5 to 70 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover:10 percent
  - woody debris: 2 percent
  - bare soil: 5 percent
- rock fragments
  - gravel: 65 percent
  - cobble: 15 percent
  - stone: 3 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.5 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Loamy 16-20" p.z.
Ecological site number: R041XC323AZ
Present vegetation: juniper, manzanita, oak, sideoats grama, snakeweed
Land capability (non irrigated): 8c

Typical Profile

Location
Public Land Survey: USGS Quadrangle The Mesas; about 2,215 feet north and 1,420 feet west of the southeast corner of Section 14, Township 11 S, Range 21 E.
Geographic Coordinate System: 32° 28' 34.50'' north, 110° 10' 7.80'' west

A—0 to 9 inches (0 to 23 cm); brown (7.5YR 4/2) very gravelly sandy loam, very dark brown (7.5YR 2.5/2), moist; 12 percent clay; weak fine and medium subangular blocky structure; slightly hard, firm, nonsticky, nonplastic; many very fine roots; many very fine irregular pores; 50 percent gravel; noneffervescent; slightly acid, pH 6.2; abrupt wavy boundary.

R—9 to 60 inches (23 to 152 cm); unweathered welded tuff bedrock.

Range in Characteristics

Rock fragments: 35 to 60 percent
Organic matter: 1 to 3 percent
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 7 to 18 percent

A horizon
Hue: 5YR, 7.5YR, 10YR
Value: 3 or 4 dry, 2 to 3 moist
Chroma: 2 to 4, dry or moist
Texture: sandy loam, loam

R horizon
Welded tuff bedrock

Magoffin soils
Taxonomic classification: Loamy, mixed, superactive, thermic Aridic Lithic Haplustolls
Geomorphic position: generally on backslopes
Parent material: slope alluvium and/or residuum weathered from welded tuff
Slope: 5 to 70 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover:40 percent
woody debris: 10 percent

bare soil: 5 percent
rock fragments
gravel: 75 percent
cobble: 15 percent
stone: 3 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.5 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Loamy 16-20” p.z.
Ecological site number: R041XC323AZ
Present vegetation: juniper, manzanita, oak, sideoats grama, snakeweed
Land capability (non irrigated): 8c

Typical Profile

Location
Public Land Survey: USGS Quadrangle The Mesas; about 2,050 feet north and 2,415 feet west of the southeast corner of Section 14, Township 11 S, Range 21 E.
Geographic Coordinate System: 32° 28’ 0.80’’ north, 110° 10’ 13.20’’ west

A—0 to 6 inches (0 to 15 cm); brown (7.5YR 4/2) gravelly sandy loam, very dark brown (7.5YR 2.5/2), moist; 15 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine irregular pores; 25 percent gravel; noneffervescent; slightly acid, pH 6.2; abrupt wavy boundary.

R—6 to 60 inches (15 to 152 cm); unweathered welded tuff bedrock.

Range in Characteristics

Rock fragments: 15 to 25 percent
Organic matter: 1 to 3 percent
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 7 to 18 percent

A horizon
Hue: 5YR, 7.5YR, 10YR
Value: 4 dry, 2.5 or 3 moist
Chroma: 2, dry or moist
Texture: sandy loam, loam

R horizon
Welded tuff bedrock

38—Rock outcrop-Lampshire complex, 10 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains
*Elevation:*3,040 to 4,610 feet (927 to 1,405 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Rock outcrop, welded tuff: 55 percent
Lampshire and similar soils: 30 percent

Minor components: Eskiminzin, Lampshire soils with calcium carbonate accumulations, Sontag. Other minor components include clayey-skeletal and very deep soils.

Soil Properties and Qualities

Rock outcrop
Rock outcrop consists of barren rock that occurs as ledges and vertical cliffs of welded tuff and volcanic breccia. Rock outcrop also includes areas where the depth to bedrock is less than four inches.

Lampshire soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic Lithic Ustic Torriorthents
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from welded tuff
Slope: 10 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:20 percent
woody debris: 5 percent
bare soil: 20 percent
rock fragments
gravel: 50 percent
cobble: 20 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.5 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Granitic Upland 12-16” p.z.
Ecological site number: R041XC322AZ
Present vegetation: Agave, bush muhly, Engelmann hedgehog cactus, mesquite, ocotillo, pricklypear, purple threeawn, range ratany, red brome, whitethorn
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Brandenburg Mountain; about 2,100 feet east and 1,900 feet north of the southwest corner of Section 6, Township 6 S, Range 18 E.

Geographic Coordinate System: 32° 56’ 1.00’’ north, 110° 32’ 52.00’’ west

A—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3), moist; 10 percent clay; weak thin platy structure; soft, very friable, nonsticky, nonplastic; many very fine roots; few fine irregular pores; 40 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

C—1 inch to 7 inches (3 to 18 cm); brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3), moist; 15 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium roots; few fine irregular pores; 40 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.8; abrupt wavy boundary.

R—7 to 60 inches (18 to 152 cm); unweathered tuff bedrock.

Range in Characteristics

Rock fragments: 35 to 65 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 10 to 20 percent

A and C horizons
- Hue: 7.5YR
- Value: 4 to 6 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loam

R horizon
- Tuff bedrock

39—Rock outcrop-Thimble-Ruidoso family complex, 15 to 65 percent slopes

Map Unit Setting

Landform(s): mountains
*Elevation:*6,000 to 6,420 feet (1,829 to 1,957 meters)
Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)
Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)
Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)
Frost-free period: 120 to 180 days
Major Land Resource Area: 38–Mogollon Transition
Land Resource Unit: 38–3 Interior Chaparral Forest

Map Unit Composition

Rock outcrop, andesite and basalt: 40 percent
Thimble and similar soils: 35 percent
Ruidoso family and similar soils: 15 percent

Minor components: Shallow loamy soils that occur on ridge tops and side slopes.

Soil Properties and Qualities

Rock outcrop
Rock outcrop consists of barren rock formed from Tertiary breccias composed of andesite, basalt and dacite. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Thimble soils
Taxonomic classification: Clayey-skeletal, smectitic, mesic Aridic Lithic Argiustolls
Geomorphic position: generally on backslopes and summits
Parent material: mixed alluvium and/or colluvium derived from basalt and/or volcanic breccia
Slope: 15 to 65 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
tree canopy: 60 percent
plant cover: 30 percent
organic litter: 15 percent
woody debris: 10 percent
bare soil: 5 percent
rock fragments
gravel: 25 percent
cobble: 40 percent
stone: 9 percent
boulder: 1 percent
Depth to restrictive feature(s): 8 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.8 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 20-24” p.z.
Ecological site number: R038XC317AZ
Present vegetation: sideoats grama, gray oak, alligator juniper, singleleaf pinyon, Emory oak, blue grama, prairie Junegrass, perennial forbs, other shrubs, bottlebrush squirreltail
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of San Carlos Indian Reservation, AZ, Parts of Gila and Graham Counties; USGS Quadrangle Willow

Mountain; 2,520 feet north and 350 feet west of the southeast corner of Section 25, Township 2N, Range 26 E.

Geographic Coordinate System: 33° 29’ 13.80’’ north, 109° 34’ 55.60’’ west

A—0 to 1 inch (0 to 3 cm); dark reddish gray (5YR 4/2) extremely cobbly loam, dark reddish brown (5YR 2.5/2), moist; 20 percent clay; weak medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; common very fine and fine pores; 20 percent gravel and 35 percent cobble and 9 percent stone and 1 percent boulder; noneffervescent, by HCl, 1 normal; neutral, pH 6.6 by Bromthymol blue.

Bt—1 inch to 9 inches (3 to 23 cm); dark reddish gray (5YR 4/2) very cobbly clay loam, dark reddish brown (5YR 3/2), moist; 38 percent clay; moderate medium and coarse subangular blocky structure; hard, firm, moderately sticky, moderately plastic; common very fine, fine and medium roots; common fine pores; few distinct clay films on faces of peds; 20 percent gravel and 30 percent cobble; noneffervescent, by HCl, 1 normal; neutral, pH 6.6 by Bromthymol blue.

R—9 to 60 inches (23 to 152 cm); unweathered volcanic breccia bedrock.

Range in Characteristics

Rock fragments: 35 to 75 percent
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: 35 to 60 percent

A horizon
- Hue: 5YR, 7.5YR, 10YR
- Value: 4 dry, 2.5 to 3 moist
- Chroma: 2 to 3, dry or moist
- Texture: loam, clay loam

Bt horizon
- Hue: 5YR, 7.5YR
- Value: 4 dry, 3 moist
- Chroma: 2 to 3, dry or moist
- Texture: clay loam, clay
- Effervescence: none to slight

R horizon
- Volcanic breccia composed of andesite, basalt, and dacite bedrock

Ruidoso family soils
Taxonomic classification: Fine, mixed, superactive, mesic Pachic Argiustolls
Geomorphic position: generally on backslopes
Parent material: mixed colluvium and/or slope alluvium over residuum weathered from volcanic breccia
Slope: 15 to 50 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - tree canopy: 50 percent

plant cover: 30 percent
organic litter: 30 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 20 percent
cobble: 30 percent
stone: 9 percent
boulder: 1 percent

Depth to restrictive feature(s): 30 to 60 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 4.4 (low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 20-24” p.z.
Ecological site number: R038XC317AZ
Present vegetation: sideoats grama, gray oak, alligator juniper, singleleaf pinyon, Emory oak, blue grama, prairie Junegrass, perennial forbs, other shrubs, bottlebrush squirreltail
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of San Carlos Indian Reservation, AZ, Parts of Gila and Graham Counties; USGS Quadrangle Willow Mountain; 2,150 feet south and 290 feet west of the northeast corner of Section 17, Township 1N, Range 27 E.

Geographic Coordinate System: 33° 25’ 50.30’’ north, 109° 32’ 49.50’’ west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/2) very cobbly loam, very dark brown (7.5YR 2/2), moist; 18 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; common very fine and fine pores; 15 percent gravel and 20 percent cobble and 5 percent stone and 1 percent boulder; noneffervescent, by HCl, 1 normal; neutral, pH 6.8 by Bromthymol blue; abrupt smooth boundary.

Bt1—2 to 18 inches (5 to 46 cm); dark brown (7.5YR 3/2) gravelly clay loam, very dark brown (7.5YR 2/2), moist; 33 percent clay; weak medium prismatic parting to moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common very fine, fine and medium roots; common very fine and fine pores; common distinct clay films on faces of peds and rock fragments; 20 percent gravel and 5 percent cobble; noneffervescent, by HCl, 1 normal; neutral, pH 6.8 by Bromthymol blue; gradual wavy boundary.

Bt2—18 to 25 inches (46 to 64 cm); dark brown (7.5YR 3/3) clay, dark brown (7.5YR 3/3), moist; 45 percent clay; weak medium prismatic parting to moderate fine and medium subangular blocky structure; very hard, firm, moderately sticky, moderately plastic; common fine, medium, and coarse roots; common very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 10 percent gravel;

noneffervescent, by HCl, 1 normal; neutral, pH 6.8 by Bromthymol blue; clear smooth boundary.

Bt3—25 to 32 inches (64 to 81 cm); brown (7.5YR 5/4) gravelly clay, brown (7.5YR 4/4), moist; 50 percent clay; weak medium prismatic parting to moderate fine and medium subangular blocky structure; extremely hard, firm, moderately sticky, moderately plastic; common fine, medium, and coarse roots; common very fine and fine pores; common distinct clay films on faces of peds and rock fragments; 15 percent gravel and 5 percent cobble; noneffervescent, by HCl, 1 normal; neutral, pH 6.8 by Bromthymol blue; gradual wavy boundary.

R—32 to 60 inches (81 to 152 cm); unweathered volcanic breccia bedrock.

Range in Characteristics

Rock fragments: 15 to 35 percent
Organic matter: 1 to 3 percent
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in control section: 35 to 50 percent

A horizon
- Hue: 7.5YR
- Value: 3 to 4 dry, 2 to 3 moist
- Chroma: 2 to 3, dry or moist
- Texture: loam
- Rock fragments: 35 to 60 percent

Upper Bt horizons
- Hue: 5YR, 7.5YR
- Value: 3 to 4 dry, 2 to 3 moist
- Chroma: 2 to 3, dry or moist
- Texture: clay loam, clay
- Rock fragments: 15 to 35 percent

Lower Bt horizons
- Hue: 5YR, 7.5YR
- Value: 3 to 5 dry, 3 to 4 moist
- Chroma: 3 to 4, dry or moist
- Texture: clay
- Rock fragments: 5 to 35 percent

R horizon
- Volcanic breccia composed of andesite, basalt, and dacite bedrock

40—Sasabe clay loam, 0 to 1 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*4,410 to 4,480 feet (1,344 to 1,366 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Sasabe and similar soils: 90 percent

Minor components: soils having greater than 35 percent rock fragments, soils with a calcic horizon below 20 inches.

Soil Properties and Qualities

Sasabe soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Paleargids
Geomorphic position: generally on backslopes and summits
Parent material: mixed fan alluvium
Slope: 0 to 1 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 0 percent
woody debris: 0 percent
bare soil: 100 percent
rock fragments
gravel: 10 percent
Depth to restrictive feature(s): 5 to 15 inches to abrupt textural change
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 1.9 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Present vegetation: Johnsongrass, maize
Land capability (irrigated): 3c
Land capability non-irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Fort Grant; about 315 feet south and 500 feet east of the northwest corner of Section 26, Township 10 S, Range 23 E.
Geographic Coordinate System: 32° 32’ 33.60’’ north, 109° 58’ 18.60’’ west

Ap—0 to 10 inches (0 to 25 cm); yellowish red (5YR 4/6) clay loam, yellowish red (5YR 4/6), moist; 35 percent clay; moderate medium platy parting to weak medium subangular blocky structure; slightly hard, friable, moderately sticky, very plastic; many very fine roots; many very fine tubular pores; 5 percent gravel; noneffervescent; slightly acid, pH 6.4; abrupt smooth boundary.

Bt—10 to 20 inches (25 to 51 cm); yellowish red (5YR 4/6) clay, yellowish red (5YR 4/6), moist; 50 percent clay; moderate medium prismatic structure; very hard, firm, very sticky, very plastic; many very fine roots; many very fine tubular pores; many distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; neutral, pH 6.8; clear wavy boundary.

Btk1—20 to 28 inches (51 to 71 cm); yellowish red (5YR 4/6) clay, yellowish red (5YR 4/6), moist; 50 percent clay; moderate medium prismatic structure; very hard, firm, very sticky, very plastic; common very fine roots; many very fine tubular pores; many distinct clay films on faces of peds and rock fragments; many medium distinct carbonate masses; 5 percent gravel; slightly effervescent; neutral, pH 6.6; clear wavy boundary.

Btk2—28 to 60 inches (71 to 152 cm); yellowish red (5YR 4/6) clay loam, yellowish red (5YR 4/6), moist; 35 percent clay; weak medium subangular blocky structure; slightly hard, friable, very sticky, very plastic; few very fine roots; common very fine tubular pores; common distinct clay films on faces of peds and rock fragments; many medium distinct carbonate masses; 5 percent gravel; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: 0 to 30 percent gravel
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 35 to 60 percent

Ap horizon
- Hue: 5YR, 7.5YR
- Value: 3 or 4, dry or moist
- Chroma: 3 to 6 dry, 2 to 6 moist
- Texture: clay loam

Bt horizons
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 3 to 5, dry or moist
- Chroma: 3 to 6, dry or moist
- Texture: clay loam, clay

Btk horizons
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 3 to 5, dry or moist
- Chroma: 3 to 6, dry or moist
- Texture: clay loam, clay

41—Sasabe sandy clay loam, 0 to 1 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*4,460 to 4,480 feet (1,359 to 1,366 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Sasabe and similar soils: 90 percent

Minor components: Mallet over Sasabe

Soil Properties and Qualities

Sasabe soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Paleargids
Geomorphic position: generally on backslopes and summits
Parent material: mixed fan alluvium
Slope: 0 to 1 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 80 percent
woody debris: 0 percent
bare soil: 20 percent
rock fragments
gravel: 5 percent
Depth to restrictive feature(s): 5 to 20 inches to abrupt textural change
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 2.4 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Present vegetation: bare ground
Land capability (irrigated): 3c
Land capability (non-irrigated): 3w

Typical Profile

Location
Public Land Survey: USGS Quadrangle Fort Grant; about 1,410 feet south and 525 feet east of the northwest corner of Section 26, Township 10 S, Range 23 E.
Geographic Coordinate System: 32° 32’ 22.80’’ north, 109° 58’ 18.50’’ west

Ap—0 to 10 inches (0 to 25 cm); reddish brown (5YR 4/3) sandy clay loam, dark reddish brown (5YR 3/3), moist; 23 percent clay; weak fine and medium angular blocky parting to weak fine granular structure; moderately hard, very friable, slightly sticky, slightly plastic; many very fine roots; many fine vesicular pores; 5 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt1—10 to 16 inches (25 to 41 cm); reddish brown (5YR 4/3) sandy clay loam, dark reddish brown (5YR 3/3), moist; 24 percent clay; moderate fine and medium angular blocky structure; moderately hard, very friable, slightly sticky, slightly plastic; common very fine roots; many fine tubular pores; common distinct clay films on faces of peds; 5 percent gravel; noneffervescent; neutral, pH 7.0; clear wavy boundary.

Bt2—16 to 34 inches (41 to 86 cm); reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4), moist; 50 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; common very fine roots; common fine tubular pores; many distinct clay films on faces of peds; 5 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt3—34 to 48 inches (86 to 122 cm); reddish brown (2.5YR 5/4) clay, reddish brown (2.5YR 4/4), moist; 50 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; few very fine roots; common fine tubular pores; common distinct clay films on faces of peds; 5 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

2Btk—48 to 60 inches (122 to 152 cm); reddish brown (2.5YR 5/4) gravelly clay, reddish brown (2.5YR 4/4), moist; 50 percent clay; strong fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; few fine roots; common fine tubular pores; common distinct clay films on faces of peds; 25 percent gravel; slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: 0 to 25 percent gravel
Reaction: 6.8 to 7.0 (neutral)
Average percent clay in the control section: 35 to 60 percent

Ap horizon
- Hue: 5YR, 7.5YR
- Value: 4 dry, 3 or 4 moist
- Chroma: 3 dry, 2 to 4 moist
- Texture: sandy clay loam

Bt horizons
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 3 or 4 dry, 3 to 6 moist
- Texture: sandy clay loam, sandy clay, clay

42—Sasabe sandy loam, 1 to 8 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*4,340 to 5,370 feet (1,323 to 1,637 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Sasabe and similar soils: 70 percent

Minor components: Baboquivari, Caralampi, Combate, Eloma, Hooks, Mallet, Riverwash. Other minor components include soils that are fine-loamy with carbonates, soils that are coarse-loamy with an argillic horizon.

Soil Properties and Qualities

Sasabe soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Paleargids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 1 to 8 percent

Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 15 percent
woody debris: 5 percent
bare soil: 75 percent
rock fragments
gravel: 5 percent
Depth to restrictive feature(s): 1 inch to 10 inches to abrupt textural change
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Ecological site name: Sandy Loam Upland 12-16” p.z.
Ecological site number: R041XC319AZ
Present vegetation: globemallow, Lehmann lovegrass, manyflowered mentzelia, mesquite, snakeweed, soaptree yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 175 feet north and 525 feet west of the southeast corner of Section 5, Township 9 S, Range 232 E.
Geographic Coordinate System: 32° 35’ 15.00’’ north, 110° 0’ 34.70’’ west

A—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 8 percent clay; weak thin and medium platy parting to weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many fine irregular pores; 5 percent gravel; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

Bw—2 to 8 inches (5 to 20 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 11 percent clay; weak fine subangular blocky and weak medium subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; common very fine roots; common very fine tubular pores; 5 percent gravel; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

Bt—8 to 36 inches (20 to 91 cm); red (2.5YR 4/6) clay, dark red (2.5YR 3/6), moist; 54 percent clay; strong coarse prismatic and strong medium prismatic structure; very hard, very firm, very sticky, very plastic; few medium roots throughout and few very fine roots; many very fine tubular pores; common pressure faces and many continuous distinct clay films on faces of peds; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Btk—36 to 60 inches (91 to 152 cm); yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6), moist; 40 percent clay; strong coarse subangular blocky and strong medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few very fine

roots; many very fine tubular pores; many continuous distinct clay films on faces of peds; common threadlike carbonate masses and common irregular carbonate masses; 5 percent gravel; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Rock fragments: 0 to 30 percent gravel
Reaction: 6.0 to 7.4 (moderately acid to slightly alkaline)
Average percent clay in the control section: 35 to 60 percent

A horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 or 5 dry, 2.5 to 4 moist
- Chroma: 3 to 6 dry, 1 to 6 moist
- Texture: sandy loam, sandy clay loam, clay loam, loam, fine sandy loam

Bw horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 to 6 dry, 2 to 6 moist
- Texture: sandy loam, sandy clay loam, clay loam, fine sandy loam

Bt horizons
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 3 to 5 dry, 2.5 to 5 moist
- Chroma: 3 to 6 dry, 1 to 6 moist
- Texture: clay, sandy clay, sandy clay loam, clay loam

Btk or Bk horizon(s) (when present)
- Hue: 5YR, 7.5YR
- Value: 5 to 6 dry, 4 to 6 moist
- Chroma: 4 to 6, dry or moist
- Texture: clay loam, sandy clay loam, clay

43—Sasabe-Bonita-Forrest complex, 0 to 3 percent slopes

Map Unit Setting

Landform(s): basin floors
*Elevation:*4,330 to 4,610 feet (1,320 to 1,405 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Sasabe and similar soils: 35 percent
Bonita and similar soils: 25 percent
Forrest and similar soils: 20 percent

Minor components: Hooks, Mallet

Soil Properties and Qualities

Sasabe soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Paleargids
Geomorphic position: playa
Parent material: mixed alluvium
Slope: 0 to 3 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 10 percent
woody debris: 0 percent
bare soil: 70 percent
rock fragments
gravel: 25 percent
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Available water capacity total inches: 10.2 (very high)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: very rare
Runoff class: low
Hydrologic group: C
Ecological site name: Loamy Upland 12-16” p.z.
Ecological site number: R041XC313AZ
Present vegetation: aster, mesquite, mustard, pricklypear, tobosagrass
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 2,690 feet south and 2,205 feet east of the northwest corner of Section 28, Township 10 S, Range 22 E.
Geographic Coordinate System: 32° 32’ 9.30’’ north, 110° 6’ 12.60’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) loam, brown (7.5YR 4/4), moist; 10 percent clay; moderate thin and thick platy parting to strong fine granular structure; soft, friable, nonsticky, nonplastic; many very fine roots; many very fine tubular pores; 10 percent gravel; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt1—2 to 8 inches (5 to 20 cm); brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4), moist; 33 percent clay; moderate fine and medium subangular blocky structure; slightly hard, firm, moderately sticky, very plastic; many very fine roots; many very fine tubular pores; common continuous distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt2—8 to 14 inches (20 to 36 cm); brown (7.5YR 4/4) gravelly clay loam, dark brown (7.5YR 3/4), moist; 35 percent clay; moderate fine and medium subangular blocky structure; slightly hard, firm, moderately sticky, very plastic; common very fine roots; many very fine tubular pores; common continuous distinct clay films on faces of

peds and rock fragments; 30 percent gravel; noneffervescent; neutral, pH 6.8; abrupt smooth boundary.

Btk1—14 to 34 inches (36 to 86 cm); yellowish red (5YR 4/6) clay, reddish brown (5YR 4/4), moist; 55 percent clay; strong medium subangular blocky structure; very hard, very firm, very sticky, very plastic; few fine roots; common very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; many fine carbonate masses; 3 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Btk2—34 to 60 inches (86 to 152 cm); yellowish red (5YR 4/6) clay loam, yellowish red (5YR 4/6), moist; 35 percent clay; moderate fine and medium subangular blocky structure; slightly hard, firm, very sticky, very plastic; few fine roots; common very fine tubular pores; many continuous distinct clay films on faces of peds and rock fragments; common patchy distinct carbonate coats on rock fragments; many fine carbonate masses; 15 percent gravel; violently effervescent, 14 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: less than 35 percent in control section
Reaction: 6.1 to 8.4 (slightly acid to moderately alkaline)
Average percent clay in the control section: greater than 35 percent

A horizon
- Hue: 7.5YR
- Value: 4 or 5 dry, 3 to 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loam

Bt horizons
- Hue: 5YR, 7.5YR
- Value: 4 dry, 3 moist
- Chroma: 3 or 4, dry or moist
- Texture: clay, clay loam

Btk horizons
- Hue: 5YR
- Value: 4, dry or moist
- Chroma: 6 dry, 4 to 6 moist
- Texture: clay, clay loam, loam
- Calcium carbonate equivalent: less than 15 percent

Bonita soils
Taxonomic classification: Fine, smectitic, thermic Typic Haplotorrerts
Geomorphic position: drainageways
Parent material: mixed alluvium
Slope: 0 to 3 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 5 percent

woody debris: 0 percent
bare soil: 80 percent
rock fragments
gravel: 20 percent
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Available water capacity total inches: 9.1 (high)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: very rare
Runoff class: medium
Hydrologic group: D
Ecological site name: Clayey Upland 12-16" p.z.
Ecological site number: R041XC304AZ
Present vegetation: aster, little barley, mesquite, mustard, tobosagrass
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 2,540 feet north and 190 feet west of the southeast corner of Section 28, Township 10 S, Range 22 E.
Geographic Coordinate System: 32° 32' 8.80'' north, 110° 5' 38.60'' west

A—0 to 5 inches (0 to 13 cm); brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4), moist; 45 percent clay; strong fine granular parting to strong fine and medium subangular blocky structure; soft, very friable, very sticky, very plastic; many very fine roots; many very fine interstitial pores; 5 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Btss—5 to 35 inches (13 to 89 cm); dark brown (7.5YR 3/4) clay, dark brown (7.5YR 3/4), moist; 55 percent clay; strong fine to coarse wedge structure; extremely hard, extremely firm, very sticky, very plastic; common very fine roots and few fine roots; common very fine dendritic tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Btk—35 to 60 inches (89 to 152 cm); yellowish red (5YR 4/6) gravelly clay loam, yellowish red (5YR 4/6), moist; 38 percent clay; moderate fine and medium subangular blocky structure; slightly hard, friable, very sticky, very plastic; few fine roots; common very fine dendritic tubular pores; common continuous distinct clay films on faces of peds and rock fragments; 15 percent gravel; very slightly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Soil cracks: many vertical cracks 0.25 inch to 3 inches wide from the surface to a depth of 18 inches or more
Rock fragments: less than 15 percent in control section
Reaction: 6.6 to 8.4 (neutral to moderately alkaline)
Average percent clay in the control section: greater than 35 percent

A horizon
Hue: 7.5YR
Value: 4 or 5 dry, 2.5 to 5 moist
Chroma: 3 or 4 dry, 1 to 4 moist
Texture: clay, clay loam, silty clay loam

Bt horizon
Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2.5 to 4 moist
Chroma: 4 dry, 1 to 6 moist
Texture: clay, clay loam

Btk horizon
Hue: 5YR
Value: 4 or 5 dry, 4 moist
Chroma: 4 to 6, dry or moist
Texture: clay, clay loam
Calcium carbonate equivalent: less than 15 percent

Forrest soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Calciargids
Geomorphic position: playa
Parent material: mixed alluvium
Slope: 0 to 3 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 5 percent
woody debris: 0 percent
bare soil: 80 percent
rock fragments
gravel: 5 percent
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Available water capacity total inches: 5.2 (moderate)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: very rare
Runoff class: low
Hydrologic group: C
Ecological site name: Sandy Loam Upland 12-16” p.z.
Ecological site number: R041XC319AZ
Present vegetation: mesquite, tobosagrass
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Sierra Bonita Ranch; about 175 feet north and 1,075 feet east of the southwest corner of Section 27, Township 10 S, Range 22 E.
Geographic Coordinate System: 32° 31’ 45.30’’ north, 110° 5’ 23.90’’ west

A—0 to 5 inches (0 to 13 cm); brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4), moist; 26 percent clay; moderate medium subangular blocky parting to moderate fine granular structure; soft, friable, slightly sticky, slightly plastic; many very fine roots; many very fine dendritic tubular pores; 3 percent gravel; noneffervescent; neutral, pH 6.6; clear wavy boundary.

Bt—5 to 22 inches (13 to 56 cm); brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4), moist; 50 percent clay; strong medium subangular blocky structure; very hard, very firm, very sticky, very plastic; many very fine and few medium roots; many very fine dendritic tubular pores; many continuous distinct clay films on faces of peds and rock fragments; 3 percent gravel; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Btk—22 to 40 inches (56 to 102 cm); light brown (7.5YR 6/3) gravelly sandy loam, brown (7.5YR 4/4), moist; 15 percent clay; massive; soft, very friable, slightly sticky, slightly plastic; few very fine roots; common very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; many fine and medium carbonate masses; 15 percent gravel; violently effervescent, 16 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Rock fragments: less than 35 percent in control section
Reaction: 6.1 to 8.4 (slightly acid to moderately alkaline)
Average percent clay in the control section: greater than 35 percent

A horizon
- Hue: 7.5YR
- Value: 3 or 4 dry, 2.5 or 3 moist
- Chroma: 3 or 4 dry, 1 to 3 moist
- Texture: clay loam, sandy loam, loam

Bt horizon
- Hue: 5YR, 7.5YR, 2.5YR
- Value: 3 or 4 dry, 2.5 to 4 moist
- Chroma: 3 or 4 dry, 2 to 4 moist
- Texture: clay, clay loam

Btk horizon
- Hue: 5YR, 7.5YR, 2.5YR
- Value: 3 to 6 dry, 2.5 to 5 moist
- Chroma: 3 to 6 dry, 3 or 4 moist
- Texture: clay, clay loam, sandy loam
- Calcium carbonate equivalent: 10 to 20 percent

44—Schrap-Rock outcrop complex, 5 to 45 percent slopes

Map Unit Setting

Landform(s): hills
*Elevation:*4,670 to 5,010 feet (1,423 to 1,527 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Schrap and similar soils: 70 percent
Rock outcrop, schist: 10 percent

Minor components: Lampshire. Other minor components include loamy soils that are less than 20 inches deep to weathered granite.

Soil Properties and Qualities

Schrap soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic, shallow Ustic Torriorthents
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from schist
Slope: 5 to 45 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 5 percent
woody debris: 0 percent
bare soil: 25 percent
rock fragments
gravel: 60 percent
cobble: 10 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 19.98 inches per hour (0.00 to 141.00 micrometers per second)
Available water capacity total inches: 0.5 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Granitic Hills 12-16” p.z.
Ecological site number: R041XC306AZ
Present vegetation: annual grasses, burroweed, false mesquite, mesquite, snakeweed
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Blue Jay Peak; about 650 feet north and 200 feet west of the southeast corner of Section 24, Township 9 S, Range 22 E.
Geographic Coordinate System: 32° 37’ 56.20’’ north, 110° 2’ 34.70’’ west

A—0 to 5 inches (0 to 13 cm); reddish brown (5YR 4/4) very gravelly loam, dark reddish brown (5YR 3/3), moist; 22 percent clay; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine irregular pores; 45 percent gravel; noneffervescent; neutral, pH 6.8; abrupt wavy boundary.

Cr—5 to 60 inches (13 to 152 cm) weathered schist bedrock.

Range in Characteristics

Rock fragments: 35 to 45 percent
Reaction: 6.6 to 7.3 (neutral)
Average percent clay in the control section: 18 to 26 percent

A horizon
Hue: 5YR, 7.5YR
Value: 4 dry, 3 moist
Chroma: 4 dry, 2 to 4 moist
Texture: loam

Cr horizon
Schist bedrock

Rock outcrop
Rock outcrop consists of barren rock that occurs as outcroppings and boulder piles of schist. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near summits.

45—Stagecoach-Delnorte complex, 5 to 45 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,120 to 3,440 feet (951 to 1,049 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40–Sonoran Basin and Range
Land Resource Unit: 40–1 Upper Sonoran Desert Shrub

Map Unit Composition

Stagecoach and similar soils: 55 percent
Delnorte and similar soils: 35 percent

Minor components: Nadha, Riverwash. Other minor components include sandy-skeletal soils, loamy soils that are very shallow and shallow to bedrock.

Soil Properties and Qualities

Stagecoach soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Typic Haplocalcids
Geomorphic position: generally on backslopes
Parent material: mixed fan alluvium
Slope: 20 to 45 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent

Physical cover
canopy plant cover:35 percent
woody debris: 0 percent
bare soil: 10 percent
rock fragments
gravel: 55 percent
cobble: 25 percent
stone: 5 percent
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 2.4 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: A
Ecological site name: Limy Slopes 10-13” p.z.
Ecological site number: R040XA110AZ
Present vegetation: other annual forbs, foothill paloverde, saguaro, triangle bursage, creosotebush, perennial forbs, ocotillo, fishhook barrel cactus, range ratany, brittlebush
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Dudleyville; about 2,450 west and 1,350 feet south of the northeast corner of Section 30, Township 5 S, Range 16 E.
Geographic Coordinate System: 32° 58’ 19.90’’ north, 110° 44’ 55.00’’ west

A—0 to 6 inches (0 to 15 cm); brown (10YR 5/3) extremely cobbly sandy loam, brown (10YR 4/3), moist; 12 percent clay; weak very thin platy parting to weak very fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 35 percent gravel and 25 percent cobble; violently effervescent, 5 percent Calcium carbonate equivalent; slightly alkaline, pH 7.6; abrupt wavy boundary.

Bk1—6 to 19 inches (15 to 48 cm); pale brown (10YR 6/3) extremely cobbly sandy loam, brown (10YR 5/3), moist; 12 percent clay; weak very fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine and few medium and coarse roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 25 percent gravel and 35 percent cobble; violently effervescent, 16 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Bk2—19 to 48 inches (48 to 122 cm); light brownish gray (10YR 6/2) extremely gravelly sandy loam, brown (10YR 5/3), moist; 12 percent clay; weak very fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel and 20 percent cobble; violently effervescent, 16 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk3—48 to 60 inches (122 to 152 cm); pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3), moist; 10 percent clay; massive; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel and

20 percent cobble; violently effervescent, 11 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: 35 to 65 percent
Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)
Average percent clay in the control section: 7 to 18 percent
Calcium carbonate equivalent: 5 to 20 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 5 or 6 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam

Bk horizons
- Hue: 7.5YR, 10YR
- Value: 6 or 7 dry, 3 to 6 moist
- Chroma: 2 or 3 dry, 3 or 4 moist
- Texture: sandy loam, loam

Delnorte soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 5 to 25 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:40 percent
  - woody debris: 20 percent
  - bare soil: 5 percent
- rock fragments
  - gravel: 75 percent
  - cobble: 20 percent

Depth to restrictive feature(s): 6 to 20 inches to petrocalcic
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Limy Slopes 10-13” p.z.
Ecological site number: R040XA110AZ

Present vegetation: creosotebush, other annual forbs, ocotillo, triangle bursage, saguaro, foothill paloverde
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Dudleyville; about 2,200 feet west and 550 feet south of the northeast corner of Section 30, Township 5 S, Range 16 E.
Geographic Coordinate System: 32° 58’ 27.30’’ north, 110° 44’ 50.40’’ west

A—0 to 1 inch (0 to 3 cm); light brownish gray (10YR 6/2) very gravelly sandy loam, dark grayish brown (10YR 4/2), moist; 10 percent clay; weak very thin platy parting to weak fine granular structure; soft, very friable, nonsticky, nonplastic; few very fine roots; few fine irregular pores; 35 percent gravel and 10 percent cobble; violently effervescent, 8 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk—1 inch to 13 inches (3 to 33 cm); pale brown (10YR 6/3) very cobbly sandy loam, brown (10YR 5/3), moist; 12 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and few medium roots; few fine tubular pores; many continuous distinct carbonate coats on rock fragments; many fine and medium carbonate masses; 15 percent gravel and 40 percent cobble; violently effervescent, 18 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bkm—13 to 60 inches (33 to 152 cm); violently effervescent; cemented material, thin laminar cap; indurated; petrocalcic.

Range in Characteristics

Rock fragments: 35 to 70 percent
Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)
Average percent clay in the control section: 7 to 18 percent
Calcium carbonate equivalent: 5 to 20 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 5 or 6 dry, 3 or 4 moist
- Chroma: 2 to 4, dry or moist
- Texture: sandy loam

Bk horizons
- Hue: 7.5YR, 10YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loam

Bkm horizon
- Cemented: calcium carbonate
- Hardness: indurated
- Thickness: 1 foot to 3 feet; continuous

46—Stagecoach-Haplogypsids-Delnorte complex, 5 to 80 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,120 to 3,370 feet (951 to 1,027 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40–Sonoran Basin and Range
Land Resource Unit: 40–1 Upper Sonoran Desert Shrub

Map Unit Composition

Stagecoach and similar soils: 40 percent
Haplogypsids and similar soils: 30 percent
Delnorte and similar soils: 15 percent

Minor components: Contention, Nahda, Queencreek, Riverwash, Whitecliff. Other minor components include haplogypsids that have pH greater than 9.0, badlands, soils with consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials, loamy-skeletal soils without a calcic horizon, coarse-loamy soils with a calcic horizon, coarse-loamy soils with a calcic and gypsic horizon.

Soil Properties and Qualities

Stagecoach soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Typic Haplocalcids
Geomorphic position: generally on backslopes and summits
Parent material: mixed fan alluvium
Slope: 5 to 45 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:20 percent
  - woody debris: 5 percent
  - bare soil: 25 percent
- rock fragments
  - gravel: 40 percent
  - cobble: 10 percent

Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 3.6 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low

Hydrologic group: A
Ecological site name: Limy Upland, Deep 10-13” p.z.
Ecological site number: R040XA106AZ
Present vegetation: annual grasses, catclaw acacia, Christmas cactus, creosotebush, foothill paloverde, mesquite, pricklypear, saguaro
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Mammoth; about 2,000 feet south and 300 feet east of the northwest corner of Section 17, Township 8 S, Range 17 E.
Geographic Coordinate System: 32° 44’ 20.00’’ north, 110° 38’ 12.00’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) gravelly fine sandy loam, dark brown (7.5YR 3/4), moist; 7 percent clay; weak thin platy structure; soft, very friable, nonsticky, nonplastic; many very fine roots; common fine irregular pores; 30 percent gravel; violently effervescent, 1 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk1—2 to 38 inches (5 to 97 cm); light brown (7.5YR 6/3) very gravelly sandy loam, brown (7.5YR 4/3), moist; 10 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine and few medium roots; few fine tubular pores; many continuous distinct carbonate coats on rock fragments; many fine and medium carbonate masses; 45 percent gravel; violently effervescent, 13 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk2—38 to 60 inches (97 to 152 cm); light brown (7.5YR 6/3) very gravelly loamy sand, brown (7.5YR 4/3), moist; 5 percent clay; massive; soft, very friable, weakly, nonsticky, nonplastic; few fine and medium roots; few fine tubular pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel and 10 percent cobble; violently effervescent, 9 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Range in Characteristics

Rock fragments: 35 to 60 percent, averages more than 35 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 5 to 20 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loamy sand, fine sandy loam

Bk horizons
- Hue: 10YR, 7.5YR
- Value: 5 to 7 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loamy sand
- Calcium carbonate equivalent: 5 to 25 percent
- Gypsum: 0 to 5 percent

These soils occur over consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials.

Haplogypsids soils
Taxonomic classification: Haplogypsids
Geomorphic position: generally on backslopes
Parent material: gypsiferous and calcaerous lacustrine deposits
Slope: 20 to 80 percent
Surface cover:
Biological crust
cyanobacteria: 30 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 10 percent (crystals)
Physical cover
canopy plant cover:25 percent
woody debris: 5 percent
bare soil: 10 percent
rock fragments
gravel: 20 percent
cobble: 5 percent
Depth to restrictive feature(s): 30 to 48 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 4.6 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Gypsum Upland 10-13” p.z.
Ecological site number: R040XA126AZ
Present vegetation: annual grasses, catclaw acacia, creosotebush, Engelmann hedgehog cactus, foothill paloverde, mesquite, Mormon tea, ocotillo, pricklypear, whitethorn
Land capability (non irrigated): 8

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Mammoth; about 1,400 feet south and 1,200 feet east of the northwest corner of Section 17, Township 8 S, Range 17 E.
Geographic Coordinate System: 32° 44’ 34.00’’ north, 110° 37’ 50.00’’ west

Bky1—0 to 2 inches (0 to 5 cm); light gray (10YR 7/2) loam, light yellowish brown (10YR 6/4), moist; 10 percent clay; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; many fine vesicular pores; many fine and medium gypsum crystals; noneffervescent, 38 percent gypsum; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bky2—2 to 18 inches (5 to 46 cm); very pale brown (10YR 7/3) sandy loam, yellowish brown (10YR 5/4), moist; 5 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine roots; many fine tubular pores; many fine carbonate and gypsum masses; many fine and medium gypsum

crystals; strongly effervescent, 33 percent gypsum; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bky3—18 to 26 inches (46 to 66 cm); pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4), moist; 8 percent clay; massive; soft, very friable, nonsticky, nonplastic; few very fine roots; few fine tubular pores; few very fine carbonate and gypsum masses; many very fine gypsum crystals; strongly effervescent, 1 percent Calcium carbonate equivalent and 38 percent gypsum; slightly alkaline, pH 7.8; clear smooth boundary.

Bky4—26 to 42 inches (66 to 107 cm); brown (10YR 5/3) loam, dark yellowish brown (10YR 4/4), moist; 18 percent clay; strong thin and medium platy structure; slightly hard, very friable, nonsticky, slightly plastic; few very fine roots; few fine tubular pores; many very fine gypsum crystals; violently effervescent, 10 percent Calcium carbonate equivalent and 33 percent gypsum; moderately alkaline, pH 8.0; abrupt smooth boundary.

R—42 to 48 inches (107 to 122 cm); extremely hard; strongly effervescent, 75 percent gypsum; unweathered consolidated gypsum bedrock; abrupt smooth boundary.

Cky—48 to 60 inches (122 to 152 cm); brown (10YR 5/3) clay loam, dark yellowish brown (10YR 4/4), moist; 32 percent clay; massive; soft, very friable, very sticky, very plastic; few fine tubular pores; many fine and medium gypsum crystals; violently effervescent, 8 percent calcium carbonate equivalent and 33 percent gypsum; slightly alkaline, pH 7.8.

Range in Characteristics

Rock fragments: 0 to 10 percent; may contain up to 60 percent gypsum crystals and consolidated gypsum fragments
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 5 to 35 percent
Calcium carbonate equivalent: 0 to 20
Gypsum: 15 to 50 percent

Bky and Cky horizons
- Hue: 10YR. 7.5YR
- Value: 5 to 7 dry, 3 to 6 moist
- Chroma: 2 to 4, dry or moist
- Texture: sandy loam, loam, fine sandy loam, clay loam, silty clay loam, clay, silt loam, very fine sandy loam

R horizon
- Consolidated calcareous and gypsiferous sedimentary bedrocks that are interbedded with nonconsolidated (lacustrine sediments) materials. Can be cemented with gypsum, calcium carbonate, and/or silica. Bedrock is hard to extremely hard and can be brittle.
- With depth there is consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials
- Bedrock is not present in all pedons within 60 inches.

Delnorte soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids
Geomorphic position: generally on summits
Parent material: mixed fan alluvium
Slope: 5 to 10 percent
Surface cover:
- Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:20 percent
woody debris: 5 percent
bare soil: 10 percent
rock fragments
gravel: 70 percent
cobble: 20 percent

Depth to restrictive feature(s): 6 to 20 inches to petrocalcic; 20 to 45 inches to strongly contrasting textural stratification
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.2 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Limy Upland 10-13” p.z.
Ecological site number: R040XA111AZ
Present vegetation: annual grasses, catclaw acacia, creosotebush, foothill paloverde, Mormon tea, ocotillo, pricklypear, saguaro
Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Eastern Pinal and Southern Gila Counties, AZ; USGS Quadrangle Mammoth; about 1,000 feet south and 1,900 feet east of the northwest corner of Section 17, Township 8 S, Range 17 E.

Geographic Coordinate System: 32° 44’ 30.00’’ north, 110° 37’ 54.00’’ west

A—0 to 1 inch (0 to 3 cm); yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4), moist; 10 percent clay; weak thin platy structure; soft, very friable, nonsticky, nonplastic; common very fine roots; common fine irregular pores; 25 percent gravel; strongly effervescent, 1 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk1—1 inch to 8 inches (3 to 20 cm); yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 4/4), moist; 15 percent clay; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; common fine tubular pores; many continuous distinct carbonate coats on rock fragments; many very fine carbonate masses; 45 percent gravel; violently effervescent, 12 percent Calcium carbonate equivalent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk2—8 to 13 inches (20 to 33 cm); pale brown (10YR 6/3) very gravelly loam, yellowish brown (10YR 5/4), moist; 15 percent clay; massive; slightly hard, friable, nonsticky, slightly plastic; common very fine roots; few fine tubular pores; many continuous distinct carbonate coats on rock fragments; 40 percent gravel; violently

effervescent, 21 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Bkm—13 to 38 inches (33 to 97 cm); very hard; violently effervescent; cemented material, indurated; petrocalcic; abrupt smooth boundary.

Bk3—38 to 60 inches (97 to 152 cm); pale brown (10YR 6/3) very gravelly loamy sand, yellowish brown (10YR 5/4), moist; 3 percent clay; massive; soft, very friable, nonsticky, nonplastic; few fine irregular pores; many continuous distinct carbonate coats on rock fragments; many fine carbonate masses; 40 percent gravel; violently effervescent, 22 percent Calcium carbonate equivalent and 2 percent gypsum; moderately alkaline, pH 8.0; abrupt smooth boundary.

Range in Characteristics

Rock fragments: 25 to 50 percent, averages more than 35 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 5 to 25 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loamy sand, loam

Bk horizons
- Hue: 10YR, 7.5YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loam, loamy sand
- Calcium carbonate equivalent: 5 to 30 percent
- Gypsum: 0 to 4 percent

Bkm horizon
- Cemented: calcium carbonate
- Hardness: indurated
- Thickness: 1 foot to 6 feet; continuous

These soils occur over consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials.

47—Stagecoach-Pinaleno complex, Sonoran, 15 to 60 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,030 to 3,430 feet (924 to 1,045 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 62 to 68 degrees F (16.7 to 20.0 degrees C)
Mean annual soil temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Frost-free period: 190 to 260 days
Major Land Resource Area: 40–Sonoran Basin and Range
Land Resource Unit: 40–1 Upper Sonoran Desert Shrub

Map Unit Composition

Stagecoach, Sonoran and similar soils: 50 percent

Pinaleno and similar soils: 35 percent

Minor components: Delnorte. Other minor components include soils that contain argillic horizons above a petrocalcic, soils with sandy loam textures in the Bt horizons, sandy-skeletal soils, loamy soils very shallow and shallow to bedrock.

Soil Properties and Qualities

Stagecoach, Sonoran soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Typic Haplocalcids
Geomorphic position: generally on shoulders
Parent material: mixed calcareous fan alluvium
Slope: 15 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:35 percent
woody debris: 5 percent
bare soil: 30 percent
rock fragments
gravel: 55 percent
cobble: 5 percent
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 3.2 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: A
Ecological site name: Limy Slopes 10-13” p.z.
Ecological site number: R040XA110AZ
Present vegetation: foothill paloverde, whitethorn, creosotebush, desert zinnia, pricklypear, blue threeawn, bush muhly, mesquite, annual grasses, black grama, slim tridens, spidergrass
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Soza Canyon; about 1,900 feet south and 2,600 feet west of northeast corner of Section 4, Township 13 S, Range 19 E.
Geographic Coordinate System: 32° 20’ 20.30’’ north, 110° 24’ 41.10’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 10 percent clay; weak thin platy parting to weak very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine irregular pores; 50 percent gravel; strongly effervescent, 3 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Bk1—2 to 13 inches (5 to 33 cm); brown (7.5YR 4/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 17 percent clay; weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine tubular pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel; violently effervescent, 10 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt smooth boundary.

Bk2—13 to 27 inches (33 to 69 cm); brown (7.5YR 5/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 16 percent clay; weak very fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and few medium roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 50 percent gravel and 5 percent cobble; violently effervescent, 10 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Bk3—27 to 60 inches (69 to 152 cm); light yellowish brown (10YR 6/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/4), moist; 11 percent clay; single grain; loose, loose, nonsticky, nonplastic; common very fine and few medium roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 55 percent gravel and 5 percent cobble; violently effervescent, 12 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 7.9 - 8.4 (moderately alkaline)
Average percent clay in the control section: 5 to 18 percent

A horizon
- Hue: 7.5YR
- Value: 4 or 5 dry, 3 moist
- Chroma: 3 dry, 3 or 4 moist
- Texture: sandy loam

Bk horizons
- Hue: 7.5YR, 10YR
- Value: 4 to 6 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam
- Calcium carbonate equivalent: 5 to 15 percent

Pinaleno, Sonoran soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Typic Calciargids
Geomorphic position: generally on shoulders
Parent material: mixed fan alluvium
Slope: 15 to 45 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:35 percent
  - woody debris: 5 percent
  - bare soil: 30 percent

rock fragments
gravel: 55 percent
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Available water capacity total inches: 3.4 (low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: C
Ecological site name: Loamy Slopes 10-13” p.z.
Ecological site number: R040XA113AZ
Present vegetation: foothill paloverde, creosotebush, whitethorn, black grama, bush muhly, perennial forbs, blue threeawn, other annual forbs, saguaro, slim tridens
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Soza Canyon; about 1,700 feet south and 2,500 feet west of the northeast corner of Section 4, Township 13 S, Range 19 E.
Geographic Coordinate System: 32° 20’ 21.30’’ north, 110° 24’ 40.60’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/4) very gravelly sandy loam, dark brown (7.5YR 3/4), moist; 13 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine roots; many very fine interstitial pores; 40 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Bt—2 to 22 inches (5 to 56 cm); reddish brown (5YR 4/3) very gravelly sandy clay loam, dark reddish brown (5YR 3/4), moist; 22 percent clay; moderate very fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many fine tubular pores; many continuous distinct clay films on rock fragments; 40 percent gravel and 15 percent cobble; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

Btk—22 to 60 inches (56 to 152 cm); brown (7.5YR 5/3) extremely gravelly sandy loam, brown (7.5YR 4/4), moist; 16 percent clay; massive; soft, very friable, nonsticky, nonplastic; many very fine and few medium roots; many fine tubular pores; many continuous distinct clay films on rock fragments; many continuous distinct carbonate coats on rock fragments; 50 percent gravel and 10 percent cobble; violently effervescent, 15 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Rock fragments: 35 to 65 percent
Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)
Average percent clay in the control section: 18 to 35 percent

A horizon
Hue: 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 or 4, dry or moist
Texture: sandy loam
Reaction: 7.4 to 7.8 (slightly alkaline)

Bt horizon
Hue: 5YR, 7.5YR
Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 6, dry or moist
Texture: loam, sandy clay loam, clay loam
Reaction: 7.4 to 7.8 (slightly alkaline)

Btk horizon
Hue: 5YR, 7.5YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 to 4 dry, 3 to 6 moist
Texture: loam, sandy clay loam
Reaction: 7.9 to 8.4 (moderately alkaline)
Calcium carbonate equivalent: 8 to 20 percent

48—Stagecoach-Whitlock-Delnorte complex, Sonoran, 5 to 20 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,000 to 3,100 feet (914 to 945 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 62 to 68 degrees F (16.7 to 20.0 degrees C)
Mean annual soil temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Frost-free period: 190 to 260 days
Major Land Resource Area: 40–Sonoran Basin and Range
Land Resource Unit: 40–1 Upper Sonoran Desert Shrub

Map Unit Composition

Stagecoach, Sonoran and similar soils: 40 percent
Whitlock, Sonoran and similar soils: 25 percent
Delnorte and similar soils: 20 percent

Minor components: Pinaleno. Other minor components include sandy-skeletal soils with and without a calcic horizon.

Soil Properties and Qualities

Stagecoach, Sonoran soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Typic Haplocalcids
Geomorphic position: generally on summits
Parent material: mixed calcareous fan alluvium
Slope: 5 to 20 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:40 percent
woody debris: 5 percent
bare soil: 15 percent
rock fragments

gravel: 55 percent
cobble: 20 percent
stone: 10 percent
Drainage class: somewhat excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 4.6 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: A
Ecological site name: Limy Upland, Deep 10-13” p.z.
Ecological site number: R040XA106AZ
Present vegetation: creosotebush, bush muhly, whitethorn acacia, mesquite, mintbush lippia, desert zinnia, other annual forbs, perennial forbs
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Wildhorse Mountain; about 2,350 feet north and 2,400 feet east of the southwest corner of Section 10, Township 15 S, Range 20 E.
Geographic Coordinate System: 32° 8’ 36.80’’ north, 110° 17’ 17.70’’ west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/3) very cobbly sandy loam, brown (7.5YR 4/3), moist; 10 percent clay; weak medium and thick platy parting to single grain structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 10 percent gravel and 35 percent cobble; slightly effervescent, 3 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bk1—3 to 18 inches (8 to 46 cm); light brown (7.5YR 6/3) very cobbly sandy loam, brown (7.5YR 5/3), moist; 8 percent clay; single grain; loose, loose, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 10 percent gravel and 30 percent cobble; violently effervescent, 9 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4; clear smooth boundary.

Bk2—18 to 46 inches (46 to 117 cm); light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4), moist; 8 percent clay; single grain; loose, loose, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine interstitial pores; many continuous distinct carbonate coats on rock fragments; 30 percent gravel and 10 percent cobble; violently effervescent, 9 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt smooth boundary.

Bk3—46 to 60 inches (117 to 152 cm); brown (7.5YR 5/4) gravelly sandy loam, strong brown (7.5YR 4/6), moist; 9 percent clay; massive; hard, friable, nonsticky, nonplastic; many very fine and fine roots; common very fine tubular pores; many continuous distinct carbonate coats on rock fragments; many medium carbonate masses; 20 percent gravel; strongly effervescent, 8 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2.

Range in Characteristics

Rock fragments: 20 to 60 percent, averages more than 35 percent
Reaction: 7.9 to 8.4 (moderately alkaline)
Average percent clay in the control section: 5 to 15 percent

A horizon
Hue: 7.5YR, 10YR
Value: 4 or 5 dry, 3 to 5 moist
Chroma: 3 or 4, dry or moist
Texture: loamy sand, sandy loam
Calcium carbonate equivalent: 1 to 5 percent

Bk horizons
Hue: 7.5YR, 10YR
Value: 4 to 7 dry, 3 to 5 moist
Chroma: 3 to 6, dry or moist
Texture: coarse sandy loam, sandy loam
Calcium carbonate equivalent: 5 to 20 percent

Whitlock, Sonoran soils
Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocalcids
Geomorphic position: generally on summits
Parent material: mixed calcareous fan alluvium
Slope: 5 to 20 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:40 percent
woody debris: 5 percent
bare soil: 15 percent
rock fragments
gravel: 65 percent
cobble: 15 percent
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 6.5 (moderate)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: A
Ecological site name: Limy Upland, Deep 10-13” p.z.
Ecological site number: R040XA106AZ
Present vegetation: creosotebush, bush muhly, whitethorn acacia, mesquite, mintbush lippia, desert zinnia, other annual forbs, perennial forbs
Land capability (non irrigated): 7c

Typical Profile

Location
Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Wildhorse Mountain; about 2,200 feet north and 2,400 feet east of the southwest corner of Section 10, Township 15 S, Range 20 E.
Geographic Coordinate System: 32° 8’ 37.70’’ north, 110° 17’ 17.70’’ west

A—0 to 3 inches (0 to 8 cm); light brown (7.5YR 6/3) gravelly sandy loam, brown (7.5YR 4/3), moist; 9 percent clay; moderate medium and thick platy structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine interstitial and vesicular pores; many continuous distinct carbonate coats on rock fragments; 20 percent gravel and 5 percent cobble; slightly effervescent, 3 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Bk1—3 to 15 inches (8 to 38 cm); light brown (7.5YR 6/3) sandy loam, brown (7.5YR 4/3), moist; 11 percent clay; weak very fine subangular blocky parting to single grain structure; soft, very friable, slightly sticky, nonplastic; many very fine and fine and common medium roots; many very fine interstitial pores; many continuous distinct carbonate coats on faces of peds and rock fragments; many medium carbonate masses; 10 percent gravel; violently effervescent, 8 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4; clear smooth boundary.

Bk2—15 to 35 inches (38 to 89 cm); light brown (7.5YR 6/3) sandy loam, brown (7.5YR 4/3), moist; 9 percent clay; single grain; loose, loose, nonsticky, nonplastic; many very fine and fine and few medium roots; many very fine interstitial pores; many continuous distinct carbonate coats on faces of peds and rock fragments; many medium carbonate masses; 10 percent gravel; violently effervescent, 7 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt smooth boundary.

Bk3—35 to 60 inches (89 to 152 cm); brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4), moist; 9 percent clay; massive; extremely hard, firm, nonsticky, nonplastic; few very fine and medium roots; many very fine tubular pores; many continuous distinct carbonate coats on faces of peds; many medium carbonate masses; 5 percent gravel; violently effervescent, 2 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2.

Range in Characteristics

Rock fragments: 5 to 35 percent
Reaction: 7.9 to 8.4 (moderately alkaline)
Average percent clay in the control section: 5 to 15 percent
Calcium carbonate equivalent: 2 to 15 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: loam, sandy loam

Bk horizons
- Hue: 7.5YR, 10YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: loam, sandy loam

Delnorte, Sonoran soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids
Geomorphic position: generally on summits
Parent material: mixed calcareous fan alluvium
Slope: 5 to 20 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent

lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:35 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 65 percent
cobble: 15 percent
stone: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to petrocalcic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.8 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Limy Upland 10-13” p.z.
Ecological site number: R040XA111AZ
Present vegetation: creosotebush, ocotillo, fluffgrass, needle grama, other annual forbs,
Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon is from Soil Survey of Cochise County, AZ, Northwestern Part; USGS Quadrangle Wildhorse Mountain; about 1,300 feet west and 550 feet south of the northeast corner of Section 10, Township 15 S, Range 20 E.

Geographic Coordinate System: 32° 9’ 0.50’’ north, 110° 16’ 58.80’’ west

A—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3), moist; 7 percent clay; weak very fine and fine subangular blocky parting to weak very fine and fine granular structure; soft, loose, nonsticky, nonplastic; many very fine roots; many very fine interstitial pores; common patchy prominent carbonate coats on rock fragments; 45 percent gravel and 5 percent cobble; violently effervescent, 17 percent Calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bk—1 inch to 13 inches (3 to 33 cm); light gray (10YR 7/2) very gravelly coarse sandy loam, brown (10YR 5/3), moist; 7 percent clay; weak very fine and fine subangular blocky parting to single grain structure; loose, loose, nonsticky, nonplastic; many very fine and fine and few medium and coarse roots; many very fine interstitial pores; many patchy prominent carbonate coats on rock fragments; many fine carbonate nodules; 45 percent gravel and 5 percent cobble; violently effervescent, 17 percent Calcium carbonate equivalent; moderately alkaline, pH 8.4; very abrupt wavy boundary.

Bkm—13 to 60 inches (33 to 152 cm); cemented material, petrocalcic; strongly cemented.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 7.9 to 8.4 (moderately alkaline)
Average percent clay in the control section: 5 to 15 percent
Calcium carbonate equivalent: 5 to 20 percent

A horizon
- Hue: 7.5YR, 10YR
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam

Bk horizons
- Hue: 7.5YR, 10YR
- Value: 5 to 7 dry, 4 or 5 moist
- Chroma: 2 or 3, dry or moist
- Texture: coarse sandy loam, sandy loam

Bkm horizon
- Cemented: calcium carbonate
- Hardness: extremely hard and indurated
- Thickness: 1 foot to 3 feet; continuous

49—Turquoise-Lutzcan complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): mountains
*Elevation:*4,320 to 5,630 feet (1,317 to 1,716 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)
Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)
Frost-free period: 150 to 200 days
Major Land Resource Area: 38–Mogollon Transition
Land Resource Unit: 38–2 Interior Chaparral–Woodland

Map Unit Composition

Turquoise and similar soils: 35 percent
Lutzcan and similar soils: 30 percent

Minor components: Aravaipa, Deloro

Soil Properties and Qualities

Turquoise soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic, shallow Aridic Ustorthents
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from granite
Slope: 5 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust

salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:45 percent
woody debris: 5 percent
bare soil: 10 percent
rock fragments
gravel: 60 percent
cobble: 27 percent
stone: 2 percent
boulder: 1 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.5 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Granitic Hills 16-20” p.z.
Ecological site number: R038XB204AZ
Present vegetation: banana yucca, beargrass, catclaw acacia, hairy grama, manzanita, pinyon pine, range ratany, sideoats grama, skunkbush sumac, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: USGS Quadrangle Cobre Grande Mountain; about 120 feet north and 1,620 feet west of the southeast corner of Section 8, Township 6 S, Range 20 E.

Geographic Coordinate System: 32° 55’ 11.00’’ north, 110° 19’ 17.00’’ west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/3) very gravelly sandy loam, brown (7.5YR 4/3), moist; 10 percent clay; single grain; soft, loose, nonsticky, nonplastic; common very fine and fine roots; many fine interstitial pores; 30 percent gravel and 10 percent cobble; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

C—1 inch to 6 inches (3 to 15 cm); light brown (7.5YR 6/4) very gravelly sandy clay loam, brown (7.5YR 5/4), moist; 24 percent clay; weak fine subangular blocky structure; slightly hard, very friable, moderately sticky, moderately plastic; common very fine and fine roots; common fine dendritic tubular pores; 35 percent gravel and 10 percent cobble; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Cr—6 to 60 inches (15 to 152 cm) weathered granite bedrock.

Range in Characteristics

Rock fragments: greater than 35 percent in control section
Organic matter: 0.5 to 3 percent
Reaction: 5.6 to 7.3 (moderately acid to neutral)
Average percent clay in the control section: 18 to 35 percent

A horizon
Hue: 7.5YR
Value: 4 or 5 dry, 2.5 to 4 moist

Chroma: 2 or 3, dry or moist
Texture: sandy loam, loam

C horizon
Hue: 5YR, 7.5YR
Value: 3 to 6 dry, 3 to 5 moist
Chroma: 3 or 4 dry, 3 to 6 moist
Texture: sandy clay loam, sandy loam, loam

Cr horizon
Granite bedrock

Turquoise as used in this survey is a taxadjunct to the series because it has 18 to 35 percent clay and greater than 35 percent rock fragments in control section. Turquoise series is a Loamy, mixed, superactive, nonacid, thermic, shallow Aridic Ustorthents.

Lutzcan soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Aridic Argiustolls
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from granite
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:45 percent
woody debris: 5 percent
bare soil: 20 percent
rock fragments
gravel: 70 percent
cobble: 10 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.2 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: C
Ecological site name: Granitic Hills 16-20” p.z.
Ecological site number: R038XB204AZ
Present vegetation: banana yucca, beargrass, catclaw acacia, manzanita, pinyon pine, range ratany, skunkbush sumac, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Cobre Grande Mountain; about 850 feet south and 830 feet west of the northeast corner of Section 17, Township 6 S, Range 20 E.
Geographic Coordinate System: 32° 55’ 1.40’’ north, 110° 19’ 7.80’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) gravelly sandy clay loam, dark brown (7.5YR 3/3), moist; 22 percent clay; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and fine roots; many fine and medium vesicular pores; 25 percent gravel; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt1—2 to 5 inches (5 to 13 cm); reddish brown (5YR 4/3) gravelly clay loam, dark reddish brown (5YR 3/3), moist; 35 percent clay; moderate medium subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; common very fine and fine roots; common very fine and fine dendritic tubular pores; common discontinuous faint clay films on faces of peds and rock fragments; 20 percent gravel; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt2—5 to 11 inches (13 to 28 cm); brown (7.5YR 5/3) very gravelly sandy clay loam, brown (7.5YR 4/3), moist; 26 percent clay; moderate fine subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; few fine roots; common very fine and fine dendritic tubular pores; common discontinuous faint clay films on faces of peds and rock fragments; 50 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Cr—11 to 60 inches (28 to 152 cm) weathered granite bedrock.

Range in Characteristics

Rock fragments: greater than 35 percent in control section
Organic matter: 0.5 to 3 percent
Reaction: 6.1 to 7.3 (slightly acid to neutral)
Average percent clay in the control section: 18 to 35 percent

A horizon
- Hue: 5YR
- Value: 5 dry, 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: loamy sand, sandy loam, sandy clay loam

Bt horizons
- Hue: 5YR, 7.5YR
- Value: 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy clay loam, clay loam

Cr horizon
- Granite bedrock

50—Ubik-Riveroad complex, 0 to 1 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*3,220 to 4,190 feet (981 to 1,277 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Ubik and similar soils: 45 percent
Riveroad and similar soils: 40 percent

Minor components: Bodecker, Combate, Hooks, Mallet. Other minor components include soils that are sandy.

Soil Properties and Qualities

Ubik soils
Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, thermic Ustic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 1 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 10 percent
woody debris: 0 percent
bare soil: 90 percent
rock fragments
gravel: 3 percent
Drainage class: well drained
Ksat solum: 0.57 to 19.98 inches per hour (4.00 to 141.00 micrometers per second)
Available water capacity total inches: 9.9 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Present vegetation: forbs, annuals
Land capability (irrigated): 3w
Land capability non-irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 1,010 feet south and 1,460 feet west of the northeast corner of Section 1, Township 8 S, Range 20 E.
Geographic Coordinate System: 32° 46’ 21.10’’ north, 110° 15’ 7.10’’ west

Ap—0 to 8 inches (0 to 20 cm); brown (7.5YR 4/4) very fine sandy loam, dark brown (7.5YR 3/4), moist; 8 percent clay; weak thin platy parting to moderate very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine

and fine roots; many very fine vesicular and tubular pores; slightly effervescent; neutral, pH 7.2; clear smooth boundary.

C1—8 to 40 inches (20 to 102 cm); brown (7.5YR 4/3) silt loam, dark brown (7.5YR 3/3), moist; 14 percent clay; moderate very fine and fine subangular blocky structure; soft, very friable, slightly sticky, moderately plastic; many very fine and fine roots; many very fine tubular pores; strongly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

C2—40 to 60 inches (102 to 152 cm); brown (7.5YR 4/3) coarse sandy loam, dark brown (7.5YR 3/3), moist; 6 percent clay; single grain; loose, loose, nonsticky, nonplastic; common very fine roots; many very fine irregular pores; 5 percent gravel; strongly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Rock fragments: 0 to 10 percent gravel
Reaction: 6.6 to 8.0 (neutral to moderately alkaline)
Average percent clay in the control section: 10 to 18 percent

Ap horizon
- Hue: 7.5YR
- Value: 4 to 6 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: very fine sandy loam, fine sandy, loam, loam, silt loam

C horizons
- Hue: 7.5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: silt loam, coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, loamy fine sand, fine sand

Riveroad soils
Taxonomic classification: Fine-silty, mixed, superactive, calcareous, thermic Ustic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 1 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 0 percent
  - woody debris: 0 percent
  - bare soil: 100 percent
- rock fragments
  - gravel: 5 percent

Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 12.0 (very high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: occasional

Runoff class: low
Hydrologic group: C
Present vegetation: forbs, annuals
Land capability (irrigated): 3w
Land capability non-(irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Klondyke; about 45 feet south and 25 feet east of the northwest corner of Section 35, Township 7 S, Range 20 E.
Geographic Coordinate System: 32° 47’ 22.50’’ north, 110° 16’ 52.70’’ west

Ap—0 to 8 inches (0 to 20 cm); brown (7.5YR 5/3) silt loam, dark brown (7.5YR 3/3), moist; 25 percent clay; weak thin platy parting to moderate very fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine tubular and vesicular pores; strongly effervescent; slightly alkaline, pH 7.6; clear smooth boundary.

C1—8 to 25 inches (20 to 64 cm); brown (7.5YR 5/3) silty clay loam, dark brown (7.5YR 3/3), moist; 34 percent clay; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine vesicular pores; strongly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C2—25 to 38 inches (64 to 97 cm); light brown (7.5YR 6/3) silty clay loam, brown (7.5YR 4/3), moist; 30 percent clay; moderate fine subangular blocky structure; soft, very friable, moderately sticky, moderately plastic; many very fine roots; many very fine vesicular pores; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C3—38 to 60 inches (97 to 152 cm); brown (7.5YR 4/2) silty clay loam, dark brown (7.5YR 3/2), moist; 30 percent clay; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine roots; many very fine vesicular pores; strongly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Rock fragments: 0 to 5 percent gravel
Reaction: 7.4 to 8.0 (slightly to moderately alkaline)
Average percent clay in the control section: 18 to 35 percent

Ap horizon
- Hue: 7.5YR
- Value: 4 to 6 dry, 3 or 4 moist
- Chroma: 2 or 3, dry or moist
- Texture: silty clay loam, silt loam, loam, fine sandy loam, fine sand, loamy sand

C horizons
- Hue: 7.5YR
- Value: 4 to 6 dry, 3 or 4 moist
- Chroma: 2 or 3 dry, 2 to 4 moist
- Texture: silt loam, silty clay loam, clay loam, loam, silty clay, fine sandy loam, sandy loam

51—Ubik-Riveroad complex, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*3,210 to 4,950 feet (978 to 1,509 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Ubik and similar soils: 45 percent
Riveroad and similar soils: 40 percent

Minor components: Bodecker, Guest

Soil Properties and Qualities

Ubik soils
Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, thermic Ustic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed alluvium
Slope: 0 to 5 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:20 percent
  - woody debris: 15 percent
  - bare soil: 60 percent
- rock fragments
  - gravel: 5 percent

Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Available water capacity total inches: 9.0 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Ecological site name: Loamy Bottom 12-16” p.z.
Ecological site number: R041XC312AZ
Present vegetation: burroweed, catclaw, mesquite, yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Eureka Ranch; about 250 feet south and 2,545 feet west of the northeast corner of Section 2, Township 9 S, Range 21 E.
Geographic Coordinate System: 32° 41’ 14.60’’ north, 110° 10’ 13.70’’ west

C1—0 to 4 inches (0 to 10 cm); brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2), moist; 10 percent clay; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many fine roots; many fine vesicular pores; 3 percent gravel; slightly effervescent; slightly alkaline, pH 7.6; clear smooth boundary.

C1—4 to 15 inches (10 to 38 cm); brown (10YR 4/3) very fine sandy loam, dark brown (10YR 3/3), moist; 10 percent clay; weak fine angular blocky structure; soft, very friable, nonsticky, nonplastic; common fine roots; many fine tubular pores; 3 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C2—15 to 30 inches (38 to 76 cm); dark brown (10YR 3/3) loam, dark yellowish brown (10YR 3/4), moist; 12 percent clay; moderate fine and medium angular blocky structure; soft, very friable, nonsticky, nonplastic; common fine roots; many fine tubular pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C3—30 to 44 inches (76 to 112 cm); dark brown (10YR 3/3) very fine sandy loam, dark yellowish brown (10YR 3/4), moist; 10 percent clay; weak fine angular blocky structure; soft, very friable, nonsticky, nonplastic; many fine tubular pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C5—44 to 60 inches (112 to 152 cm); brown (10YR 5/3) fine sandy loam, brown (10YR 4/3), moist; 8 percent clay; massive; soft, very friable, nonsticky, nonplastic; many fine tubular pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: 0 to 15 percent
Reaction: 6.6 to 8.4 (neutral to moderately alkaline)
Average percent clay in the control section: less than 18 percent

C horizons
Hue: 7.5YR, 10YR
Value: 3 to 5 dry, 3 or 4 moist
Chroma: 2 to 4, dry or moist
Texture: very fine sandy loam, fine sandy loam, sandy loam, loam, silt loam

Riveroad soils
Taxonomic classification: Fine-silty, mixed, superactive, calcareous, thermic Ustic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed alluvium
Slope: 0 to 5 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent

Physical cover
canopy plant cover:35 percent
woody debris: 10 percent
bare soil: 30 percent
rock fragments
gravel: 5 percent
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Available water capacity total inches: 11.3 (very high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: C
Ecological site name: Loamy Bottom 12-16'' p.z.
Ecological site number: F041XC310AZ
Present vegetation: burroweed, catclaw, mesquite, yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Eureka Ranch; about 15 feet south and 2,015 feet west of the northeast corner of Section 28, Township 8 S, Range 21 E.
Geographic Coordinate System: 32° 41' 14.60'' north, 110° 10' 13.70'' west

C1—0 to 5 inches (0 to 13 cm); very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2), moist; 12 percent clay; weak fine granular structure; soft, very friable, nonsticky, nonplastic; many fine roots; many fine vesicular pores; 3 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C2—5 to 25 inches (13 to 64 cm); dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2), moist; 32 percent clay; weak fine and medium angular blocky structure; slightly hard, friable, slightly sticky, nonplastic; many fine roots; many fine tubular pores; 3 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

C3—25 to 44 inches (64 to 112 cm); very dark grayish brown (10YR 3/2) silty clay loam, very dark brown (10YR 2/2), moist; 32 percent clay; weak fine and medium angular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine roots; many fine tubular pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C4—44 to 60 inches (112 to 152 cm); dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2), moist; 32 percent clay; weak fine and medium angular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine tubular pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: 0 to 15 percent
Reaction: 6.6 to 8.4 (neutral to moderately alkaline)
Average percent clay in the control section: 18 to 35 percent

C horizons
Hue: 7.5YR, 10YR
Value: 3 to 5 dry, 2 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: silty clay loam, silt loam, silty clay, loam, clay loam

52—Urban Land

Urban land consists of areas of soil so altered by construction or obscured by structures and pavement that identification of the soils is difficult or impossible. In general, the underlying and interspersed soil material has many of the characteristics of the adjacent soil map units. This area consists of the Fort Grant Unit of the Arizona State Prison Complex and its surrounding neighborhood.

53—Ustic Torrifluvents, 0 to 1 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*4,390 to 4,480 feet (1,338 to 1,366 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Ustic Torrifluvents and similar soils: 90 percent

Minor components: Combate, Guest, Hooks

Soil Properties and Qualities

Ustic Torrifluvents soils
Taxonomic classification: Ustic Torrifluvents
Geomorphic position: benches that border drainageways
Parent material: mixed stream alluvium
Slope: 0 to 1 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - plant cover: 0 percent
  - woody debris: 0 percent
  - bare soil: 100 percent
- rock fragments
  - gravel: 10 percent

Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Available water capacity total inches: 9.8 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Present vegetation: bare ground

Land capability (irrigated): 3w
Land capability (non-irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Fort Grant; about 2,130 feet south and 715 feet west of the northeast corner of Section 21, Township 10 S, Range 23 E.
Geographic Coordinate System: 32° 33’ 8.10’’ north, 109° 59’ 35.00’’ west

Ap—0 to 10 inches (0 to 25 cm); brown (7.5YR 4/3) loam, very dark brown (7.5YR 2.5/2), moist; 22 percent clay; massive; hard, firm, slightly sticky, slightly plastic; common very fine and few fine roots; many very fine irregular pores; 2 percent gravel; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

C1—10 to 16 inches (25 to 41 cm); brown (7.5YR 4/3) loam, very dark brown (7.5YR 2.5/2), moist; 22 percent clay; weak very fine and fine granular structure; hard, firm, slightly sticky, slightly plastic; common very fine, few fine, and few coarse roots; many very fine tubular pores; 2 percent gravel; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

C2—16 to 28 inches (41 to 71 cm); brown (7.5YR 4/3) fine sandy loam, dark brown (7.5YR 3/3), moist; 10 percent clay; weak very fine and fine granular structure; soft, friable, nonsticky, nonplastic; common very fine roots; common very fine tubular pores; 2 percent gravel; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

C3—28 to 60 inches (71 to 152 cm); dark brown (7.5YR 3/4) loam, very dark brown (7.5YR 2.5/3), moist; 22 percent clay; weak very fine and fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine tubular pores; 2 percent gravel; noneffervescent; slightly acid, pH 6.4.

Range in Characteristics

Rock fragments: less than 15 percent in control section
Reaction: 6.2 to 8.2 (slightly acid to moderately alkaline
Average percent clay in the control section: 18 to 35 percent

Ap horizon
- Hue: 7.5YR, 10YR
- Value: 4 or 5 dry, 2 to 4 moist
- Chroma: 2 or 3, dry or moist
- Texture: coarse sandy loam, sandy loam, loam, clay loam, clay

C horizons
- Hue: 5YR, 7.5YR, 10YR
- Value: 3 to 5 dry, 2 to 5 moist
- Chroma: 2 to 4 dry, 1 to 6 moist
- Texture: coarse sand, loamy coarse sand, loamy sand, coarse sandy loam, fine sandy loam, sandy loam, loam, clay loam, silty clay loam

54—Ustifluventic Haplocambids, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains
*Elevation:*4,330 to 4,720 feet (1,320 to 1,439 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

Ustifluventic Haplocambids and similar soils: 80 percent

Minor components: Forrest, Hooks, Mallet, Riveroad, Sasabe, White House

Soil Properties and Qualities

Ustifluventic Haplocambids soils
Taxonomic classification: Ustifluventic Haplocambids
Geomorphic position: drainageways plus alluvial plains
Parent material: mixed stream alluvium
Slope: 0 to 3 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 40 percent
woody debris: 5 percent
bare soil: 50 percent
rock fragments
gravel: 5 percent
Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Available water capacity total inches: 11.9 (very high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: frequent
Runoff class: low
Hydrologic group: B
Ecological site name: Loamy Bottom 12-16” p.z.
Ecological site number: R041XC312AZ
Present vegetation: burroweed, giant sacaton, mesquite, mustard, tobosagrass
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle West of Greasewood Mountain; about 2,145 feet north and 1,650 feet west of the southeast corner of Section 28, Township 11 S, Range 24 E.
Geographic Coordinate System: 32° 26’ 52.00’’ north, 109° 53’ 54.50’’ west

A—0 to 3 inches (0 to 8 cm); brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2), moist; 22 percent clay; weak thin platy parting to weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many very fine roots; many very fine irregular pores; 5 percent gravel; noneffervescent; neutral, pH 6.8; abrupt smooth boundary.

Bw—3 to 33 inches (8 to 84 cm); brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/2), moist; 32 percent clay; massive; hard, very firm, very sticky, very plastic; many very fine and few fine roots; many very fine interstitial and tubular pores; 5 percent gravel; strongly effervescent; neutral, pH 7.0; clear smooth boundary.

C—33 to 60 inches (84 to 152 cm); brown (7.5YR 5/4) silt loam, dark brown (7.5YR 3/2), moist; 25 percent clay; massive; hard, very firm, very sticky, very plastic; few very fine and fine roots; many very fine interstitial and tubular pores; many very fine threadlike carbonate coats lining pores; 5 percent gravel; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Rock fragments: 0 to 5 percent
Reaction: 6.6 to 8.4 (neutral to moderately alkaline)
Average percent clay in the control section: 18 to 35 percent

A horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 2 or 3 moist
- Chroma: 3 or 4 dry, 2 or 3 moist
- Texture: loam, silt loam, sandy loam

Bw horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 2 to 4 moist
- Chroma: 2 to 4 dry, 1 to 3 moist
- Texture: loam, silt loam, clay loam, silty clay loam

C horizon
- Hue: 10YR, 7.5YR
- Value: 4 or 5 dry, 2 to 4 moist
- Chroma: 2 to 4 dry, 1 to 3 moist
- Texture: loam, silt loam, clay loam, silty clay loam

55—Water

Map Unit Setting

Landform(s): ponds
*Elevation:*4,180 to 4,400 feet (1,274 to 1,341 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days

Map Unit Composition

Water: 100 percent

Range in Characteristics

This map unit includes two unnamed bodies of water. One pond is 14 acres and the other one is 18 acres. The surface acres of these ponds fluctuate during dry periods and monsoon seasons. One pond is located on USGS Quadrangle Sierra Bonita Ranch; the other is located on USGS Quadrangle Eureka Ranch.

56—White House-Eskiminzin-Pedregosa complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): fan terraces
*Elevation:*3,680 to 4,920 feet (1,122 to 1,500 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.5 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.6 to 20.5 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41–Southeastern Arizona Basin and Range
Land Resource Unit: 41–3 Southern Arizona Semidesert Grassland

Map Unit Composition

White House and similar soils: 30 percent
Eskiminzin and similar soils: 20 percent
Pedregosa and similar soils: 20 percent

Minor components: Altar, Eloma, Tombstone. Other minor components include soils that are sandy, fine-loamy and coarse-loamy soils with a calcic horizon, loamy-skeletal soils that are fluvents.

Soil Properties and Qualities

White House soils
Taxonomic classification: Fine, mixed, superactive, thermic Ustic Haplargids
Geomorphic position: generally on backslopes
Parent material: mixed alluvium
Slope: 5 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:20 percent
  - woody debris: 10 percent
  - bare soil: 5 percent
- rock fragments
  - gravel: 20 percent
  - cobble: 25 percent
  - stone: 5 percent

Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Available water capacity total inches: 7.6 (high)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: C
Ecological site name: Clayey Slopes 12-16” p.z.
Ecological site number: R041XC303AZ

Present vegetation: juniper, mesquite, needlegrass, oak, sideoats grama, snakeweed
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Eureka Ranch; about 1,530 feet north and 880 feet east of the southwest corner of Section 31, Township 8 S, Range 21 E.
Geographic Coordinate System: 32° 41’ 32.20’’ north, 110° 14’ 42.30’’ west

A—0 to 4 inches (0 to 10 cm); dark brown (7.5YR 3/2) cobbly clay loam, black (7.5YR 2/1), moist; 37 percent clay; weak fine granular structure; slightly hard, friable, moderately sticky, moderately plastic; many fine roots; many fine vesicular pores; 10 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt1—4 to 14 inches (10 to 36 cm); dark brown (7.5YR 3/3) clay, dark brown (7.5YR 3/3), moist; 50 percent clay; moderate fine and medium prismatic parting to moderate fine and medium angular blocky structure; hard, friable, very sticky, very plastic; many fine roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 5 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

Bt2—14 to 24 inches (36 to 61 cm); reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4), moist; 50 percent clay; moderate fine and medium angular blocky structure; hard, friable, very sticky, very plastic; many fine roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 5 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.0; clear wavy boundary.

Btk—24 to 35 inches (61 to 89 cm); reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4), moist; 50 percent clay; moderate fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; many fine roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; common fine distinct irregular carbonate masses; 5 percent gravel and 5 percent cobble; strongly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bk1—35 to 46 inches (89 to 117 cm); reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4), moist; 45 percent clay; moderate fine and medium angular blocky structure; very hard, firm, moderately sticky, moderately plastic; many fine tubular pores; common fine distinct irregular carbonate masses; 5 percent gravel and 5 percent cobble; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Bk2—46 to 60 inches (117 to 152 cm); reddish brown (5YR 5/4) very gravelly sandy clay loam, reddish brown (5YR 4/4), moist; 28 percent clay; massive; very hard, friable, moderately sticky, moderately plastic; many fine tubular pores; common fine distinct irregular carbonate masses; 40 percent gravel and 10 percent cobble; violently effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Rock fragments: less than 35 percent in the control section
Reaction: 6.6 to 8.4 (neutral to moderately alkaline)
Average percent clay in the control section: greater than 35 percent

A horizon
- Hue: 7.5YR
- Value: 3 to 5 dry, 2 to 4 moist
- Chroma: 2 or 3 dry, 1 or 2 moist
- Texture: clay loam
- Rock fragments: 15 to 35 percent

Bt horizon
Hue: 5YR or 7.5YR
Value: 3 or 4, dry or moist
Chroma: 2 to 4, dry or moist
Texture: clay

Btk horizon
Hue: 5YR or 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 or 4, dry or moist
Texture: clay

Bk horizon
Hue: 5YR or 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 3 or 4, dry or moist
Texture: clay, clay loam, sandy clay loam
Rock fragments: greater than 35 percent below 40 inches

Eskiminzin soils
Taxonomic classification: Clayey-skeletal, smectitic, thermic Lithic Ustic Haplargids
Geomorphic position: generally on backslopes
Parent material: mixed alluvium
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover:35 percent
woody debris: 10 percent
bare soil: 5 percent
rock fragments
gravel: 30 percent
cobble: 15 percent
stone: 5 percent
Depth to restrictive feature(s): representative value is 12 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 12-16” p.z.
Ecological site number: R041XC330AZ
Present vegetation: catclaw acacia, dropseed, juniper, mesquite, needle and thread, oak, sideoats grama
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Eureka Ranch; about 1,480 feet north and 1,750 feet west of the southeast corner of Section 30, Township 8 S, Range 21 E.
Geographic Coordinate System: 32° 42’ 25.50’’ north, 110° 14’ 11.20’’ west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/2) very cobbly loam, very dark brown (7.5YR 2/2), moist; 23 percent clay; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine roots; many fine vesicular pores; 20 percent gravel and 20 percent cobble; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt—2 to 12 inches (5 to 30 cm); dark reddish brown (5YR 3/3) very cobbly clay, dark reddish brown (5YR 3/3), moist; 50 percent clay; moderate fine and medium angular blocky structure; moderately hard, friable, very sticky, very plastic; many fine and common medium roots; many fine tubular pores; few discontinuous distinct clay films on faces of peds; 20 percent gravel and 20 percent cobble; noneffervescent; neutral, pH 6.8; clear wavy boundary.

R—12 to 60 inches (30 to 152 cm); unweathered conglomerate bedrock.

Range in Characteristics

Rock fragments: 35 to 65 percent in the control section
Reaction: 6.6 to 7.8 (neutral to slightly alkaline)
Average percent clay in the control section: greater than 35 percent

A horizon
- Hue: 7.5YR
- Value: 3 to 5 dry, 2 or 3 moist
- Chroma: 2 or 3, dry or moist
- Texture: loam

Bt horizon
- Hue: 5YR or 7.5YR
- Value: 3 or 4, dry or moist
- Chroma: 3 or 4, dry or moist
- Texture: clay

R horizon
- Conglomerate bedrock

Pedregosa soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids
Geomorphic position: generally on summits
Parent material: mixed alluvium
Slope: 5 to 60 percent
Surface cover:
- Biological crust
  - cyanobacteria: 0 percent
  - lichen: 0 percent
  - moss: 0 percent
- Chemical crust
  - salt: 0 percent
  - gypsum: 0 percent
- Physical cover
  - canopy plant cover:30 percent

woody debris: 15 percent
bare soil: 15 percent
rock fragments
gravel: 30 percent
cobble: 5 percent
stone: 5 percent
Depth to restrictive feature(s): representative value is 10 inches to petrocalcic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limy Upland 12-16” p.z.
Ecological site number: R041XC309AZ
Present vegetation: catclaw acacia, juniper, mesquite, snakeweed, tanglehead, yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Eureka Ranch; about 1,855 feet south and 390 feet west of the northeast corner of Section 24, Township 8 S, Range 20 E.
Geographic Coordinate System: 32° 43’ 35.20’’ north, 110° 14’ 55.90’’ west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) very gravelly loam, very dark brown (7.5YR 2/2), moist; 10 percent clay; weak fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine roots; many fine vesicular pores; 40 percent gravel and 5 percent cobble; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Bk—2 to 10 inches (5 to 25 cm); brown (7.5YR 4/2) very gravelly loam, dark brown (7.5YR 3/2), moist; 15 percent clay; weak fine and medium angular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many fine roots; many fine tubular pores; 40 percent gravel and 10 percent cobble; strongly effervescent; 35 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bkkm—10 to 60 inches (25 to 152 cm); violently effervescent; cemented material, indurated petrocalcic.

Range in Characteristics

Rock fragments: 35 to 60 percent
Reaction: 7.4 to 8.4 (slightly to moderately alkaline)
Average percent clay in the control section: 5 to 18 percent in the control section
Depth to petrocalcic horizon: 5 to 20 inches
Calcium carbonate equivalent: 5 to 40 percent

A horizon
Hue: 7.5YR
Value: 3 to 5 dry, 2 to 4 moist
Chroma: 2 or 3, dry or moist
Texture: loam

Bk horizon
Hue: 5YR or 7.5YR
Value: 3 or 4, dry or moist
Chroma: 2 to 4, dry or moist
Texture: loam

Bkkm horizon
Cemented: calcium carbonate and silica
Hardness: extremely hard to indurated
Thickness: 3 to 5 feet; continuous

57—Yarbam family-Silverstrike complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains
*Elevation:*4,160 to 6,000 feet (1,268 to 1,829 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)
Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)
Frost-free period: 150 to 200 days
Major Land Resource Area: 38–Mogollon Transition
Land Resource Unit: 38–2 Interior Chaparral–Woodlands

Map Unit Composition

Yarbam family and similar soils: 30 percent
Silverstrike and similar soils: 20 percent

Minor components: Beaumain, Cherrycow, White House

Soil Properties and Qualities

Yarbam family soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic Haplustolls
Geomorphic position: generally on backslopes and summits

Parent material: slope alluvium and/or residuum weathered from limestone
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 55 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 60 percent
cobble: 27 percent

stone: 2 percent
boulder: 1 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.2 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limestone Hills 16-20” p.z.
Ecological site number: R038XB205AZ
Present vegetation: agave, algerita, blue threeawn, buckbrush, mintbush lippia, mountain mahogany, pinyon, sideoats grama, sotol, sugar sumac, tanglehead, yucca
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Cobre Grande Mountain; about 2,510 feet north and 20 feet west of the southeast corner of Section 30, Township 5 S, Range 20 E.
Geographic Coordinate System: 32° 58’ 7.80’’ north, 110° 19’ 38.90’’ west

A—0 to 2 inches (0 to 5 cm); reddish brown (5YR 5/3) very gravelly loam, dark reddish brown (5YR 3/3), moist; 24 percent clay; weak fine subangular blocky structure; slightly hard, very friable, moderately sticky, moderately plastic; many very fine and fine roots; many very fine vesicular pores; 30 percent gravel and 20 percent cobble; violently effervescent, 22 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk—2 to 14 inches (5 to 36 cm); reddish brown (5YR 4/3) extremely cobbly clay loam, dark reddish brown (5YR 3/3), moist; 32 percent clay; moderate fine subangular blocky structure; moderately hard, friable, moderately sticky, moderately plastic; many fine and medium roots; common very fine and fine dendritic tubular pores; carbonate masses around rock fragments; 30 percent gravel and 30 percent cobble; violently effervescent, 22 percent Calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

R—14 to 60 inches (36 to 152 cm); unweathered limestone bedrock.

Range in Characteristics

Rock fragments: 20 to 30 percent gravels, 10 to 20 percent cobbles
Organic matter: 0.5 to 3 percent
Reaction: 7.6 to 8.0 (slightly to moderately alkaline)
Average percent clay in the control section: 18 to 35 percent
Calcium carbonate equivalent: 10 to 25 percent

A horizon
Hue: 5YR, 7.5YR
Value: 5 dry, 3 or 4 moist
Chroma: 3 dry, 2 or 3 moist
Texture: loam, clay loam

Bk horizon
Hue: 5YR
Value: 4 dry, 3 moist
Chroma: 3 dry, 2 or 3 moist
Texture: clay loam, sandy clay loam, loam

R horizon
Limestone bedrock

Yarbam as used in this soil mapping unit is at the family level because this soil contains more than 18 percent clay in the particle size control section.

Silverstrike soils
Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Aridic Haplustalfs
Geomorphic position: generally on backslopes and summits
Parent material: slope alluvium and/or residuum weathered from limestone
Slope: 5 to 60 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
plant cover: 45 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 80 percent
cobble: 10 percent
Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 2.2 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Clayey Hills 16-20” p.z.
Ecological site number: R038XB215AZ
Present vegetation: catclaw acacia, juniper, mesquite, pricklypear, red brome, sideoats grama, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location
Public Land Survey: USGS Quadrangle Cobre Grande Mountain; about 85 feet north and 2,630 feet east of the southwest corner of Section 25, Township 5 S, Range 19 E.
Geographic Coordinate System: 32° 57’ 43.20’’ north, 110° 21’ 31.30’’ west

A—0 to 1 inch (0 to 3 cm); reddish brown (5YR 5/4) extremely gravelly sandy clay loam, dark reddish brown (5YR 3/3), moist; 20 percent clay; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine roots; many fine and medium vesicular pores; 50 percent gravel and 10 percent cobble; noneffervescent; moderately acid, pH 5.8; clear smooth boundary.

Bt1—1 inch to 4 inches (3 to 10 cm); reddish brown (2.5YR 5/3) extremely gravelly clay, dark reddish brown (2.5YR 3/3), moist; 42 percent clay; moderate fine subangular blocky structure; moderately hard, friable, very sticky, very plastic; common fine and medium roots; common very fine and fine dendritic tubular pores; few faint clay films on faces of peds and rock fragments; 40 percent gravel and 20 percent cobble; noneffervescent; moderately acid, pH 6.0; clear smooth boundary.

Bt2—4 to 17 inches (10 to 43 cm); reddish brown (2.5YR 5/4) very gravelly clay, reddish brown (2.5YR 4/4), moist; 55 percent clay; moderate fine and medium angular blocky structure; very hard, firm, very sticky, very plastic; common fine and medium roots; common very fine dendritic tubular pores; many distinct clay films on faces of peds and rock fragments; 40 percent gravel; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

BCt—17 to 28 inches (43 to 71 cm); light reddish brown (5YR 6/4) extremely gravelly clay loam, reddish brown (5YR 4/4), moist; 36 percent clay; moderate fine angular blocky structure; hard, firm, moderately sticky, moderately plastic; few medium roots; few very fine interstitial pores; common distinct clay films on faces of peds and rock fragments; 65 percent gravel; noneffervescent; neutral, pH 6.6; abrupt wavy boundary.

R—28 to 60 inches (71 to 152 cm); unweathered quartzite bedrock.

Range in Characteristics

Rock fragments: 10 to 50 percent gravels, 10 to 35 percent cobbles
Organic matter: 0.5 to 3 percent
Reaction: 5.8 to 7.0 (moderately acid to neutral)
Average percent clay in the control section: 35 to 60 percent

A horizon
- Hue: 2.5YR, 5YR
- Value: 5 dry, 2 or 3 moist
- Chroma: 4 dry, 3 moist
- Texture: clay loam, sandy clay loam, loam

Bt horizons
- Hue: 2.5YR, 5YR
- Value: 5 or 6 dry, 3 or 4 moist
- Chroma: 3 or 4 dry, 3 to 6 moist
- Texture: clay, clay loam

R horizon
- Quartzite bedrock

Formation of Soils

The term “soil formation” refers to two processes that occur simultaneously in the environment. The first is the breakdown, through physical and chemical weathering, of consolidated material which is not capable of sustaining plants (rock) to a loose material capable of sustaining plant life (soil). The second is the subsequent development of soil horizons within the unconsolidated material, a process called pedogenesis.

Five major factors are recognized as working in concert to influence soil formation: parent material, climate, topography, biological factors, and time (Brady, 2002). The interactions of these five factors result in the wide variety of soils found throughout the world, as well as in any specific study area, such as Graham County, Arizona, Southwestern Part.

Parent Material

Parent material is the unconsolidated mineral and organic material in which soil forms. It can be derived in place from the underlying bedrock (residuum), or transported by wind (eolian material), water (alluvium), or gravity (colluvium). A soil that formed in residuum derived from granite bedrock on a nearly level summit will be very different from a soil that formed in an alluvial stream deposit derived from limestone. The chemistry, structure, grain-size distribution, and other factors of parent material are important constituents in soil formation. The soils in this survey area formed in a wide variety of parent materials.

Climate

Climate, past and present, has a strong effect on soil formation. Temperature and moisture affect the weathering of parent material, the release and leaching and/or accumulation of nutrients, and the activity of micro-organisms. They also influence the native plant community growing on the soil, which in turn influences soil formation. Wind and water transport soil material over long distances, and solar radiation affects soil moisture retention and oxidation of surface organic matter. In general, the intensity of weathering processes increases with increases in both temperature and moisture.

Topography

Topography influences soil formation through its effect on water movement and on the stability of soil material. The rate of surface water runoff and the extent of erosion by water or gravitational forces increase on steep slopes, lessening the amount of time available for soil formation. Northern aspects of steep slopes receive less solar radiation than southern aspects and consequently lose less moisture to evapotranspiration. Runoff from adjoining uplands collects in level or concave areas, where organic matter and sediments are dropped from the alluvial waters. On steep and very steep slopes, the soils commonly are unstable and erosion occurs faster than the processes of soil formation. These soils are commonly shallow and show minimal development of genetic horizons. Soils on lesser slopes tend to be more stable and

develop distinct genetic horizons over time. In areas of alluvial deposition, the surface horizons are somewhat thicker and higher in content of organic matter.

The topography of the survey area ranges from broad, nearly level to gently sloping areas to steep areas near escarpments. Some areas are broken by deeply entrenched, rugged canyons and washes with steep to nearly vertical escarpments. The washes and canyons have nearly level to gently sloping areas of alluvial deposits in drainageways.

Biological Factors

The living organisms that influence soil formation include micro-organisms as well as plants and animals. Within the soil, the life processes of bacteria, algae, fungi, and protozoa decompose organic matter and minerals and thus release oxygen, carbon dioxide, and nitrogen to plants. Insects and worms burrow into the soil, redistributing soil material and creating channels for air and water movement. Animals trample and mix soil material, add and bury organic debris, and burrow into the ground. Surface plants add organic matter to the soil, create pores and channels with rooting networks, decrease the extent of erosion and the rate of surface water runoff, and affect physical and chemical properties with their decomposed residue. This survey area has distinct native plant communities that are related to the environmental factors of soil formation.

Time

Time refers to the duration of the period that a parent material has been in place and has been influenced by other soil-forming factors. The age of a soil is related to the age or stability of the geomorphic surface on which it formed, rather than the age of the landscape. Mountains are much older than the alluvial and colluvial deposits at the base of the slopes of those mountains, but the surface of the more stable alluvial deposits may be much older than the more unstable mountain side slopes. Certain soil characteristics require long periods to become well expressed. Other morphological features may develop in less time but perhaps develop in climatic conditions known to have occurred only in the distant past.

Young soils tend to lack expressions of soil development, whereas older soils generally have well developed genetic horizons. Soils on flood plains are subject to constant reworking and deposition of sediment during period of flooding. Many soils on steep and very steep slopes are subject to the influence of gravity and erosion and thus do not have enough time to develop genetic horizons.

Landforms of the Survey Area

The survey area is part of the Southeastern Arizona Basin and Range Province, which is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys or basins. Landforms are not static; they are continually being created and eroded. Some landforms are hard to distinguish; their boundaries are not always sharp but fold and blend into each other naturally. Figure 2 is a three-dimensional representation of the survey area.

This three dimensional image displays the boundaries of several detailed soil map units with corresponding map unit symbols (in black), and a segment of the soil survey boundary (in red). This image depicts the soil-landscape relationship between numerous soil map units as they exist across a variety of landforms. The Pinaleno Mountains (protruding above the soil survey boundary) are composed of middle proterozoic granitic rock and early proterozoic metamorphic rock, which make up the dominant parent material of the soil bodies shown in this image.

All of the landforms that exist in this survey are represented in this image. Hills, mountains, and pediments are represented by map units 9 and 18. Fan terraces are represented by map units 15, 21 and 42. Alluvial fans are represented by map units 14 and 27. Flood plains are represented by map units 36, 51, and 54. Basin floors are represented by map unit 43.

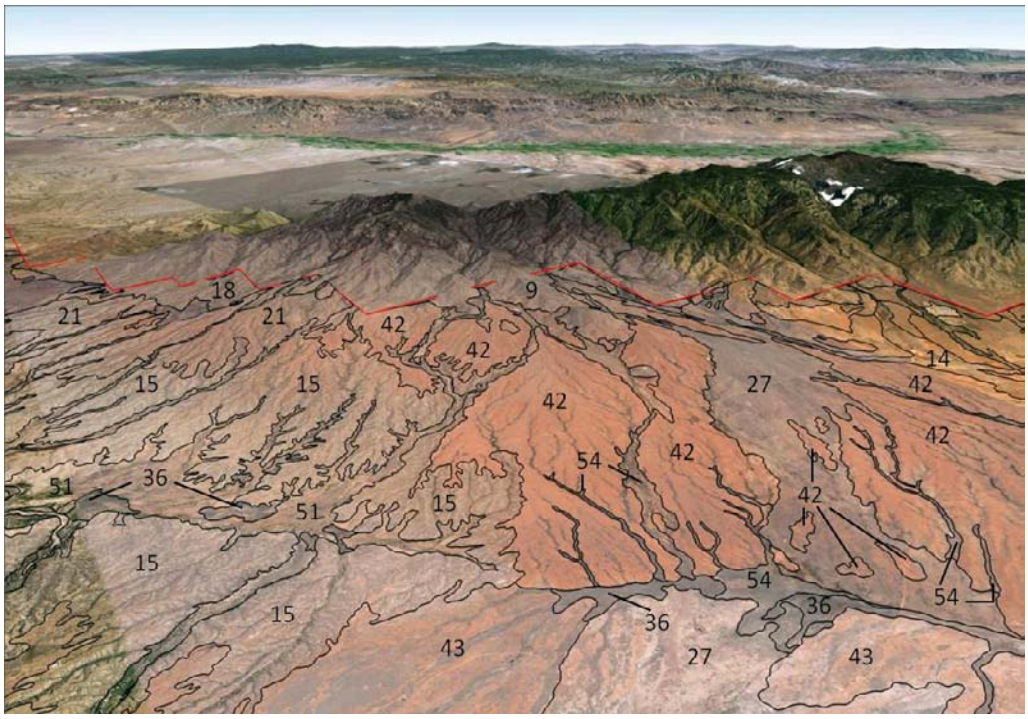

Figure 2.–Soil-landscape relationships in the survey area.

The following paragraphs describe the major landforms recognized in the survey area and some of the soils associated with these landforms.

Flood plains are being formed from Holocene and present-day stream alluvium. Floodwaters in the survey area flow at low to very low slope gradients adjacent to basin floor and fan terraces. The soils on the flood plains receive periodic depositions of fresh alluvium, resulting in an irregular decrease in organic matter and weak or no soil profile development. The sediment load of the floodwater tends to be sandy to clayey. Typical soils on the flood plains in this survey area are the Queencreek, Riveroad, Guest, Bodecker, Rafter, and Stanford series.

Alluvial fans are formed from Holocene and present-day material originating from mountains and hills or other upslope areas. Sediment loads are deposited when slope gradients change from upland positions to a lower segment on the landscape. An inherent feature of fan development is the continuously changing pattern of channels and loci of deposition (Cooke and Warren, 1973). Over a long period of time, these changes ensure the maintenance of fans formed through wide distribution of material on the surface (Cooke and Warren, 1973). The alluvial areas in this survey area generally occur either as triangular alluvial fans, which formed from the high hills or the high fronts, or as long and narrow or elongated fans inset between fan terraces. Typical soils on the alluvial fans in this survey area are the Combate, Tenneco, Hooks, Mallet, and Caralampi series.

Fan terraces developed during the middle Pleistocene and early Holocene eras. They are relict alluvial fans, which are no longer sites of active deposition. They vary greatly in their makeup. The soils on fan terraces exhibit different stages of soil development, which is characterized by well developed argillic, calcic, gypsic, and cemented horizons. Fan terraces have been strongly dissected or eroded to the point where they are not subject to flooding or are subject to only rare flooding. They range from nearly level to steep. Commonly, the soils on the higher, steeper fan terraces closest to the mountain fronts have more rock fragments than the soils on the lower, nearly level fan terraces, which have very few rock fragments. Typical soils on the fan terraces in this survey area are the Sasabe, Eloma, Tombstone, White House, Kimrose, and Saddlebrook series.

Pediments developed during the middle Pleistocene and early Holocene eras. They are broad, level or gently sloping, rock-floored erosion surfaces of low relief at the base of abrupt and receding mountains and are underlain by bedrock. They are bare in some areas but more commonly are partly mantled with a thin, discontinuous veneer of alluvium derived from upland masses and in transit across the surface. Pediments tend to have a rolling landscape. The depth to bedrock ranges from less than 20 inches to more than 60 inches. Typical soils on the pediments in the survey area are the Cherrycow, Brewster, Aravaipa, and Holguin series.

Hills and mountains are characterized by soil development that is highly dependent on the nature of the bedrock, such as its chemical composition, grain size, and hardness. The most influential soil-forming factors on the hills and mountains are time and the slope gradient of the bedrock. The soils on these landforms vary greatly in soil development. Some show no evidence of development, and others have well developed argillic, calcic, and/or petrocalcic horizons. The soils that show little or no evidence of horizon development generally are on the steeper slopes, where erosional activity is greatest. The soils that have well developed horizons generally are on gently sloping to moderately steep slopes, where the hazard of erosion is slight or moderate. Typical soils on the hills and mountain are Beaumain, Pantak, Leyte, Eskiminzin, Nugget, and Graham series.

Basin floors were developed during the late to mid Pleistocene, when the amount of effective moisture was greater than that of the present time. The soils on present-day basin floors possibly formed on two active landforms during the Pleistocene. These are alluvial fans and lake plains (playas) in enclosed basins where there

is no water outlet. The two alluvial processes filled in the enclosed basin through sedimentation, which increased the thickness of the soil mantle. Eventually, enough sediment was deposited to raise the base level and allow drainage. Commonly, the soils on basin floors have several buried horizons representing relict paleosols. These soils generally have varying accumulations of gypsum and salts. The accumulation of gypsum is related to a high water table, which occurred at some time in the process of soil development. Soil affected by gypsum has a high to very high hazard of erosion. High concentrations of sodium and salts affect plant growth. Typical soils on the basin floors in this survey area are the Sasabe, Bonita, and Forrest series.

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Glossary

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. A low, outspread, relatively flat to gently sloping mass of loose rock material that is shaped like an open fan or segment of a cone. This alluvial material is deposited by a stream at the place where it issues from a narrow mountain valley into a plain or broad valley, or where a tributary stream joins a main stream, or wherever constriction in a valley abruptly ceases or the gradient of the stream suddenly decreases. The fan is steeper near the mouth of the valley, where its apex points upstream, and it slopes gently and convexly outward with gradually decreasing gradient.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basin floor. A general term for the nearly level to gently sloping, bottom surface of an intermountain basin (bolson). Component landforms include playas, broad alluvial flats containing ephemeral drainageways and relict alluvial and lacustrine surfaces that rarely if ever are subject to flooding. Where drainage systems are well-developed, alluvial plains are dominant and lake plains are absent or of limited extent. Basin floors grade mountainward to distal parts of the piedmont slopes.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breccia. A coarse grained, clastic rock composed of angular, broken rock fragments held together by a mineral cement or a fine grained matrix.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Calcic horizon. This is a horizon of calcium carbonate or calcium and magnesium carbonate accumulation. If the texture of the soil is greater than 18 percent clay the calcic horizon will be more than six inches thick and have more than 15 percent calcium carbonate equivalent and at least 5 percent calcium carbonate equivalent is required.

Calcium carbonate. Used interchangeably with lime or limy.

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 directly beneath the solum, or it is exposed at the surface by erosion.

Cambic horizon. A horizon characterized by the formation of calcium carbonate coatings in root channels and on the surface of gravel. In some cases, clay bridges have begun to form between sand grains and clay films in root channels.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

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 depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas 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 or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common

compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

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.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Dense layer. A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement. On a desert surface, a layer of gravel or larger fragments that was emplaced by upward movement of the underlying sediments or that remains after finer particles have been removed by running water or the wind.

Distal. Said of a sedimentary deposit consisting of fine clastics and deposited farthest from the source area. Opposite of proximal.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological 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 ecological sites in kind and/or proportion of species or in total production.

Effervescence. In the field, cold 1N hydrochloric acid is used to test for carbonates. The amount and expression of effervescence are affected by size distribution and mineralogy as well as the amount of carbonates. Consequently, effervescence cannot be used to estimate the amount of carbonate. Four classes of effervescence are recognized: *noneffervescent*—few to no bubbles seen, *slightly effervescent*—bubbles readily seen, *strongly effervescent*—bubbles form low foam, *violently effervescent*—thick foam forms quickly.

Eluviation. The movement of materials in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Material transported and deposited by the wind. It includes earth material, such as sand, silt, and clay, and chemical material, such as calcium carbonate.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of 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.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Fan Alluvium. Unconsolidated clastic materials deposited on alluvial fans and fan terraces by running water, including gravel, sand, silt, clay and various mixtures of these.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Fine textured soil. Sandy clay, silty clay, or clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flooding Frequency Classes. *None*—No reasonable possibility of flooding (near 0 percent chance of flooding in any year). *Rare*—Flooding unlikely but possible under unusual weather conditions (from near 0 to 5 percent chance or near 0 to 5 times in 100 years). *Occasional*—Flooding is expected infrequently under usual weather conditions (5 to 50 percent chance of flooding or 5 to 50 times in 100 years). *Frequent*—Flooding is likely to occur often under usual weather conditions (more than a 50 percent chance of flooding or more than 50 times in 100 years). *Common*—Occasional and frequent classes can be grouped for certain purposes and called common flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Forb. Any herbaceous plant not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to

be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

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.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and depends on local usage.

Holocene. An epoch of the Quaternary period from the end of the Pleistocene to the present time. Approximately 0 to 10,000-12,000 years BP.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon. — An organic layer of fresh and decaying plant residue.

A horizon. — The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon. — The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon. —The mineral horizon below an 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.

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 overlying soil material. 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, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon. —Soft, consolidated bedrock beneath the soil.

R layer. —Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Inclusions. Soil components or miscellaneous areas that are not identified in the named map unit. Many areas of these components are too small to be delineated separately or cannot be identified by practical field methods or are deliberately placed in map units to avoid excessive detail on the map or legends. These are two types of inclusions. Similar inclusions are the named components in characteristics and properties and have the same major interpretations. Contrasting inclusions (Minor Components) differ appreciably in one or more properties, and the differences generally are great enough to affect major interpretations.

Induration. The hardening of a soil horizon by chemical action to form a hardpan.

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 varies 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
1. 0.2 to 0.4	low
2. 0.4 to 0.75	moderately low
3. 0.75 to 1.25	moderate
4. 1.25 to 1.75	moderately high
5. 1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives groundwater discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Ksat. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landform. Any recognizable physical form or feature of the earth's surface having a characteristic shape and resulting from natural causes.

Lava flow. A lateral surficial outpouring of molten lava from a vent or a fissure; also, the solidified body of rock that is so formed.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at 1/3-bar or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lime. Chemically, lime is calcium oxide, but as the term is commonly used it also refers to calcium carbonate and calcium hydroxide.

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.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: *abundance*—few, common, and many; *size*—fine, medium, and coarse; and *contrast*—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil. Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies that lack visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Paleosol. A soil that formed on a landscape in the past and that has distinctive morphological features resulting from a soil-forming environment that no longer

exists at the site. The former pedogenic process was either altered because of external environmental change or interrupted by burial.

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.

Pediment. A broad, flat or gently sloping, rock-floored erosion surface or plain of low relief. It typically was developed by subaerial agents in an arid or semiarid region at the base of an abrupt and receding mountain front or plateau escarpment and is underlain by bedrock that may be bare but more often is partly mantled with a thin and discontinuous veneer of alluvium derived from the upland masses and in transit across the surface.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Petrocalcic horizon. A continuous or fractured, cemented or indurated calcic horizon cemented by carbonates and some silica. This is the same as a lime cemented hardpan or a cemented calcium carbonate hardpan.

Petronodes. Petronodes are thought to have formed from calcium and magnesium that precipitated out during periods of a fluctuating seasonal water table and under a climate much wetter than that of the present. Repeated wetting and extreme drying of the soil may have contributed to nodule development. The nodules have no internal organization and break down completely in hydrochloric acid but not in water.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping. Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Pliocene. An epoch of the Tertiary period, after the Miocene and before the Pleistocene. Approximately 1,640,000 to 5,200.000 years BCE.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proximal. Said of a sedimentary deposit consisting of coarse clastics and deposited nearest the source area. Opposite of distal.

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.

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 degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly 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

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

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.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called groundwater runoff or seepage flow from groundwater. Runoff of water from a soil is determined by the slope percentage and the hydrologic group.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The degree to which a soil is affected by soluble salts. The amount of total salts in the soil is ascertained by measuring the conductivity of a saturated soil extract. The conductivity is measured in decisiemens per meter (dS/m), which are the same as millimhos per centimeter (mmhos/cm). Classes of salinity are

nonsaline, 0 to 2 dS/m; *very slightly saline*, 2 to 4 dS/m; *slightly saline*, 4 to 8 dS/m; *moderately saline*, 8 to 16 dS/m; and *strongly saline*, 16 to 32 dS/m.

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-sized particles.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

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.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. 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 surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, building foundations, dams, 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.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 3 percent
Gently sloping or undulating	3 to 7 percent
Strongly sloping or rolling	7 to 15 percent
Moderately steep or hilly	15 to 25 percent
Steep	25 to 55 percent
Very steep	55+ percent

Slope alluvium. Sediments gradually transported on mountain or hill slopes primarily by alluvial processes and characterized by particle sorting. In a profile sequence, the sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. They contrast with unsorted colluvial deposits because of the sorting of rounded or subrounded gravel or cobbles and buried peds.

Sodic (alkali) 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.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na+ to Ca++ + Mg++. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. 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 if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream alluvium. Unconsolidated clastic material deposited on stream terraces by running water, including gravel, sand, silt, clay and various mixtures of these.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream, and representing the dissected remnants of an abandoned flood plain, stream bed, or valley floor produced during a former stage of erosion or deposition.

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.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

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.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjunct. 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 taxadjunct to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjunct only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Urban land. Areas of soil so altered by construction or obscured by structures and pavement that identification of the soil is difficult or impossible.

Valley fill. Alluvium deposited by heavily loaded streams.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water erosion classes. Water erosion is determined by the soil erodibility factor (K factor) of the soil’s surface texture and percent slope. The K factor is a measure of the susceptibility of a soil to particle detachment and transport by rainfall. It is a quantitative value, experimentally determined.

		Percent	*Slope*	
K factor	0 to 5	5 to 15	15 to 30	30+
0.02-0.20	Slight	Slight	Moderate	Severe
0.24-0.37	Slight	Moderate	Severe	Severe
0.43-0.69	Moderate	Severe	Severe	Severe

For soils in which the content of gypsum is 5 percent or more, the hazard of water erosion is as follows:

		Percent	*Slope*	
K factor	0 to 5	5 to 15	15 to 30	30+
0.02-0.20	Slight	Moderate	Severe	Severe
0.24-0.37	Moderate	Severe	Very Severe	Very Severe
0.43-0.69	Severe	Very Severe	Very Severe	Very Severe

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Wind Erodibility Group. A wind erodibility group (WEG) is a collection of soils that have similar properties affecting their resistance to soil blowing. The groups indicate the susceptibility to blowing. The lower the number the more susceptible the soil is to wind erosion. The hazard of wind erosion for each of the various wind erodibility groups is as follows:

1	very high
2	high
3	moderately high
4, 4L	moderate
5 – 7	slightly
8	very slightly

A brief description of each wind erodibility group is given under the heading "Physical Properties.

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