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Agriculture



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the Interior



NRCS

Natural
Resources
Conservation
Service



National Park
Service

Soil Survey of City of Rocks National Reserve, Idaho



How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

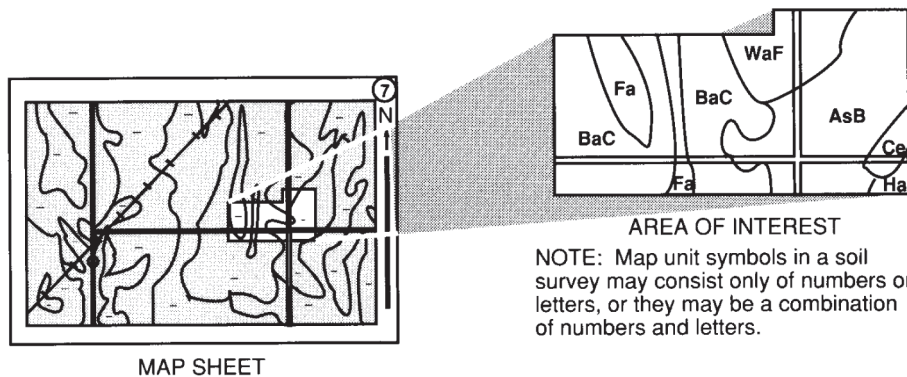
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Map

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

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.



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. This survey was made cooperatively by the United States Department of Agriculture, Natural Resources Conservation Service, and the United States Department of the Interior, National Park Service. The survey is part of the technical assistance furnished to the managers of the City of Rocks National Reserve, Idaho.

Major fieldwork for this soil survey was completed in 1986 and 2005. Soil names and descriptions were approved in 1987 and 2009. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2009. The most current official data are available on the Internet.

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.

Citation

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

Cover Caption

View looking north toward the central area of rock outcroppings. Ola-Rock outcrop-Earcree complex, 35 to 55 percent slopes, is in foreground, and Graham Peak is in background.

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Issued 2011

Foreword

This soil survey was made in conjunction with the National Park Service inventory and monitoring program. It is intended to serve as the official source document for soils of the City of Rocks National Reserve, Idaho.

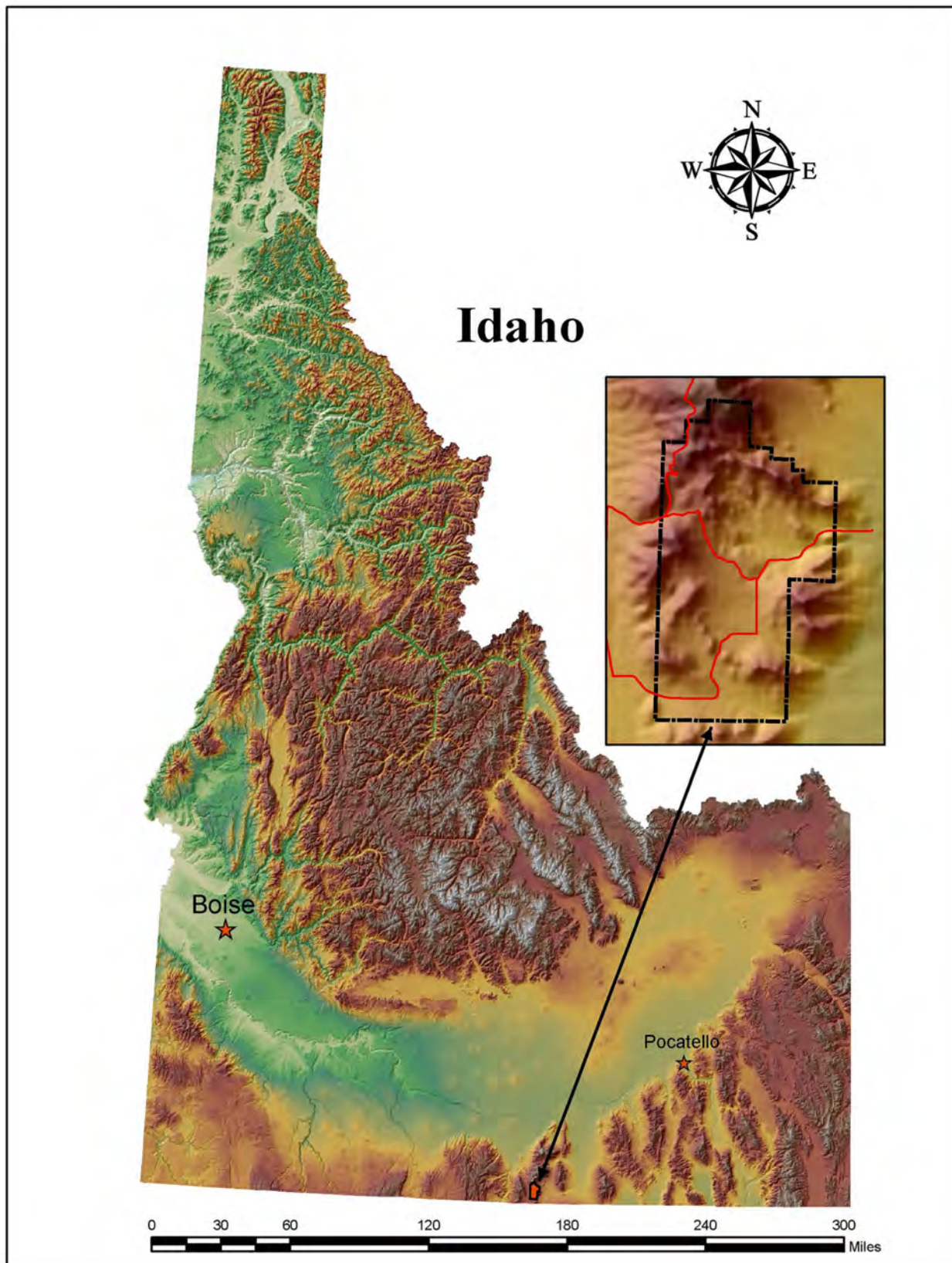
This soil survey contains information that affects current and future land use planning in the reserve. It contains predictions of soil behavior for selected land uses. It highlights soil limitations, practices needed to overcome the limitations, and the impact of selected land uses on the environment. This soil survey is designed to meet the needs of the National Park Service and its partners to better understand the various soil properties and their effect on various natural ecological properties in order to understand, protect, and enhance the environment.

Various land use regulations 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 map unit is shown on the detailed soil map. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the City of Rocks National Reserve.

Jeffery Burwell
State Conservationist
Natural Resources Conservation Service



Location of City of Rocks National Reserve, Idaho.

Soil Survey of City of Rocks National Reserve, Idaho

By Francis Kukachka and Carla Rebernak, Natural Resources
Conservation Service

Fieldwork by Francis Kukachka, Carla Rebernak, and Bill Hiett,
Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources
Conservation Service, and United States Department of the
Interior, National Park Service

CITY OF ROCKS NATIONAL RESERVE is in the extreme south-central part of Idaho. It is bounded on the east by Smokey Mountain, the Cedar Hills, and the Upper Raft River Valley; on the south by the Cedar Hills; on the west by part of the Albion Mountains and Junction Valley; and on the north by the Sawtooth National Forest. The total area is about 14,407 acres, or about 22.5 square miles. Elevation ranges from about 5,500 feet above sea level where Circle Creek exits the reserve to about 8,900 feet on Graham Peak.

The dominant feature of the reserve is the array of granitic spires and rocks for which the reserve is named. The Albion Mountains, which include Graham Peak, Smokey Mountain, and the Cedar Hills, make up the major topographic relief.

General Nature of the Reserve

This section provides general information about the reserve. It describes climate, history and development, and geology.

Climate

Prepared by the Natural Resources Conservation Service, National Water and Climate Center, Portland, Oregon.

The climate tables were created from data recorded at the Oakley, Idaho, climate station. Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from various climate atlases, including the Parameter-elevation Regressions on Independent Slopes Model (PRISM) for the City of Rocks National Reserve.

[Table 1](#) gives data on temperature and precipitation for the reserve as recorded at Oakley during the period 1971 to 2000. [Table 2](#) shows probable dates of the first freeze in fall and the last freeze in spring. [Table 3](#) provides data on the length of the growing season.

In winter, the average temperature is 30.8 degrees F and the average daily minimum temperature is 21.4 degrees (15 degrees at the reserve). The lowest temperature on record, which occurred at Oakley on February 9, 1933, is -27 degrees. In summer, the average temperature is 66.6 degrees and the average daily maximum

temperature is 81.3 degrees (72 degrees at the reserve). The highest recorded temperature, which occurred at Oakley on July 26, 1933, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall. For the reserve, the growing season at an elevation of 2,000 feet higher than that of Oakley is approximately 46 days shorter than the growing season at Oakley (23 days later in spring and 23 days earlier in fall).

The average annual total precipitation is about 11.25 inches (28.00 inches at the City of Rocks National Reserve). Of this, 5.31 inches, or about 47 percent, usually falls in May through September (June through August for the reserve). The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 1.51 inches at Oakley on October 2, 1946. Thunderstorms occur on about 18 days each year, and most occur in July.

The average seasonal snowfall is about 27.1 inches (67 inches at the reserve). The greatest snow depth at any one time during the period of record was 23 inches on January 28, 1949. On the average, 17 days of the year have at least 1 inch of snow on the ground (37 days at the reserve). The heaviest 1-day snowfall on record was 14.3 inches recorded on January 28, 1949.

The average relative humidity in midafternoon is about 46 percent. Humidity is higher at night, and the average at dawn is about 76 percent. The sun shines 78 percent of the time possible in summer and 42 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in March.

Additional climate information is available online at <http://www.wrcc.dri.edu/Climsum.html>.

History and Development

The City of Rocks National Reserve is recognized as a natural and historic landmark for its scenic, geologic, and historic significance. In 1988, it was recognized as a National reserve and protected by Congress. The reserve is a popular destination for sightseeing, picnicking, rock climbing, camping, hiking, mountain biking, taking photographs, and studying nature. The reserve is managed by the Idaho Department of Parks and Recreation under a cooperative agreement with the National Park Service.

The Comprehensive Management Plan (Idaho Department of Parks and Recreation, 1988) of the reserve contains the following historical account of the area:

"The story of the California Trail is an important but relatively brief part of the history of the City of Rocks. People have inhabited the area for thousands of years. By the early 1800's Shoshone and other Native American groups ranged over a broad territory that included the City of Rocks. The area was first visited by white fur hunters in 1826. It was poor fur-bearer habitat and proved more valuable as a practical travel corridor when the mountain men turned to laying out the early transcontinental wagon routes about 15 years later. Most of the pioneer families bound for California and virtually all of the 49ers who traveled overland to the California gold fields and many Oregon-bound emigrants who followed the Applegate Trail used this route. The use peaked in 1852, when some 52,000 people passed over the California Trail. The overgrazing of land along the trail and the depletion of game by the emigrants eventually led to conflicts with the Native Americans, who by the late 1860's were forced to resettle on the reservations.

Following the completion of the transcontinental railroad in 1869, a road was developed from Kelton, Utah, to Boise, Idaho, to provide a connection for postal service, express, and freighting operations between the railroad and the burgeoning mining communities of southern Idaho. A stage station near the junction of the old California Trail and Salt Lake Alternate served the thriving Boise-Kelton traffic until 1882 when the Oregon Short Line Railroad took the place of the road.

Responding in part to the growing market for meat by the expanding Idaho mining communities, cattle ranching began in the City of Rocks vicinity in the early 1870's. From the late 1870's Mormon settlements also began to dot the valleys adjacent to the City of Rocks. Dry-farming methods coupled with increasing precipitation after about 1890 allowed successful crop planting in the City of Rocks up until the 1920's. Sagebrush was cleared, lands were fenced, and grain and hay crops were planted. During this period the existing road was built across the City of Rocks from Almo to Mouton. In the 1920's more arid conditions and the severe agricultural depression that followed World War I caused a retrenchment of dry-farming operations, and previous farm holdings at the City of Rocks were consolidated back into stock ranches. Few farm or ranch buildings still stand in the reserve, but several structures or parts of structures have survived, along with many of the cattle trailing routes, passes, water sources, grasslands, pastures, and basins that are an important part of the memories passed down through the farming and ranching families who lived there. This historic rural setting is an important and increasingly rare remnant of the American West."

Geology

The reserve lies in a northern extension of the Basin and Range Province in the south-central part of Idaho ([fig. 1](#)).

The Albion Mountains stretch for 50 kilometers between the Idaho/Utah border on the south and the Snake River Plain on the north (Carson and others, 2002). The range is part of the Albion-Raft River-Grouse Creek metamorphic core complex, which exposes some of the most highly extended and deeply-derived rocks of the Basin and Range geologic province (Miller, 1980). Granite, granitic gneiss, schist, and amphibolite belonging to the 2.5 billion-year-old Green Creek Complex are the oldest rocks in the range. These basement rocks are unconformably overlain by Proterozoic and Paleozoic sediment that was metamorphosed during crustal thickening in the hinterland of the Sevier orogenic belt (Armstrong, 1968). The highland created by the Sevier orogeny began to collapse and extend during the early Cenozoic. The formerly deep-seated Precambrian rocks were arched into broad domes and structurally unroofed along large-scale low-angle normal faults (Miller and Bedford, 1999). During the Oligocene, the core complex was intruded by several bodies of granite that include the 28 million-year-old Almo Pluton of the Albion Mountains.

Geologically, the City of Rocks includes some of the oldest rocks in the western United States juxtaposed with others that are more recent. Granite of the Almo Pluton (28 million years ago) and the Green Creek Complex (2.5 billion years ago) has eroded into the unique shapes visible today (Miller, 1980). A prominent feature in the reserve, the Twin Sisters Formation, consists of two spires, one from each rock formation ([fig. 2](#)). These formations are billions of years apart in age.

Following emplacement of granitic plutons at a depth of approximately 10 kilometers, the region experienced rapid uplift. By 10 million years ago, a combination

Soil Survey of City of Rocks National Reserve, Idaho

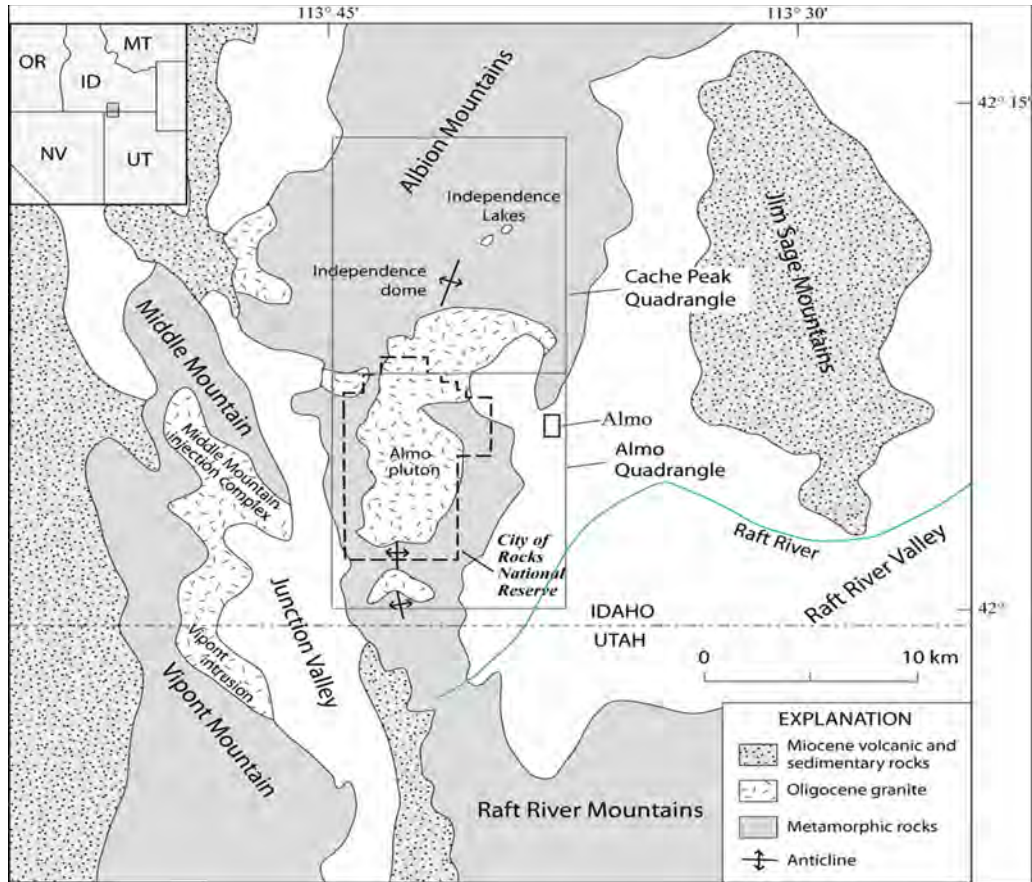


Figure 1.—General geology of the City of Rocks National Reserve and surrounding area.

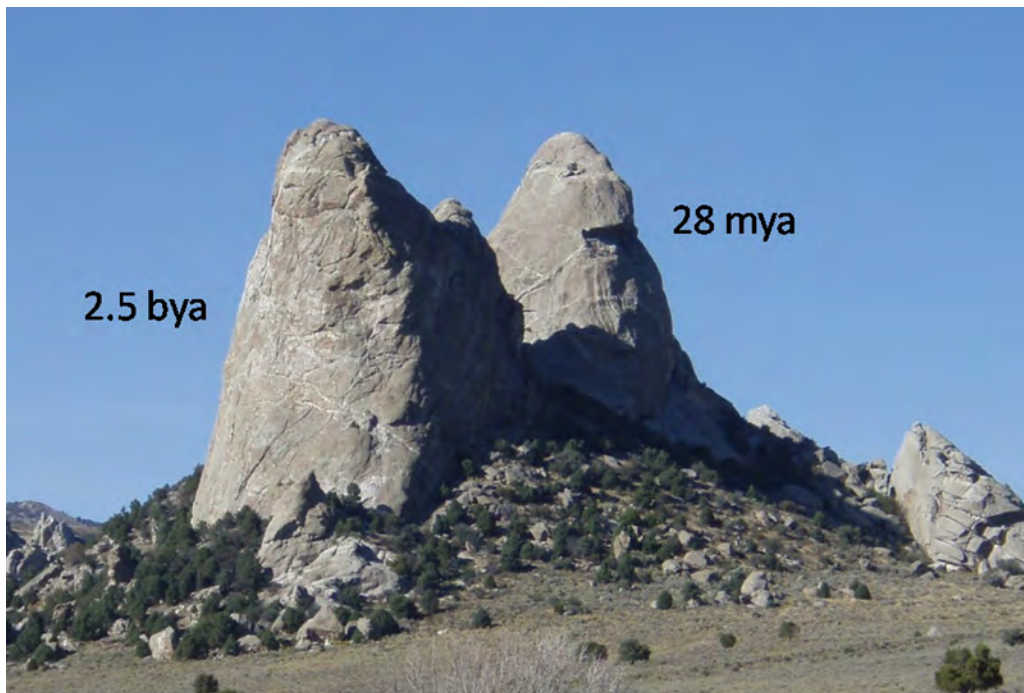


Figure 2.—Twin Sisters Formation.

of low-angle normal faulting and erosion had exhumed the Almo Pluton, allowing ashflow tuffs from calderas associated with the nearby Yellowstone hot spot to be emplaced on the exposed granite (Miller and Bedford, 1999). During the late Miocene, most of these rhyolitic rocks were translated to the east on low-angle normal faults as the core complex continued to rise. Quaternary uplift of the range has occurred along high-angle, range-bounding normal faults. The present shape of the mountains results primarily from the headward erosion of streams that are tributaries of the Raft and Snake Rivers on the north and east and Birch and Goose Creeks on the west. Headward erosion by Raft River tributaries eventually breached resistant Proterozoic quartzites in the structural domes of the southern Albion Mountains. The Tertiary granite cores of the domes were much more easily weathered, particularly in regions of high joint density and hydrothermal alteration. Streams differentially eroded the weathered granite, leaving behind a spectacular landscape of domes, fins, and spires rising out of broad valleys in the interior of the range (Carson and others, 2002). The City of Rocks National Reserve encompasses this unique landscape.

How This Survey Was Made

This survey was made in conjunction with the National Park Service soil inventory and monitoring program to provide information about the soils and miscellaneous areas in the reserve. Most of the reserve was mapped as part of the soil survey of Cassia County, Idaho, Eastern Part. This survey was completed in 1986 and published in 1994 (USDA, 1994). The remaining part of the reserve was mapped in 2005. The data from the 1986 and 2005 mapping of the reserve were combined to produce this publication. The information in this publication updates the part of the Cassia County, Idaho, Eastern Part, publication that covers the reserve. The most current official data are available on the Internet.

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 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.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in the reserve occur 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 reserve 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 reserve and determining their properties, the soil scientists assigned the soils to taxonomic classes. 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 reserve, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests 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 range production was determined through onsite investigation and the plant populations in an area were measured and correlated to specific soils.

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 reserve, 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. Digital color aerial imagery of the 2009 National Agriculture Imagery Program (NAIP) was used as the base map for placement of soil lines for this soil survey.

General Soil Map Units

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

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

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

Soils on Mountain Slopes and Hillslopes

Number of map units: 4

Percentage of reserve: 76 percent

1. Povey-Pachic Haplocryolls

Cold, well drained, deep and very deep soils that formed in mixed alluvium and colluvium derived from igneous and metamorphic rock on slopes of 15 to 60 percent

Percentage of reserve: 11 percent

Landform: Mountain slopes

Elevation: 6,400 to 8,900 feet

Frost-free period: 30 to 60 days

Mean annual precipitation: 16 to 28 inches

Minor components: Nurkey and Chokecherry soils, Rock outcrop

2. Howcan-Searla

Cool, well drained, very deep soils that formed in mixed alluvium and colluvium derived from igneous rock on slopes of 4 to 55 percent

Percentage of reserve: 5 percent

Landform: Mountain slopes

Elevation: 6,500 to 7,800 feet

Frost-free period: 65 to 95 days

Mean annual precipitation: 18 to 28 inches

Minor components: Ola soils, Pachic Haplocryolls, Povey soils

3. **Ola-Rock outcrop-Earcree**

Cool and cold, well drained, moderately deep and very deep soils that formed in mixed alluvium and colluvium derived from granodiorite, metamorphic rock, and quartz diorite on slopes of 3 to 60 percent

Percentage of reserve: 38 percent

Landform: Mountain slopes, hillslopes (fig. 3)

Elevation: 5,700 to 8,900 feet

Frost-free period: 30 to 95 days

Mean annual precipitation: 14 to 28 inches

Minor component: Kanlee soils

4. **Birchcreek-Itca-Rock outcrop**

Cool, well drained, shallow and moderately deep soils that formed in mixed alluvium and colluvium derived from mica schist and quartzite on slopes of 20 to 55 percent

Percentage of reserve: 22 percent

Landform: Mountain slopes

Elevation: 5,500 to 7,600 feet

Frost-free period: 65 to 95 days

Mean annual precipitation: 12 to 20 inches

Minor components: Rubble land, Jimsage and Poisonhol soils

Soils on Fan Remnants

Number of map units: 1

Percentage of reserve: 24 percent



Figure 3.—Typical area of general soil map units Ola-Rock outcrop-Earcree (3), Arbone-Riceton (5), and Cumulic Endoaquolls (6). View is looking toward the north.

5. *Arbone-Riceton*

Well drained, very deep soils that formed in mixed alluvium and loess on slopes of 4 to 12 percent

Percentage of reserve: 24 percent

Landform: Fan remnants (fig. 3, see page 8)

Elevation: 5,700 to 6,600 feet

Frost-free period: 65 to 95 days

Mean annual precipitation: 14 to 18 inches

Minor components: Chayson, Raft river, and Poisonhol soils

Soils on Flood Plains and Stream Terraces

Number of map units: 1

Percentage of reserve: Less than 1 percent

6. *Cumulic Endoaquolls*

Poorly drained, very deep soils that formed in mixed alluvium on slopes of 0 to 4 percent

Percentage of reserve: Less than 1 percent

Landform: Flood plains, stream terraces (fig. 3, see page 8)

Elevation: 5,800 to 5,900 feet

Frost-free period: 65 to 95 days

Mean annual precipitation: 14 to 16 inches

Detailed Soil Map Units

The map units delineated on the detailed soil map in this survey represent the soils or miscellaneous areas in the reserve. The map unit descriptions in this section, along with the map, 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.

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.

Minor soil components that have properties similar to those of the dominant soil or soils in the map unit do not affect use and management. These are called noncontrasting, or similar, components. They typically are not 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. 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. In this soil survey area, the Acord, Aninto, Hardister, Hutchley, Koosharem, Kovich, Pavohroo, Ricrest, Vipoint, and Yeates Hollow series occur only as minor components. Information on these soils is provided in the soil survey of Cassia County, Idaho, Eastern Part (USDA, 1994).

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.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given 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 map are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Povey very stony loam, 35 to 55 percent slopes, is a phase of the Povey series.

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

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 map. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Birchcreek-Itca complex, 25 to 55 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the map. Because of present or anticipated uses of the map units in the reserve, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Hymas-Bezzant association, 10 to 30 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Each detailed soil map unit is assigned to a major land resource area (MLRA) (USDA Agriculture Handbook 296). The MLRA for each detailed soil map unit is given in this section. Some map units, such as Rock outcrop, Water, and other miscellaneous areas, may not be assigned to a single MLRA because the unit can occur in any MLRA.

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

6—Arbone loam, 4 to 12 percent slopes

Landscape: Hills (fig. 4, see page 15)

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,800 to 6,330 feet (1,767 to 1,929 meters)

Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Arbone and similar soils: 85 percent

Dissimilar minor components: 15 percent

Characteristics of Arbone

Setting

Landform: Fan remnants

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): Southeast

Aspect (range): All aspects

Slope range: 4 to 12 percent

Parent material: Mixed alluvium with some loess influence

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Nonsaline (about 1 millimho per centimeter)

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: 18 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Moderate (about 8.7 inches)

Interpretive groups

Land capability subclass (nonirrigated): 3e

Ecological site: LOAMY 12-16 ARTRV/PSSPS-FEID (R013XY001ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Coarse-loamy, mixed, superactive, frigid Calcic Haploxerolls

Typical profile

A—0 to 10 inches; loam

Bw—10 to 35 inches; loam

Bk—35 to 60 inches; loam

Minor Components

Arbone soils, skeletal throughout

Percentage of map unit: 5 percent

Chayson soils

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 3 percent

Arbone soils, silt loam surface

Percentage of map unit: 2 percent

19—Birchcreek extremely stony loam, 20 to 55 percent slopes

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,220 to 7,250 feet (1,896 to 2,209 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Birchcreek, thin surface, and similar soils: 80 percent

Dissimilar minor components: 20 percent

Characteristics of Birchcreek, Thin Surface

Setting

Landform: Mountain slopes

Downslope shape: Linear

Across-slope shape: Convex

Aspect (representative): South

Aspect (range): East to southwest (clockwise)

Slope range: 20 to 55 percent

Parent material: Mixed alluvium and colluvium over mica schist and quartzite

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately low

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 1.2 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)

Hydric soil status: Not hydric

Hydrologic soil group: D

Taxonomic classification: Clayey-skeletal, smectitic, frigid Typic Argixerolls

Typical profile

A—0 to 8 inches; extremely stony loam

Bt1—8 to 15 inches; very gravelly clay loam

Bt2—15 to 22 inches; extremely gravelly clay

R—22 to 32 inches; unweathered bedrock

Minor Components

Acord soils

Percentage of map unit: 5 percent

Birchcreek soils, extremely flaggy surface

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 5 percent

Yeates Hollow soils

Percentage of map unit: 5 percent

21—Birchcreek-Itca complex, 25 to 55 percent slopes

Landscape: Mountains ([fig. 4](#))

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,600 to 7,560 feet (1,708 to 2,303 meters)

Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Birchcreek, moist, and similar soils: 45 percent

Itca and similar soils: 30 percent

Dissimilar minor components: 25 percent

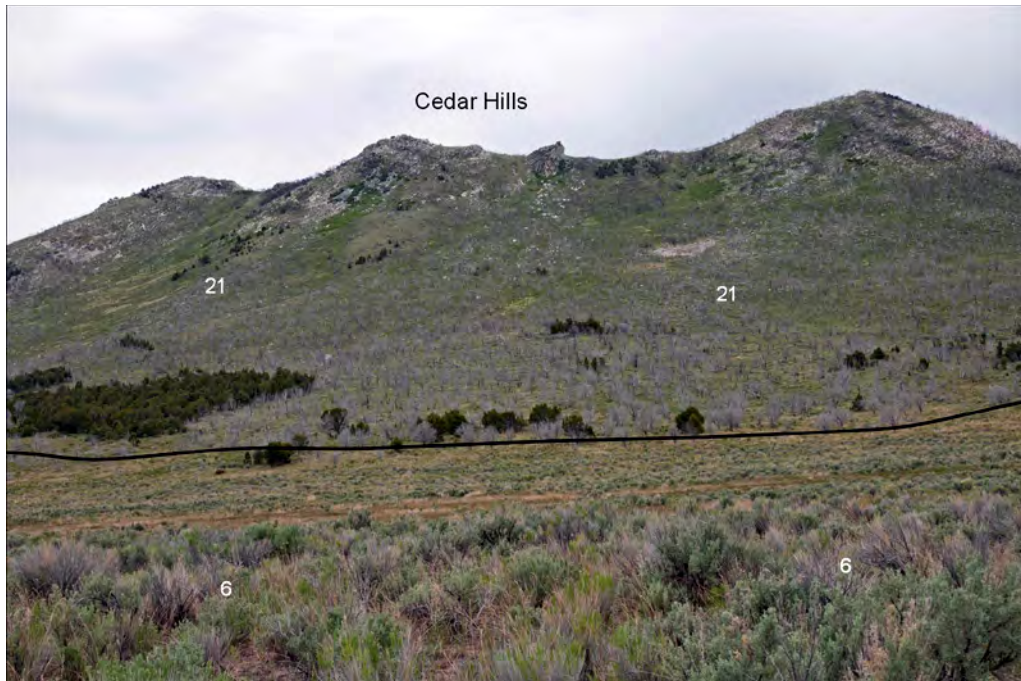


Figure 4.—Typical area of Arbone loam, 4 to 12 percent slopes (6), and Birchcreek-Itca complex, 25 to 55 percent slopes (21). Most of the juniper and pinyon trees have been burned by wildfire. View is looking toward the south.

Characteristics of Birchcreek, Moist

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Linear

Aspect (representative): South

Aspect (range): Northeast to north (clockwise)

Slope range: 25 to 55 percent

Parent material: Mixed alluvium and colluvium over mica schist and quartzite

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately low

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.4 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)

Hydric soil status: Not hydric

Hydrologic soil group: D

Taxonomic classification: Clayey-skeletal, smectitic, frigid Typic Argixerolls

Typical profile

A—0 to 5 inches; very stony loam

Bt1—5 to 9 inches; very gravelly clay loam

Bt2—9 to 31 inches; very stony clay

R—31 to 41 inches; unweathered bedrock

Characteristics of Itca

Setting

Landform: Mountain slopes

Downslope shape: Convex

Across-slope shape: Convex

Aspect (representative): South

Aspect (range): Northeast to north (clockwise)

Slope range: 25 to 55 percent

Parent material: Mixed alluvium and colluvium over quartzite and mica schist

Properties and qualities

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately low

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 0.8 inch)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: Upland Stony Loam (Pinyon-Utah Juniper) (R028AY338UT)

Hydric soil status: Not hydric

Hydrologic soil group: D

Taxonomic classification: Clayey-skeletal, smectitic, frigid Lithic Argixerolls

Typical profile

A—0 to 3 inches; very stony loam

Bt—3 to 17 inches; extremely stony clay

R—17 to 27 inches; unweathered bedrock

Minor Components

Hutchley soils

Percentage of map unit: 10 percent

Birchcreek soils, thick surface

Percentage of map unit: 5 percent

Rubble land

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 5 percent

26—Chayson gravelly silt loam, 2 to 10 percent slopes

Landscape: Hills ([fig. 6](#), see page 23)

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,780 to 6,260 feet (1,762 to 1,908 meters)

Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Chayson and similar soils: 90 percent

Dissimilar minor component: 10 percent

Characteristics of Chayson

Setting

Landform: Fan remnants

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): Southwest

Aspect (range): All aspects

Slope range: 2 to 10 percent

Parent material: Mixed alluvium with some loess influence

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to indurated duripan

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Very slightly saline (about 3 millimhos per centimeter)

Sodicity (maximum): Sodium adsorption ratio about 10

Calcium carbonate equivalent: 18 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.8 inches)

Interpretive groups

Land capability subclass (nonirrigated): 4e

Ecological site: LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Typic
Durixerolls

Typical profile

A—0 to 3 inches; gravelly silt loam

Btk—3 to 18 inches; gravelly clay loam

Bk—18 to 28 inches; gravelly loam

2Bkqm—28 to 32 inches; cemented material

Minor Component

Chayson soils, deep to hardpan

Percentage of map unit: 10 percent

32—Conneridge very gravelly loam, 20 to 50 percent slopes, extremely stony

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,220 to 7,370 feet (1,897 to 2,247 meters)

Mean annual precipitation: 18 to 20 inches (457 to 508 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Conneridge, extremely stony surface, and similar soils: 85 percent

Dissimilar minor components: 15 percent

Characteristics of Conneridge, Extremely Stony Surface

Setting

Landform: Ridges

Downslope shape: Linear

Across-slope shape: Convex

Aspect (representative): Southeast

Aspect (range): All aspects

Slope range: 20 to 50 percent

Parent material: Mixed alluvium and colluvium over mica schist and quartzite

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Nonsaline (about 1 millimho per centimeter)

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: 28 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 1.6 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Calcic Haploxerolls

Typical profile

A—0 to 3 inches; very gravelly loam

Bw1—3 to 7 inches; very gravelly loam

Bw2—7 to 13 inches; very stony loam

Bk1—13 to 17 inches; very gravelly loam
Bk2—17 to 23 inches; extremely gravelly loam
R—23 to 33 inches; unweathered bedrock

Minor Components

Conneridge soils, shallow

Percentage of map unit: 5 percent

Vipont soils

Percentage of map unit: 5 percent

Ricrest soils

Percentage of map unit: 3 percent

Rock outcrop

Percentage of map unit: 2 percent

36—Cumulic Endoaquolls, 0 to 4 percent slopes

Landscape: Plains (fig. 5)

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,800 to 5,910 feet (1,768 to 1,801 meters)

Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Cumulic Endoaquolls and similar soils: 85 percent

Dissimilar minor components: 15 percent



Figure 5.—Typical area of Cumulic Endoaquolls, 0 to 4 percent slopes (36); Kanlee sandy loam, 4 to 12 percent slopes (89); Riceton loamy coarse sand, 4 to 12 percent slopes (116); and Ola-Rock outcrop-Earcree complex, 35 to 55 percent slopes (124). View is looking toward the north.

Characteristics of Cumulic Endoaquolls

Setting

Landform: Flood plains
Downslope shape: Concave
Across-slope shape: Linear
Aspect (representative): Southeast
Aspect (range): All aspects
Slope range: 0 to 4 percent
Parent material: Mixed alluvium

Properties and qualities

Depth to restrictive feature: 40 to 60 inches to strongly contrasting textural stratification
Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Calcium carbonate equivalent: 3

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high
Natural drainage class: Poorly drained
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Depth to seasonal water table: About 18 to 30 inches (see Water Features table)
Available water capacity (entire profile): Moderate (about 7.5 inches)

Interpretive groups

Land capability subclass (nonirrigated): 3w
Ecological site: DRY MEADOW PONE3-PHAL2 (R025XY039ID)
Hydric soil status: Not hydric
Hydrologic soil group: C
Taxonomic classification: Cumulic Endoaquolls

Typical profile

A—0 to 28 inches; clay loam
Bg—28 to 40 inches; sandy clay loam
Cg—40 to 60 inches; sandy loam

Minor Components

Cumulic Endoaquolls, cobbly throughout

Percentage of map unit: 5 percent

Hardister soils

Percentage of map unit: 5 percent

Kovich soils

Percentage of map unit: 5 percent

78—Hymas-Bezzant association, 10 to 30 percent slopes

Landscape: Hills
Major land resource area: 25—Owyhee High Plateau
Elevation: 5,880 to 6,400 feet (1,793 to 1,952 meters)
Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)
Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)
Frost-free period: 65 to 95 days

Map Unit Composition

Hymas and similar soils: 45 percent

Bezzant and similar soils: 40 percent

Dissimilar minor components: 15 percent

Characteristics of Hymas

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulders, backslopes

Downslope shape: Linear

Across-slope shape: Convex

Aspect (representative): East

Aspect (range): East to southeast (clockwise)

Slope range: 10 to 30 percent

Parent material: Mixed alluvium and colluvium over limestone

Properties and qualities

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Nonsaline (about 1 millimho per centimeter)

Sodicity (maximum): Sodium adsorption ratio about 3

Calcium carbonate equivalent: 45 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 1.2 inches)

Interpretive groups

Land capability subclass (nonirrigated): 6e

Ecological site: SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)

Hydric soil status: Not hydric

Hydrologic soil group: D

Taxonomic classification: Loamy-skeletal, carbonatic, frigid Lithic Haploxerolls

Typical profile

A—0 to 11 inches; very stony loam

Bk—11 to 15 inches; very stony loam

R—15 to 25 inches; unweathered bedrock

Characteristics of Bezzant

Setting

Landform: Hillslopes

Landform position (two-dimensional): Backslopes, toeslopes

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): East

Aspect (range): East to southeast (clockwise)

Slope range: 10 to 20 percent

Parent material: Mixed alluvium

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Nonsaline (about 1 millimho per centimeter)

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: 38 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 5.5 inches)

Interpretive groups

Land capability subclass (nonirrigated): 4e

Ecological site: STONY LOAM 13-16 ARTRV/PSSPS (R013XY002ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Typic Calcixerolls

Typical profile

A—0 to 15 inches; cobbly loam

Bk1—15 to 23 inches; very cobbly loam

Bk2—23 to 31 inches; very cobbly clay loam

2C—31 to 60 inches; very cobbly loam

Minor Components

Birchcreek soils, loamy subsoil

Percentage of map unit: 5 percent

Hymas soils, very shallow

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 5 percent

84—Itca-Birchcreek-Rock outcrop complex, 25 to 55 percent slopes

Landscape: Mountains ([fig. 6](#))

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,500 to 7,500 feet (1,677 to 2,285 meters)

Mean annual precipitation: 12 to 18 inches (305 to 457 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Itca and similar soils: 35 percent

Birchcreek, moist, and similar soils: 25 percent

Rock outcrop: 20 percent

Dissimilar minor components: 20 percent

Characteristics of Itca

Setting

Landform: Mountain slopes

Downslope shape: Convex

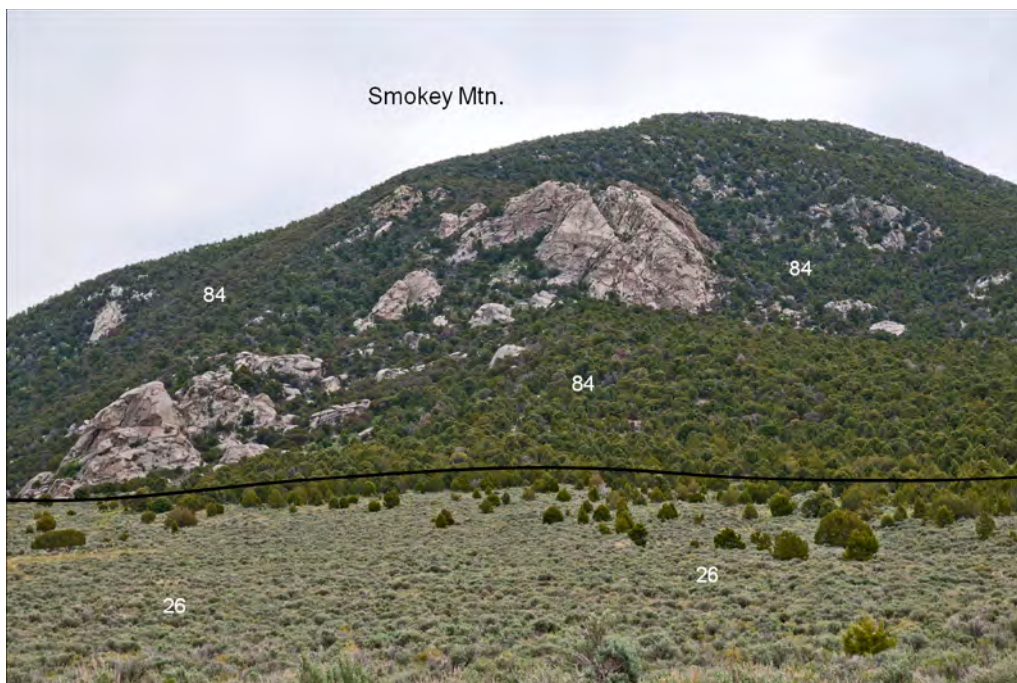


Figure 6.—Typical area of Chayson gravelly silt loam, 2 to 10 percent slopes (26), and Itca-Birchcreek-Rock outcrop complex, 25 to 55 percent slopes (84). Juniper is invading onto the Chayson soil. View is looking toward the east.

Across-slope shape: Convex

Aspect (representative): South

Aspect (range): Southeast to west (clockwise)

Slope range: 25 to 35 percent

Parent material: Mixed alluvium and colluvium over quartzite and mica schist

Properties and qualities

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately low

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 0.8 inch)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: Upland Stony Loam (Pinyon-Utah Juniper) (R028AY338UT)

Hydric soil status: Not hydric

Hydrologic soil group: D

Taxonomic classification: Clayey-skeletal, smectitic, frigid Lithic Argixerolls

Typical profile

A—0 to 3 inches; very stony loam

Bt—3 to 17 inches; extremely stony clay

R—17 to 27 inches; unweathered bedrock

Characteristics of Birchcreek, Moist

Setting

Landform: Mountain slopes

Downslope shape: Linear

Across-slope shape: Convex

Aspect (representative): South

Aspect (range): Southeast to west (clockwise)

Slope range: 25 to 55 percent

Parent material: Mixed alluvium and colluvium over mica schist and quartzite

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately low

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 1.2 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)

Hydric soil status: Not hydric

Hydrologic soil group: D

Taxonomic classification: Clayey-skeletal, smectitic, frigid Typic Argixerolls

Typical profile

A—0 to 5 inches; very stony loam

Bt1—5 to 9 inches; very gravelly clay loam

Bt2—9 to 31 inches; very stony clay

R—31 to 41 inches; unweathered bedrock

Characteristics of Rock Outcrop

Description of areas: Exposures or outcroppings of bare bedrock

Minor Components

Rubble land

Percentage of map unit: 10 percent

Birchcreek soils, loamy subsoil

Percentage of map unit: 5 percent

Poisonhol soils

Percentage of map unit: 5 percent

86—Jimsage-Doodlelink complex, 40 to 60 percent slopes

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,340 to 7,060 feet (1,933 to 2,152 meters)

Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Jimsage and similar soils: 50 percent

Doodlelink and similar soils: 30 percent

Dissimilar minor components: 20 percent

Characteristics of Jimsage

Setting

Landform: Mountain slopes

Downslope shape: Convex

Across-slope shape: Convex

Aspect (representative): West

Aspect (range): Southwest to north (clockwise)

Slope range: 40 to 60 percent

Parent material: Loess-influenced colluvium derived from quartz-monzonite

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Very slightly saline (about 3 millimhos per centimeter)

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: 10 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 3.7 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Calcic Pachic Haploxerolls

Typical profile

A—0 to 6 inches; gravelly loam

Bw1—6 to 14 inches; very gravelly loam

Bw2—14 to 23 inches; extremely gravelly loam

Bk—23 to 60 inches; extremely gravelly sandy loam

Characteristics of Doodlelink

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Concave

Aspect (representative): West

Aspect (range): Southwest to north (clockwise)

Slope range: 40 to 60 percent

Parent material: Loess-influenced colluvium derived from quartz-monzonite

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 5.7 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Pachic
Haploxerolls

Typical profile

A—0 to 10 inches; gravelly loam

Bw—10 to 60 inches; very cobbly loam

Minor Components

Hutchley soils

Percentage of map unit: 10 percent

Rock outcrop

Percentage of map unit: 5 percent

Rubble land

Percentage of map unit: 5 percent

89—Kanlee sandy loam, 4 to 12 percent slopes

Landscape: Uplands ([figs. 5 and 8](#), see pages 19 and 37)

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,610 to 7,140 feet (1,711 to 2,176 meters)

Mean annual precipitation: 14 to 20 inches (356 to 508 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Kanlee and similar soils: 75 percent

Dissimilar minor components: 25 percent

Characteristics of Kanlee

Setting

Landform: Pediments

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): South

Aspect (range): All aspects

Slope range: 4 to 12 percent

Parent material: Mixed alluvium and colluvium over quartz-monzonite and granodiorite

Properties and qualities

Depth to restrictive features: 20 to 40 inches to paralithic bedrock and 35 to 40 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.6 inches)

Interpretive groups

Land capability subclass (nonirrigated): 4e

Ecological site: LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Typic Argixerolls

Typical profile

A—0 to 10 inches; sandy loam

Bt1—10 to 14 inches; sandy loam

Bt2—14 to 29 inches; gravelly sandy clay loam

Cr—29 to 35 inches; weathered bedrock

R—35 to 45 inches; unweathered bedrock

Minor Components

Ola soils

Percentage of map unit: 10 percent

Cumulic Endoaquolls

Percentage of map unit: 5 percent

Kanlee soils, shallow

Percentage of map unit: 5 percent

Kanlee soils, skeletal subsoil

Percentage of map unit: 5 percent

101—Ola sandy loam, 6 to 20 percent slopes

Landscape: Hills ([fig. 7](#))

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,060 to 6,710 feet (1,846 to 2,046 meters)

Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Ola and similar soils: 90 percent

Dissimilar minor components: 10 percent

Characteristics of Ola

Setting

Landform: Hillslopes

Landform position (two-dimensional): Footslopes

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): East

Aspect (range): Northeast to south (clockwise)

Slope range: 6 to 20 percent

Parent material: Mixed alluvium and colluvium over granodiorite

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

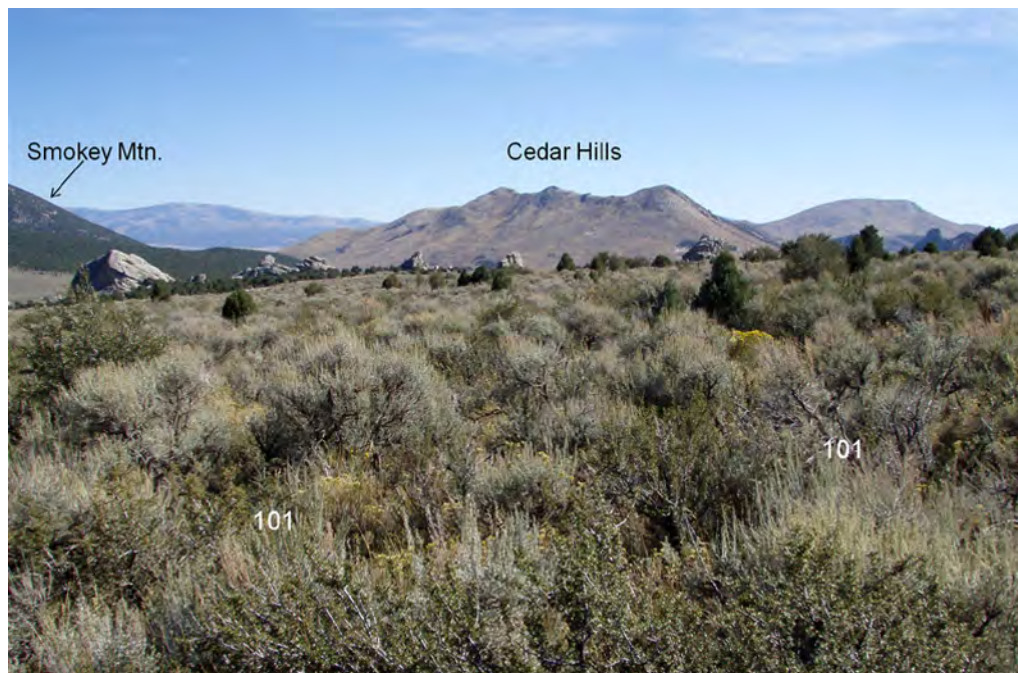


Figure 7.—Typical area of Ola sandy loam, 6 to 20 percent slopes (101). View is looking toward the southeast.

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.2 inches)

Interpretive groups

Land capability subclass (nonirrigated): 4e

Ecological site: LOAMY 16+ ARTRV/FEID (R025XY022ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Coarse-loamy, mixed, superactive, frigid Pachic Haploxerolls

Typical profile

A—0 to 16 inches; sandy loam

Bw—16 to 22 inches; sandy loam

C—22 to 30 inches; gravelly sandy loam

Cr—30 to 40 inches; weathered bedrock

Minor Components

Kanlee soils

Percentage of map unit: 5 percent

Riceton soils

Percentage of map unit: 3 percent

Rock outcrop

Percentage of map unit: 2 percent

102—Pachic Haplocryolls, 15 to 45 percent slopes

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,470 to 8,810 feet (1,972 to 2,685 meters)

Mean annual precipitation: 16 to 28 inches (406 to 711 millimeters)

Mean annual air temperature: 36 to 39 degrees F (2 to 4 degrees C)

Frost-free period: 30 to 60 days

Map Unit Composition

Pachic Haplocryolls and similar soils: 90 percent

Dissimilar minor components: 10 percent

Characteristics of Pachic Haplocryolls

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Concave

Aspect (representative): East

Aspect (range): North to south (clockwise)

Slope range: 15 to 45 percent

Parent material: Mixed alluvium and colluvium

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high
Natural drainage class: Well drained
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within a depth of 72 inches
Available water capacity (entire profile): Low (about 4.1 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e
Ecological site: ASPEN THICKET 16-22 POTR5 (R025XY001ID)
Hydric soil status: Not hydric
Hydrologic soil group: C
Taxonomic classification: Pachic Haplocryolls

Typical profile

A—0 to 3 inches; stony loam
AB—3 to 13 inches; gravelly loam
BA—13 to 24 inches; very gravelly clay loam
Bw1—24 to 31 inches; extremely stony loam
Bw2—31 to 45 inches; extremely cobbly loam
Bw3—45 to 60 inches; extremely stony clay loam

Minor Components

Middlehill soils

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 5 percent

107—Poisonhol loam, 8 to 15 percent slopes, extremely stony

Landscape: Hills
Major land resource area: 25—Owyhee High Plateau
Elevation: 5,590 to 6,130 feet (1,703 to 1,869 meters)
Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)
Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)
Frost-free period: 65 to 95 days

Map Unit Composition

Poisonhol, extremely stony surface, and similar soils: 90 percent
Dissimilar minor components: 10 percent

Characteristics of Poisonhol, Extremely Stony Surface

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslopes
Downslope shape: Linear
Across-slope shape: Linear
Aspect (representative): South
Aspect (range): All aspects

Slope range: 8 to 15 percent

Parent material: Mixed alluvium with some loess influence

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to an indurated duripan

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Very slightly saline (about 3 millimhos per centimeter)

Sodicity (maximum): Sodium adsorption ratio about 6

Calcium carbonate equivalent: 25 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.5 inches)

Interpretive groups

Land capability subclass (nonirrigated): 6e

Ecological site: STONY LOAM 13-16 ARTRV/PSSPS (R013XY002ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Haploxerollic Durixerolls

Typical profile

A—0 to 5 inches; loam

Bw—5 to 11 inches; very cobbly clay loam

Bk1—11 to 15 inches; very cobbly loam

Bk2—15 to 39 inches; extremely cobbly loam

Bkqm—39 to 43 inches; cemented material

Minor Components

Poisonhol soils, clayey subsoil

Percentage of map unit: 5 percent

Poisonhol soils, shallow to a hardpan

Percentage of map unit: 5 percent

108—Povey very stony loam, 35 to 55 percent slopes

Landscape: Mountains ([fig. 8](#), see page 37)

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,780 to 7,350 feet (2,067 to 2,240 meters)

Mean annual precipitation: 16 to 18 inches (406 to 457 millimeters)

Mean annual air temperature: 37 to 43 degrees F (3 to 6 degrees C)

Frost-free period: 30 to 60 days

Map Unit Composition

Povey and similar soils: 75 percent

Dissimilar minor components: 25 percent

Characteristics of Povey

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Concave

Aspect (representative): South

Aspect (range): East to west (clockwise)

Slope range: 35 to 55 percent

Parent material: Mixed alluvium and colluvium over igneous and metamorphic rock

Properties and qualities

Depth to restrictive feature: 40 to 50 inches to lithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.7 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Loamy-skeletal, mixed, superactive Pachic Haplocryolls

Typical profile

A1—0 to 3 inches; very stony loam

A2—3 to 25 inches; extremely stony loam

Bw1—25 to 36 inches; extremely stony loam

Bw2—36 to 50 inches; very cobbly sandy loam

R—50 to 60 inches; unweathered bedrock

Minor Components

Povey soils, nonskeletal

Percentage of map unit: 10 percent

Middlehill soils

Percentage of map unit: 5 percent

Pavohroo soils

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 5 percent

109—Povey-Middlehill complex, 20 to 55 percent slopes

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 7,060 to 7,270 feet (2,152 to 2,217 meters)

Mean annual precipitation: 16 to 18 inches (406 to 457 millimeters)

Mean annual air temperature: 37 to 43 degrees F (3 to 6 degrees C)

Frost-free period: 30 to 60 days

Map Unit Composition

Povey and similar soils: 50 percent

Middlehill and similar soils: 30 percent

Dissimilar minor components: 20 percent

Characteristics of Povey

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Concave

Aspect (representative): West

Aspect (range): Southwest to west (clockwise)

Slope range: 20 to 55 percent

Parent material: Mixed alluvium and colluvium over igneous and metamorphic rock

Properties and qualities

Depth to restrictive feature: 40 to 50 inches to lithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.7 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Loamy-skeletal, mixed, superactive Pachic Haplocryolls

Typical profile

A1—0 to 3 inches; very stony loam

A2—3 to 25 inches; extremely stony loam

Bw1—25 to 36 inches; extremely stony loam

Bw2—36 to 50 inches; very cobbly sandy loam

R—50 to 60 inches; unweathered bedrock

Characteristics of Middlehill

Setting

Landform: Mountain slopes

Downslope shape: Convex

Across-slope shape: Convex

Aspect (representative): West

Aspect (range): Southwest to west (clockwise)

Slope range: 20 to 55 percent

Parent material: Mixed alluvium and colluvium over mica schist and quartzite

Properties and qualities

Depth to restrictive features: 15 to 20 inches to strongly contrasting textural stratification and 20 to 40 inches to lithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Nonsaline (about 1 millimho per centimeter)

Sodicity (maximum): Sodium adsorption ratio about 3

Calcium carbonate equivalent: 10 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 0.5 inch)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: WINDSWEPT RIDGE 12-20 ARNO4/PSSPS (R013XY011ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Loamy-skeletal, mixed, superactive Xeric
Haplocryolls

Typical profile

A—0 to 3 inches; extremely stony sandy loam

AB—3 to 9 inches; extremely stony loam

Bw—9 to 16 inches; extremely cobbly sandy loam

Bk—16 to 24 inches; extremely stony loamy coarse sand

R—24 to 34 inches; unweathered bedrock

Minor Components

Middlehill soils, shallow

Percentage of map unit: 5 percent

Pachic Haplocryolls

Percentage of map unit: 5 percent

Povey soils, nonskeletal

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 5 percent

111—Raft river loam, 2 to 4 percent slopes

Landscape: Hills

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,920 to 6,170 feet (1,804 to 1,881 meters)

Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Raft river and similar soils: 85 percent

Dissimilar minor components: 15 percent

Characteristics of Rafriver

Setting

Landform: Fan remnants

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): South

Aspect (range): All aspects

Slope range: 2 to 4 percent

Parent material: Mixed alluvium with some loess influence

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to an indurated duripan

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Very slightly saline (about 3 millimhos per centimeter)

Sodicity (maximum): Sodium adsorption ratio about 6

Calcium carbonate equivalent: 25 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 4.2 inches)

Interpretive groups

Land capability subclass (nonirrigated): 5s

Ecological site: LOAMY 12-16 ARTRW8/PSSPS (R025XY003ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Coarse-loamy, mixed, superactive, frigid Xeric Haplodurids

Typical profile

A—0 to 4 inches; loam

Bw—4 to 8 inches; silt loam

Bk1—8 to 13 inches; silt loam

Bk2—13 to 23 inches; loam

2Bkq—23 to 29 inches; very gravelly sandy loam

2Bkqm—29 to 39 inches; cemented material

Minor Components

Aninto soils

Percentage of map unit: 5 percent

Koosharem soils

Percentage of map unit: 5 percent

Rafriver soils, very shallow to a hardpan

Percentage of map unit: 5 percent

116—Riceton loamy coarse sand, 4 to 12 percent slopes

Landscape: Hills ([fig. 5](#), see page 19)

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,720 to 6,600 feet (1,745 to 2,011 meters)

Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)
Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)
Frost-free period: 65 to 95 days

Map Unit Composition

Riceton and similar soils: 85 percent
Dissimilar minor components: 15 percent

Characteristics of Riceton

Setting

Landform: Fan remnants
Downslope shape: Linear
Across-slope shape: Linear
Aspect (representative): Southeast
Aspect (range): All aspects
Slope range: 4 to 12 percent
Parent material: Mixed alluvium derived from igneous rock and granodiorite

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches
Shrink-swell potential: Low (linear extensibility percentage about 1.5)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): High
Natural drainage class: Well drained
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within a depth of 72 inches
Available water capacity (entire profile): Very low (about 2.3 inches)

Interpretive groups

Land capability subclass (nonirrigated): 3e
Ecological site: SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)
Hydric soil status: Not hydric
Hydrologic soil group: A
Taxonomic classification: Coarse-loamy, mixed, superactive, frigid Typic Haploxerolls

Typical profile

A—0 to 7 inches; loamy coarse sand
Bw1 and Bw2—7 to 23 inches; coarse sandy loam
Bw3—23 to 33 inches; gravelly coarse sandy loam
C—33 to 44 inches; gravelly coarse sandy loam
Ab—44 to 60 inches; gravelly loamy coarse sand

Minor Components

Kanlee soils

Percentage of map unit: 5 percent

Ola soils

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 5 percent

123—Kanlee-Rock outcrop-Earcree complex, 3 to 30 percent slopes

Landscape: Mountains ([fig. 8](#))

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,980 to 7,040 feet (1,823 to 2,146 meters)

Mean annual precipitation: 14 to 16 inches (356 to 406 millimeters)

Mean annual air temperature: 37 to 45 degrees F (3 to 7 degrees C)

Frost-free period: 30 to 95 days

Map Unit Composition

Kanlee and similar soils: 35 percent

Rock outcrop: 30 percent

Earcree and similar soils: 25 percent

Dissimilar minor components: 10 percent

Characteristics of Kanlee

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Linear

Aspect (representative): Southeast

Aspect (range): Northeast to southwest (clockwise)

Slope range: 3 to 30 percent

Parent material: Mixed alluvium and colluvium over quartz-monzonite and granodiorite



Figure 8.—Typical area of Kanlee sandy loam, 4 to 12 percent slopes (89), Povey very stony loam, 35 to 55 percent slopes (108), Kanlee-Rock outcrop-Earcree complex, 3 to 30 percent slopes (123), and Povey-Nurkey complex, 15 to 55 percent slopes (167). View is looking toward the southwest.

Properties and qualities

Depth to restrictive features: 20 to 40 inches to paralithic bedrock and 35 to 60 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.4 inches)

Interpretive groups

Land capability subclass (nonirrigated): 4e

Ecological site: LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID) (fig. 9)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Typic Argixerolls

Typical profile

A—0 to 2 inches; sandy loam

Bt1—2 to 19 inches; sandy clay loam



Figure 9.—Typical vegetation on Kanlee sandy loam in an area of Kanlee-Rock outcrop-Earcree complex, 3 to 30 percent slopes (123). The ecological site is LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID) (mountain big sagebrush/bluebunch wheatgrass-Idaho fescue).

Bt2—19 to 24 inches; coarse sandy loam
Cr—24 to 35 inches; weathered bedrock
R—35 to 45 inches; unweathered bedrock

Characteristics of Rock Outcrop

Description of areas: Exposures or outcroppings of bare bedrock

Characteristics of Earcree

Setting

Landform: Mountain slopes
Downslope shape: Linear
Across-slope shape: Convex
Aspect (representative): Southeast
Aspect (range): Northeast to southwest (clockwise)
Slope range: 3 to 30 percent
Parent material: Mixed alluvium and colluvium derived from metamorphic rock, quartz-diorite, and granodiorite

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches
Shrink-swell potential: Low (linear extensibility percentage about 1.5)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): High
Natural drainage class: Well drained
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within a depth of 72 inches
Available water capacity (entire profile): Very low (about 2.8 inches)

Interpretive groups

Land capability subclass (nonirrigated): 5e
Ecological site: MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA (R025XY018ID)
Hydric soil status: Not hydric
Hydrologic soil group: A
Taxonomic classification: Coarse-loamy, mixed, superactive Pachic Haplocryolls

Typical profile

A—0 to 37 inches; gravelly coarse sandy loam
C1—37 to 52 inches; gravelly coarse sandy loam
C2—52 to 60 inches; very gravelly loamy coarse sand

Minor Components

Kanlee soils, shallow

Percentage of map unit: 5 percent

Ola soils

Percentage of map unit: 5 percent

124—Ola-Rock outcrop-Earcree complex, 35 to 55 percent slopes

Landscape: Mountains ([fig. 5](#), see page 19, and [fig. 10](#))

Major land resource area: 25—Owyhee High Plateau

Elevation: 5,770 to 8,460 feet (1,759 to 2,579 meters)

Mean annual precipitation: 14 to 28 inches (356 to 711 millimeters)

Mean annual air temperature: 37 to 45 degrees F (3 to 7 degrees C)

Frost-free period: 30 to 95 days

Map Unit Composition

Ola, cool, and similar soils: 35 percent

Rock outcrop: 30 percent

Earcree and similar soils: 25 percent

Dissimilar minor components: 10 percent

Characteristics of Ola, Cool

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Concave

Aspect (representative): Southeast

Aspect (range): East to southwest (clockwise)

Slope range: 35 to 55 percent

Parent material: Mixed alluvium and colluvium over granodiorite and metamorphic rock



Figure 10.—Typical area of the Ola soil in an area of Ola-Rock outcrop-Earcree complex, 35 to 55 percent slopes (124).

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): High

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 1.4 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: LOAMY 16+ ARTRV/FEID (R025XY022ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Coarse-loamy, mixed, superactive, frigid Pachic
Haploxerolls

Typical profile

A—0 to 16 inches; coarse sandy loam

Bw—16 to 22 inches; coarse sandy loam

C—22 to 30 inches; gravelly coarse sandy loam

Cr—30 to 40 inches; weathered bedrock

Characteristics of Rock Outcrop

Description of areas: Exposures or outcroppings of bare bedrock

Characteristics of Earcree

Setting

Landform: Mountain slopes

Downslope shape: Linear

Across-slope shape: Convex

Aspect (representative): Southeast

Aspect (range): East to southwest (clockwise)

Slope range: 35 to 55 percent

Parent material: Mixed alluvium and colluvium derived from metamorphic rock,
quartz-diorite, or granodiorite

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): High

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.8 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA (R025XY018ID) ([fig. 11](#))

Hydric soil status: Not hydric

Hydrologic soil group: A

Taxonomic classification: Coarse-loamy, mixed, superactive Pachic Haplocryolls

Typical profile

A—0 to 37 inches; gravelly coarse sandy loam

C1—37 to 52 inches; gravelly coarse sandy loam

C2—52 to 60 inches; very gravelly loamy coarse sand

Minor Components

Ola soils, deep

Percentage of map unit: 5 percent

Ola soils, shallow

Percentage of map unit: 5 percent

166—Chokecherry very channery sandy loam, 4 to 35 percent slopes

Landscape: Mountains ([fig. 12](#))

Major land resource area: 25—Owyhee High Plateau

Elevation: 7,080 to 8,800 feet (2,159 to 2,682 meters)

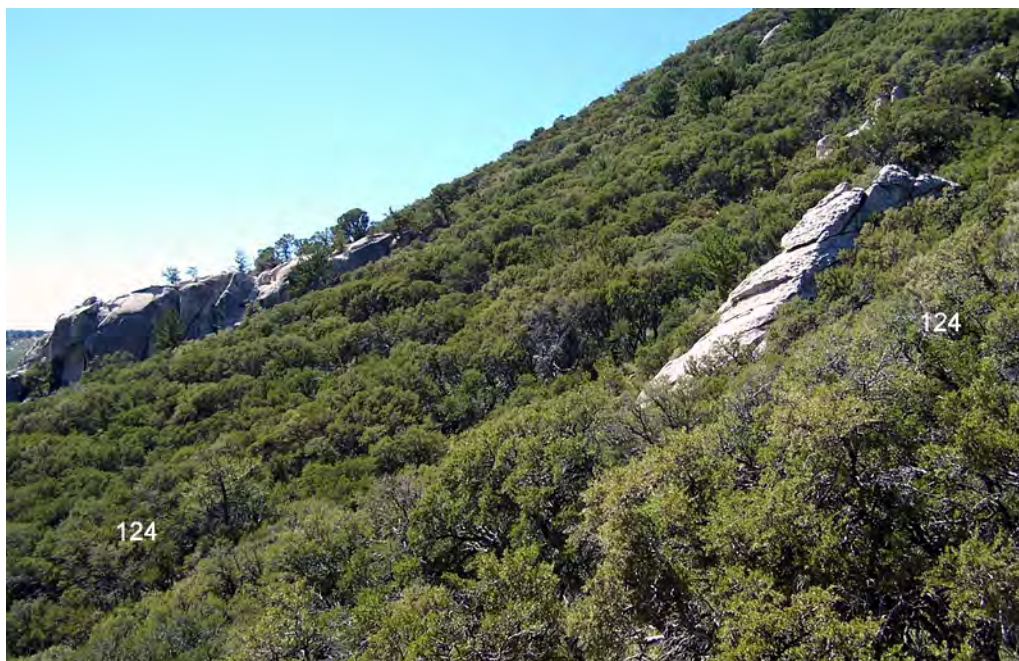


Figure 11.—Typical area of the Earcree soil in an area of Ola-Rock outcrop-Earcree complex, 35 to 55 percent slopes (124). The ecological site is MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA (R025XY018ID) (mountain mahogany-mountain snowberry/Idaho fescue-needlegrass).



Figure 12.—Typical area of Chokecherry very channery sandy loam, 4 to 35 percent slopes (166).
View is looking toward the south.

Mean annual precipitation: 18 to 28 inches (457 to 711 millimeters)

Mean annual air temperature: 37 to 43 degrees F (3 to 6 degrees C)

Frost-free period: 30 to 60 days

Map Unit Composition

Chokecherry and similar soils: 80 percent

Dissimilar minor components: 20 percent

Characteristics of Chokecherry

Setting

Landform: Ridges

Downslope shape: Convex

Across-slope shape: Convex

Aspect (representative): Southwest

Aspect (range): Southeast to west (clockwise)

Slope range: 4 to 35 percent

Parent material: Mixed alluvium and colluvium over mica schist

Properties and qualities

Depth to restrictive feature: 10 to 20 inches to paralithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): High

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 0.6 inch)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: WINDSWEPT RIDGE 12-22 ARFR4-ARAR8/POA (R013XY046ID)

Hydric soil status: Not hydric

Hydrologic soil group: D

Taxonomic classification: Loamy-skeletal, mixed, superactive, shallow Typic Haplocryolls

Typical profile

A—0 to 5 inches; very channery sandy loam

Bw—5 to 14 inches; extremely channery sandy loam

Cr—14 to 24 inches; weathered bedrock

Minor Components

Povey soils

Percentage of map unit: 10 percent

Rock outcrop

Percentage of map unit: 10 percent

167—Povey-Nurkey complex, 15 to 55 percent slopes

Landscape: Mountains ([fig. 8](#), see page 37)

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,570 to 8,550 feet (2,004 to 2,606 meters)

Mean annual precipitation: 16 to 18 inches (406 to 457 millimeters)

Mean annual air temperature: 37 to 45 degrees F (3 to 7 degrees C)

Frost-free period: 30 to 95 days

Map Unit Composition

Povey and similar soils: 40 percent

Nurkey and similar soils: 30 percent

Dissimilar minor components: 30 percent

Characteristics of Povey

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Concave

Aspect (representative): Southeast

Aspect (range): Northeast to west (clockwise)

Slope range: 15 to 55 percent

Parent material: Mixed alluvium and colluvium over igneous and metamorphic rock

Properties and qualities

Depth to restrictive feature: 40 to 50 inches to lithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.7 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Loamy-skeletal, mixed, superactive Pachic Haplocryolls

Typical profile

A1—0 to 3 inches; very stony loam

A2—3 to 25 inches; extremely stony loam

Bw1—25 to 36 inches; extremely stony loam

Bw2—36 to 50 inches; very cobbly sandy loam

R—50 to 60 inches; unweathered bedrock

Characteristics of Nurkey

Setting

Landform: Mountain slopes

Downslope shape: Linear

Across-slope shape: Concave

Aspect (representative): Southeast

Aspect (range): Northeast to west (clockwise)

Slope range: 15 to 55 percent

Parent material: Colluvium derived from calcareous conglomerate

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Nonsaline (about 1 millimho per centimeter)

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: 15 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 4.9 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Loamy-skeletal, mixed, superactive Calcic Argicryolls

Typical profile

A1—0 to 2 inches; sandy loam

A2—2 to 6 inches; cobbly loam

AB—6 to 12 inches; cobbly loam

Bt1—12 to 18 inches; very cobbly loam

Bt2—18 to 28 inches; very gravelly loam

Bt3—28 to 35 inches; very gravelly loam

BC—35 to 39 inches; very cobbly sandy loam

Bk—39 to 60 inches; very cobbly sandy loam

Minor Components

Earcree soils

Percentage of map unit: 10 percent

Pachic Haplocryolls

Percentage of map unit: 10 percent

Rock outcrop

Percentage of map unit: 5 percent

Searla soils

Percentage of map unit: 5 percent

168—Kanlee sandy loam, 12 to 25 percent slopes

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,740 to 7,360 feet (2,055 to 2,245 meters)

Mean annual precipitation: 18 to 20 inches (457 to 508 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Kanlee and similar soils: 80 percent

Dissimilar minor components: 20 percent

Characteristics of Kanlee

Setting

Landform: Pediments

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): Southeast

Aspect (range): East to south (clockwise)

Slope range: 12 to 25 percent

Parent material: Mixed alluvium and colluvium over quartz-monzonite and granodiorite

Properties and qualities

Depth to restrictive features: 20 to 40 inches to paralithic bedrock and 35 to 40 inches to lithic bedrock

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.6 inches)

Interpretive groups

Land capability subclass (nonirrigated): 4e

Ecological site: LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Typic Argixerolls

Typical profile

A—0 to 10 inches; sandy loam

Bt1—10 to 14 inches; sandy loam

Bt2—14 to 29 inches; gravelly sandy clay loam

Cr—29 to 35 inches; weathered bedrock

R—35 to 45 inches; unweathered bedrock

Minor Components

Pachic Haplocryolls

Percentage of map unit: 10 percent

Kanlee soils, shallow

Percentage of map unit: 5 percent

Kanlee soils, skeletal subsoil

Percentage of map unit: 5 percent

169—Povey-Ola complex, 35 to 60 percent slopes

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 7,060 to 8,820 feet (2,153 to 2,688 meters)

Mean annual precipitation: 20 to 28 inches (508 to 711 millimeters)

Mean annual air temperature: 37 to 45 degrees F (3 to 7 degrees C)

Frost-free period: 30 to 95 days

Map Unit Composition

Povey and similar soils: 60 percent

Ola, cool, and similar soils: 20 percent

Dissimilar minor components: 20 percent

Characteristics of Povey

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Concave

Aspect (representative): Southeast

Aspect (range): East to south (clockwise)

Slope range: 35 to 60 percent

Parent material: Mixed alluvium and colluvium over igneous and metamorphic rock

Properties and qualities

Depth to restrictive feature: 40 to 50 inches to lithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 2.7 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID) ([fig. 13](#))

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Loamy-skeletal, mixed, superactive Pachic Haplocryolls

Typical profile

A1—0 to 3 inches; very stony loam

A2—3 to 25 inches; extremely stony loam

Bw1—25 to 36 inches; extremely stony loam

Bw2—36 to 50 inches; very cobbly sandy loam

R—50 to 60 inches; unweathered bedrock

Characteristics of Ola, Cool

Setting

Landform: Mountain slopes

Downslope shape: Concave

Across-slope shape: Concave

Aspect (representative): Southeast



Figure 13.—Typical vegetation on Povey very stony loam in an area of Povey-Ola complex, 35 to 60 percent slopes (169). The ecological site is STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID) (mountain big sagebrush/bluebunch wheatgrass).

Aspect (range): East to south (clockwise)

Slope range: 35 to 60 percent

Parent material: Mixed alluvium and colluvium over granodiorite and metamorphic rock

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Shrink-swell potential: Low (linear extensibility percentage about 1.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): High

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Very low (about 1.4 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: LOAMY 16+ ARTRV/FEID (R025XY022ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Coarse-loamy, mixed, superactive, frigid Pachic Haploxerolls

Typical profile

A—0 to 16 inches; coarse sandy loam

Bw—16 to 22 inches; coarse sandy loam

C—22 to 30 inches; gravelly coarse sandy loam

Cr—30 to 40 inches; weathered bedrock

Minor Components

Chokecherry soils

Percentage of map unit: 10 percent

Pachic Haplocryolls

Percentage of map unit: 5 percent

Rock outcrop

Percentage of map unit: 5 percent

170—Howcan-Searla complex, 4 to 12 percent slopes

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,930 to 7,290 feet (2,112 to 2,221 meters)

Mean annual precipitation: 18 to 28 inches (457 to 711 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Howcan and similar soils: 35 percent

Searla and similar soils: 30 percent

Dissimilar minor components: 35 percent

Characteristics of Howcan

Setting

Landform: Mountain slopes

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): Southwest

Aspect (range): All aspects

Slope range: 4 to 12 percent

Parent material: Mixed alluvium and colluvium derived from igneous rock

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 4.9 inches)

Interpretive groups

Land capability subclass (nonirrigated): 4e

Ecological site: STONY LOAM 16-22 ARTRV/PSSPS (R013XY019ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Typic Argixerolls

Typical profile

A—0 to 10 inches; very gravelly loam

Bt1—10 to 25 inches; very gravelly loam

Bt2—25 to 36 inches; very cobbly loam

BC—36 to 60 inches; very stony loam

Characteristics of Searla

Setting

Landform: Mountain slopes

Downslope shape: Convex

Across-slope shape: Linear

Aspect (representative): Southwest

Aspect (range): All aspects

Slope range: 4 to 12 percent

Parent material: Mixed alluvium and colluvium derived from igneous rock

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Nonsaline (about 1 millimho per centimeter)

Sodicity (maximum): Sodium adsorption ratio about 3

Calcium carbonate equivalent: 8 percent

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 4.1 inches)

Interpretive groups

Land capability subclass (nonirrigated): 4e

Ecological site: SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Calcic Argixerolls

Typical profile

A—0 to 5 inches; cobbly loam

Bt1—5 to 12 inches; cobbly clay loam

Bt2—12 to 19 inches; gravelly sandy clay loam

Btk—19 to 32 inches; very cobbly sandy clay loam

Bk1—32 to 39 inches; very cobbly sandy clay loam

Bk2—39 to 60 inches; very cobbly sandy loam

Minor Components

Ola soils, deep

Percentage of map unit: 10 percent

Pachic Haplocryolls

Percentage of map unit: 10 percent

Povey soils

Percentage of map unit: 10 percent

Rock outcrop

Percentage of map unit: 5 percent

171—Howcan-Searla complex, 12 to 55 percent slopes

Landscape: Mountains

Major land resource area: 25—Owyhee High Plateau

Elevation: 6,590 to 7,760 feet (2,008 to 2,364 meters)

Mean annual precipitation: 18 to 28 inches (457 to 711 millimeters)

Mean annual air temperature: 39 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 65 to 95 days

Map Unit Composition

Howcan and similar soils: 40 percent

Searla and similar soils: 25 percent

Dissimilar minor components: 35 percent

Characteristics of Howcan

Setting

Landform: Mountain slopes

Downslope shape: Linear

Across-slope shape: Linear

Aspect (representative): South

Aspect (range): Southeast to west (clockwise)

Slope range: 12 to 55 percent

Parent material: Mixed alluvium and colluvium derived from igneous rock

Properties and qualities

Depth to restrictive feature: None within a depth of 60 inches

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Not saline

Sodicity (maximum): Not sodic

Calcium carbonate equivalent: No carbonates

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 4.9 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: STONY LOAM 16-22 ARTRV/PSSPS (R013XY019ID)

Hydric soil status: Not hydric

Hydrologic soil group: B

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Typic Argixerolls

Typical profile

A—0 to 10 inches; very gravelly loam

Bt1—10 to 25 inches; very gravelly loam

Bt2—25 to 36 inches; very cobbly loam

BC—36 to 60 inches; very stony loam

Characteristics of Searla

Setting

Landform: Mountain slopes

Downslope shape: Convex

Across-slope shape: Linear

Aspect (representative): South

Aspect (range): Southeast to west (clockwise)

Slope range: 12 to 55 percent

Parent material: Mixed alluvium and colluvium derived from igneous rock

Properties and qualities

Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification

Shrink-swell potential: Moderate (linear extensibility percentage about 4.5)

Salinity (maximum): Nonsaline (about 1 millimho per centimeter)

Sodicity (maximum): Sodium adsorption ratio about 3

Calcium carbonate equivalent: 8

Hydrologic properties

Slowest capacity to transmit water (Ksat): Moderately high

Natural drainage class: Well drained

Flooding frequency: None

Ponding frequency: None

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Depth to seasonal water table: Not present within a depth of 72 inches

Available water capacity (entire profile): Low (about 4.1 inches)

Interpretive groups

Land capability subclass (nonirrigated): 7e

Ecological site: SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)

Hydric soil status: Not hydric

Hydrologic soil group: C

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Calcic Argixerolls

Typical profile

A—0 to 5 inches; cobbly loam

Bt1—5 to 12 inches; cobbly clay loam

Bt2—12 to 19 inches; gravelly sandy clay loam

Btk—19 to 32 inches; very cobbly sandy clay loam

Bk1—32 to 39 inches; very cobbly sandy clay loam

Bk2—39 to 60 inches; very cobbly sandy loam

Minor Components

Ola soils, deep

Percentage of map unit: 10 percent

Pachic Haplocryolls

Percentage of map unit: 10 percent

Povey soils

Percentage of map unit: 10 percent

Rock outcrop

Percentage of map unit: 5 percent

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the reserve. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for pasture, as rangeland and forestland, as sites for buildings and sanitary facilities, and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the reserve. The survey can help planners to maintain or create a management plan in harmony with the natural soil.

Maintenance staff can use this survey to locate sources of gravel, sand, reclamation material, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, campgrounds, playgrounds, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the reserve for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited*, *somewhat limited*, and *very limited*. The suitability ratings are expressed as *well suited*, *moderately suited*, *poorly suited*, and *unsuited* or as *good*, *fair*, and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact

on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961).

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2*e*. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

The capability classification of the soils in the reserve is given in the section “Detailed Soil Map Units” and in [table 5](#). It is given for each map unit component.

Prime Farmland

[Table 6](#) lists the map units in the reserve that are considered prime farmland. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of prime farmland, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 12 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 2,134 acres, or about 15 percent of the reserve, meets the requirements for prime farmland if irrigated.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Irrigation is required for the soils identified in the table to be considered prime farmland. Onsite evaluation is needed to determine whether or not irrigation water is being applied.

Rangeland

About 8,000 acres, or about 57 percent of the reserve, is used as rangeland. About 4,000 acres is privately owned. The rangeland is used for livestock and wildlife grazing, as recreation sites, and as watershed for the Raft River. Because of the relief and the temperatures in winter, the rangeland at the lower elevations is best suited to grazing in spring and the rangeland at the higher elevations is best suited to grazing in summer and fall.

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

[Table 7](#) shows, by map unit symbol and soil name, the correlated ecological site name and identification number. [Table 8](#) gives the setting information (slope, elevation, mean annual precipitation, landform, and parent material) and the correlated ecological

site name and identification number by map unit symbol and soil name. Table 9 shows, for each soil that supports vegetation suitable for grazing, the ecological site name and identification number; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in table 9 follows.

An *ecological site* is the product of all the environmental factors responsible for its development (figs. 14, 15, 16, and 17). It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service and online at <http://esis.sc.egov.usda.gov>.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.



Figure 14.—SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID) ecological site in an area of Riceton soil. The dominant species are mountain big sagebrush and bluebunch wheatgrass.



Figure 15.—ASPEN THICKET 16-22 POTR5 (R025XY001ID) ecological site in an area of Pacific Haplocryolls. The dominant understory species are pinegrass, mountain brome, and Columbia needlegrass.



Figure 16.—Windswept Ridge 12-22 ARFR4-ARAR8/POA (R013XY046ID). The dominant understory species are low sagebrush and Sandberg bluegrass.



Figure 17.—LOAMY 16+ ARTRV/FEID (R025XY022ID) ecological site in an area of Ola soil. The dominant species are mountain big sagebrush and Idaho fescue.

Characteristic plants (the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil) is listed by common name. Under *rangeland composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. [Tables 10 and 11](#) give the local common name, plant symbol, and scientific name for each plant identified in the ecological sites. The plants are sorted by common name in table 10 and by symbol in table 11.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in the “National Range and Pasture Handbook,” which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The primary management practice recommended for rangeland in the City of Rocks National Reserve is prescribed grazing, which is a system that manages the length of time, timing (when grazing will begin), and intensity (number of animals and percent of plant utilization) of grazing to achieve positive changes in the plant community. This practice may also allow plants to achieve adequate growth in spring to withstand grazing pressure, allows the soils to dry out in spring to avoid damage from trampling, allows for periodic rest or deferment of grazing, and allows for removal of livestock when the desired amount of forage has been grazed. Practices such as constructing water developments and fences, managing brush, range seeding, and properly distributing livestock facilitate the grazing system and help to bring about desired changes in the plant community. The suitability of specific practices is determined by the various characteristics of individual soils.

Land Management

In tables 12 through 15, interpretive ratings are given for various aspects of land management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified land management practice. *Well suited* indicates that the soil has features that are favorable for the specified management practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified management practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified management practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified management practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified land management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms for fire damage and seedling mortality are expressed as *low*, *moderate*, and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage or seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

Rating class terms for hazard of erosion are expressed as *slight*, *moderate*, *severe*, and *very severe*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for erosion is highest (1.00) and the point at which the potential is lowest (0.00).

The soil properties considered in rating the soils are discussed in the following paragraphs.

Table 12.—Planting

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *soil rutting with equipment use* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forest equipment.

The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Table 13.—Hazard of Erosion and Suitability for Roads

Ratings in the column *hazard of erosion* are based on slope and the soil erosion factor K. The soil loss is a result of sheet and rill erosion in areas where 50 to 75 percent of the surface has been exposed by different types of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under normal climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and erosion-control measures, including revegetation of bare areas, are needed; and *very severe* indicates that significant erosion is expected, loss of soil productivity and offsite damage are likely, and erosion-control measures would be costly and generally are not practical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erosion factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use.

Table 14.—Site Preparation

Ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Table 15.—Site Restoration

Ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Recreational Development

In tables 16 and 17, the soils of the reserve are rated according to limitations that affect their suitability for recreational development. The ratings are both verbal and

numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in these tables can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, and water management.

Table 16.—Camp and Picnic Areas

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability (Ksat), and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability (Ksat), and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Table 17.—Trail Management

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Mountain bike and off-road vehicle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Wildlife Habitat

By Ron Gill, area biologist, Natural Resources Conservation Service.

Wildlife habitat in the City of Rocks National Reserve is characterized by its capacity to provide food, water, and cover consisting of the different plant communities supported by different soils. Some of the differences in the plant communities are a result of the characteristics of the soils while others are due to elevation and land use management. Sound conservation planning based on soil information will benefit the wildlife resource. The reserve may not supply all of the annual or daily range needed for each species. For many species, the habitat in the reserve is only part of a wider landscape used.

Big game

Big game species in the reserve include mule deer and American pronghorn antelope. Mule deer commonly migrate through the area, using habitat in all of the map units.

Amphibians and reptiles

Amphibians include salamanders, frogs, and toads. Amphibians require water or very damp soil for reproduction. Soils associated with water features such as wetlands, wet meadows, or riparian zones provide habitat for amphibians. Wet soils or soil map units that have wet areas make up a very small portion of the reserve (less than 1 percent). Most are in general soil map unit 6, but they may be associated with all of the general soil map units. The only amphibian specifically identified in the reserve is the boreal chorus frog. Other amphibians likely to be found in the area include the Pacific tree frog, Great Basin spadefoot, Pacific chorus frog, and northern leopard frog.

Reptiles, lizards, and snakes are adapted to a terrestrial lifestyle. Turtles are not native to the reserve, although an occasional box turtle may be found in the area. Common reptiles include the sagebrush lizard, short-horned lizard, desert horned lizard, western fence lizard, long-nosed leopard lizard, gopher snake, and western terrestrial garter snake. These reptiles are associated with the sagebrush-steppe habitat in general soil map unit 1 and portions of unit 2.

The best known reptile in the reserve is the western rattlesnake (fig. 18). This species can tolerate a wider range of habitats and elevations and can be found in any of the general soil map units.

Birds

Common native upland game birds in the reserve include blue grouse in general soil map unit 3 and sage grouse in general soil map units 1 and 2 (fig. 19).

Potentially, more 100 species of nongame birds may nest in the area and use habitat in all of the general soil map units. Many species are associated with the ephemeral stream channels that run through the reserve. The riparian zone vegetation



Figure 18.—Western rattlesnake. These snakes can inflict a venomous bite from the day they are born. Photograph provided by Utah Division of Wildlife Resources.



Figure 19.—Male sage grouse during mating season. Photograph taken by James L. Amos and provided by National Geographic.

provides diverse habitat for songbirds. Common birds in riparian zones are song sparrow, yellow warbler, black-capped chickadee, and several species of swallows. Good riparian management can greatly improve nesting and feeding habitat for nongame birds.

Hawks, eagles, and owls are throughout the reserve. Species include golden eagle (fig. 20), ferruginous hawk, and red-tailed hawk.

An important habitat in the reserve is sagebrush steppe. It consists of sagebrush with a well-developed grass/forb understory, which provides habitat to sagebrush obligates. Some of these species, such as sage grouse and pigmy rabbit, are linked to sagebrush by their diet. Others, such as grasshopper mouse and short-horned lizard, have become highly adapted to sagebrush steppe habitat. This habitat is in general soil map units 1 and 2.

Wildlife found at the higher elevations in the reserve include yellow-bellied marmot, coyote, magpie, sage sparrow, and sage grouse. The rare Townsend's big-eared bat roosts in rock crevices in general soil map unit 1 (fig. 21).

Engineering

This section provides information for planning land uses related to development and to water management. Soils are rated for various uses, and the most limiting features



Figure 20.—Golden eagles, as well as other raptors, are common in the City of Rocks National Reserve. Photograph can be found online at www.firstpeople.us.



Figure 21.—Townsend's big-eared bat. Photograph provided by the National Park Service.

are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability (Ksat), corrosivity, shrink-

swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, reclamation material, roadfill, and topsoil; plan structures for water management; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

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

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 18 and 19 show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Table 18.—Dwellings and Small Commercial Buildings

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Table 19.—Roads and Streets, Shallow Excavations, and Lawns and Landscaping

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sewage Disposal

Table 20 shows the degree and kind of soil limitations that affect septic tank absorption fields and sewage lagoons. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by

special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches or between a depth of 24 inches and a restrictive layer is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Permeability (Ksat) is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a Ksat rate of more than 14 micrometers per second are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

Construction Materials

Tables 21 and 22 give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good*, *fair*, or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The

number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The rating class terms used for the potential sources of topsoil, reclamation material, and roadfill are *good*, *fair*, and *poor*. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, and roadfill. The lower the number, the greater the limitation.

Table 21.—Construction Materials (Part I)

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In this table, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Table 22.—Construction Materials (Part II)

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in

place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

[Table 23](#) gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability (Ksat) of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil map. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the reserve, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering properties, physical properties, erosion properties, chemical properties, and pertinent water and soil features.

Engineering Soil Properties

[Table 24](#) gives the engineering classifications and the range of engineering properties for the layers of each soil in the reserve.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the reserve and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the reserve or from nearby areas and on field examination.

Physical Soil Properties

Table 25 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the reserve. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In the table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability (K_{sat}), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $1/3$ - or $1/10$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (Ksat) refers to the ability of a soil to transmit water or air. The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion Properties

[Table 26](#) shows estimates of some erosion properties that affect soil behavior. Entries under *Erosion factors* apply to the entire profile, and those under *Wind erodibility group* and *Wind erodibility index* apply only to the survey layer. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the “National Soil Survey Handbook,” which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

[Table 27](#) shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the reserve. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity (CEC) is the total amount of exchangeable cations that can be held by the soil, expressed in terms of centimoles per kilogram. It commonly is measured at neutral pH of 7.0 (CEC-7), but it may be measured at some other stated pH value. Soils that have a low CEC hold fewer cations and may require more frequent applications of fertilizer than those that have a high CEC. The ability to retain cations minimizes the risk of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

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

Sodium adsorption ratio (SAR) is 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. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

[Table 28](#) gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

[Table 29](#) gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 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 Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeroll (*Xer*, meaning dry, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; 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 Argixerolls (*Argi*, meaning presence of an argillic horizon, plus *xeroll*, the suborder of the Mollisols that has a xeric moisture regime or an aridic moisture regime that borders on xeric).

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. An example is Typic Argixerolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. 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 class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy-skeletal, mixed, superactive, frigid Typic Argixerolls.

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 Howcan series.

[Table 30](#) indicates the order, suborder, great group, subgroup, and family of the soil series in the survey area.

Taxonomic Units and Their Morphology

In this section, each taxonomic unit recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each unit. A pedon, a small three-dimensional area of soil, that is typical of the unit in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993) and in the "Field Book for Describing and Sampling Soils" (Schoeneberger and others, 2002). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 2006). Following the pedon description is the range of important characteristics of the soils in the taxonomic unit.

Arbone Series

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Hills

Landform: Fan remnants

Parent material: Mixed alluvium with some loess influence

Slope range: 4 to 12 percent

Elevation: 5,800 to 6,330 feet

Mean annual precipitation: 14 to 18 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Calcic Haploxerolls

Typical Pedon

Arbone loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; noneffervescent; neutral (pH 7.3); clear smooth boundary.

Bw—10 to 35 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and moderately plastic; noneffervescent; slightly alkaline (pH 7.5); clear smooth boundary.

Bk—35 to 60 inches; light brownish gray (10YR 6/2) loam; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; 8 percent gravel; 18 percent calcium carbonate equivalent; violently effervescent; moderately alkaline (pH 8.3).

Range in Characteristics

A horizon:

Organic matter content—1 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—13 to 18 percent

Reaction—pH 7.2 to 7.8

Bw horizon:

Organic matter content—1 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—13 to 18 percent

Reaction—pH 7.4 to 7.8

Bk horizon:

Organic matter content—0.5 to 1.0 percent

Texture (less than 2 millimeters)—loam, silt loam

Clay content—13 to 18 percent

Rock fragment content—0 to 10 percent gravel

Calcium carbonate equivalent—5 to 30 percent

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.8 to 8.4

Bezzant Series

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Hills

Landform: Hillslopes

Parent material: Mixed alluvium

Slope range: 10 to 20 percent

Elevation: 5,880 to 6,400 feet

Mean annual precipitation: 14 to 18 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, mixed, superactive, frigid Typic Calcixerolls

Typical Pedon

Bezzant cobbly loam in the soil survey of Cassia County, Idaho, Eastern Part.
(Colors are for dry soil unless otherwise noted.)

A—0 to 15 inches; brown (10YR 5/3) cobbly loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 10 percent gravel and 15 percent cobbles; strongly effervescent; 22 percent calcium carbonate equivalent; moderately alkaline (pH 8.4); gradual smooth boundary.

Bk1—15 to 23 inches; very pale brown (10YR 8/2) very cobbly loam, pale brown (10YR 6/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 20 percent gravel and 35 percent cobbles; violently effervescent; 28 percent calcium carbonate equivalent; moderately alkaline (pH 8.4); clear wavy boundary.

Bk2—23 to 31 inches; very pale brown (10YR 8/3) very cobbly clay loam, very pale brown (10YR 7/4) moist; moderate fine subangular blocky structure; hard, friable, moderately sticky and moderately plastic; 20 percent gravel and 35 percent cobbles; violently effervescent; 38 percent calcium carbonate equivalent; moderately alkaline (pH 8.4); clear wavy boundary.

2C—31 to 60 inches; reddish yellow (7.5YR 6/6) very cobbly loam, strong brown (7.5YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; 25 percent gravel and 30 percent cobbles; slightly effervescent; 3 percent calcium carbonate equivalent; moderately alkaline (pH 8.4).

Range in Characteristics

A horizon:

Organic matter content—2 to 5 percent

Texture (less than 2 millimeters)—loam

Soil Survey of City of Rocks National Reserve, Idaho

Clay content—18 to 27 percent

Rock fragment content—5 to 15 percent gravel, 10 to 20 percent cobbles

Calcium carbonate equivalent—15 to 40 percent

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.6 to 8.4

Bk1 horizon:

Organic matter content—1 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—18 to 27 percent

Rock fragment content—15 to 40 percent gravel, 10 to 35 percent cobbles

Calcium carbonate equivalent—15 to 40 percent

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.8 to 8.4

Bk2 horizon:

Organic matter content—0 to 1 percent

Texture (less than 2 millimeters)—clay loam, sandy clay loam

Clay content—20 to 35 percent

Rock fragment content—15 to 40 percent gravel, 20 to 45 percent cobbles

Calcium carbonate equivalent—15 to 40 percent

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.8 to 8.4

2C horizon:

Organic matter content—0 to 1 percent

Texture (less than 2 millimeters)—loam, sandy clay loam

Clay content—18 to 35 percent

Rock fragment content—15 to 45 percent gravel, 15 to 35 percent cobbles

Calcium carbonate equivalent—1 to 5 percent

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.8 to 8.4

Birchcreek Series

Depth class: Moderately deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately low

Landscape: Mountains

Landform: Mountain slopes

Parent material: Mixed alluvium and colluvium over mica schist and quartzite

Slope range: 20 to 55 percent

Elevation: 5,500 to 7,560 feet

Mean annual precipitation: 12 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Clayey-skeletal, smectitic, frigid Typic Argixerolls

Typical Pedon

Birchcreek extremely stony loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 8 inches; brown (10YR 4/3) extremely stony loam, black (10YR 2/1) moist; weak thick platy structure parting to moderate fine granular; soft, very friable, slightly sticky and moderately plastic; 10 percent gravel, 25 percent cobbles, and 30 percent stones; noneffervescent; neutral (pH 7.2); clear smooth boundary.

Bt1—8 to 15 inches; brown (10YR 4/3) very gravelly clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; slightly hard, very friable, moderately sticky and moderately plastic; 25 percent gravel, 10 percent cobbles, and 5 percent stones; noneffervescent; neutral (pH 7.2); clear smooth boundary.

Bt2—15 to 22 inches; yellowish brown (10YR 5/6) extremely gravelly clay, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; hard, very friable, moderately sticky and very plastic; 60 percent gravel and 20 percent cobbles; noneffervescent; neutral (pH 7.2); abrupt wavy boundary.

R—22 to 32 inches; unweathered bedrock.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

A horizon:

Organic matter content—1 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—15 to 25 percent

Rock fragment content—5 to 30 percent gravel, 10 to 35 percent cobbles, 10 to 40 percent stones

Reaction—pH 6.6 to 7.8

Bt1 horizon:

Organic matter content—1 to 2 percent

Texture (less than 2 millimeters)—clay loam

Clay content—28 to 40 percent

Rock fragment content—15 to 40 percent gravel, 5 to 35 percent cobbles, 5 to 30 percent stones

Reaction—pH 6.6 to 7.8

Bt2 horizon:

Organic matter content—0.5 to 1.0 percent

Texture (less than 2 millimeters)—clay

Clay content—40 to 55 percent

Rock fragment content—10 to 75 percent gravel, 5 to 30 percent cobbles, 10 to 35 percent stones

Reaction—pH 6.6 to 7.8

R horizon:

Type of material—unweathered bedrock

Chayson Series

Depth class: Moderately deep to a duripan

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Very low

Landscape: Hills

Landform: Fan remnants

Parent material: Mixed alluvium with some loess influence

Slope range: 2 to 10 percent

Elevation: 5,780 to 6,260 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Durixerolls

Typical Pedon

Chayson gravelly silt loam in the soil survey of Cassia County, Idaho, Eastern Part.
(Colors are for dry soil unless otherwise noted.)

- A—0 to 3 inches; grayish brown (10YR 5/2) gravelly silt loam, very dark grayish brown (10YR 3/2) moist; strong very thick platy structure parting to strong medium platy; soft, very friable, moderately sticky and moderately plastic; common very fine and few fine roots; many very fine and few fine tubular pores; 25 percent gravel; noneffervescent; slightly alkaline (pH 7.4); abrupt smooth boundary.
- Btk1—3 to 12 inches; brown (10YR 5/3) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, moderately sticky and very plastic; few very fine roots; many very fine tubular pores; 35 percent discontinuous clay films on all faces of peds and on surfaces along pores; 25 percent gravel and 5 percent cobbles; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
- Btk2—12 to 18 inches; pale brown (10YR 6/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; few very fine roots; many very fine tubular pores; 15 percent discontinuous clay films on all faces of peds and on surfaces along pores; 25 percent gravel and 5 percent cobbles; 30 percent carbonate concretions and 30 percent fine and medium irregular carbonate masses; strongly effervescent; moderately alkaline (pH 8.2); gradual wavy boundary.
- Bk—18 to 28 inches; very pale brown (10YR 8/3) gravelly loam, very pale brown (10YR 7/3) moist; moderate fine subangular blocky structure; hard, very friable, nonsticky and slightly plastic; few very fine roots; many very fine tubular pores; 15 percent gravel, 10 percent gravel-sized duripan fragments, and 5 percent cobbles; violently effervescent; moderately alkaline (pH 8.4); abrupt wavy boundary.
- 2Bkqm—28 to 32 inches; pink (7.5YR 7/4) indurated duripan, brown (7.5YR 5/4) moist; extremely hard, extremely firm; violently effervescent; moderately alkaline (pH 8.4).

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches to a duripan

A horizon:

Organic matter content—2 to 4 percent
Texture (less than 2 millimeters)—silt loam
Clay content—15 to 25 percent
Rock fragment content—15 to 30 percent gravel
Reaction—pH 6.6 to 7.6

Btk1 and Btk2 horizons:

Organic matter content—1 to 2 percent
Texture (less than 2 millimeters)—clay loam, silty clay loam, silt loam
Clay content—25 to 34 percent
Rock fragment content—5 to 30 percent gravel, 0 to 10 percent cobbles
Calcium carbonate equivalent—5 to 20 percent
Sodium adsorption ratio—0 to 5
Electrical conductivity—0 to 2 millimhos per centimeter
Reaction—pH 7.8 to 8.4

Bk horizon:

Organic matter content—0.5 to 1.0 percent
Texture (less than 2 millimeters)—loam

Clay content—15 to 25 percent
Rock fragment content—10 to 35 percent gravel, 0 to 10 percent cobbles
Calcium carbonate equivalent—15 to 20 percent
Sodium adsorption ratio—5 to 15
Electrical conductivity—2 to 4 millimhos per centimeter
Reaction—pH 7.9 to 9.0

2Bkqm horizon:

Type of material—cemented

Chokecherry Taxadjunct

Depth class: Shallow

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes

Parent material: Mixed alluvium and colluvium over mica schist

Slope range: 4 to 35 percent

Elevation: 7,080 to 8,800 feet

Mean annual precipitation: 18 to 28 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 30 to 60 days

Taxonomic class: Loamy-skeletal, mixed, superactive, shallow Typic Haplocryolls

Typical Pedon

Chokecherry very channery sandy loam, 4 to 35 percent slopes; about 1,927 feet north and 2,110 feet west of the southeast corner of section 14, T. 15 S., R. 23 E. (Colors are for dry soil unless otherwise noted.)

A—0 to 5 inches; brown (10YR 4/3) very channery sandy loam, dark brown (7.5YR 3/2) moist; weak medium granular structure; loose, nonsticky and nonplastic; many very fine and fine roots; common very fine irregular pores; 10 percent gravel and 25 percent channers; noneffervescent; neutral (pH 7.0); clear wavy boundary.
Bw—5 to 14 inches; brown (10YR 4/3) extremely channery sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; loose, nonsticky and nonplastic; many very fine and fine roots; common very fine irregular pores; 85 percent channers; noneffervescent; neutral (pH 7.2); clear wavy boundary.
Cr—14 to 24 inches; weathered bedrock.

Range in Characteristics

Depth to restrictive feature: 10 to 20 inches to paralithic bedrock

A horizon:

Organic matter content—2.5 to 4.0 percent

Texture (less than 2 millimeters)—sandy loam

Clay content—5 to 10 percent

Rock fragment content—5 to 20 percent gravel, 20 to 45 percent channers

Reaction—pH 6.6 to 7.3

Bw horizon:

Organic matter content—1 to 2 percent

Texture (less than 2 millimeters)—sandy loam

Clay content—5 to 17 percent

Rock fragment content—65 to 90 percent channers

Reaction—pH 6.6 to 7.3

Cr horizon:

Type of material—weathered bedrock

Taxadjunct Feature

The soils in the Chokecherry series are classified as Lithic Haplocryolls. This pedon, however, has a paralithic contact and is classified as a shallow Typic Haplocryoll. This difference does not significantly affect use and management.

Conneridge Series

Depth class: Moderately deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes

Parent material: Mixed alluvium and colluvium over mica schist and quartzite

Slope range: 20 to 50 percent

Elevation: 6,220 to 7,370 feet

Mean annual precipitation: 18 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, mixed, superactive, frigid Calcic Haploxerolls

Typical Pedon

Conneridge very gravelly loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 3 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; strong very fine and fine granular structure; soft, very friable, slightly sticky and moderately plastic; many very fine roots; many very fine irregular pores; 25 percent gravel, 10 percent cobbles, and 15 percent stones; noneffervescent; neutral (pH 7.0); abrupt smooth boundary.

Bw1—3 to 7 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; strong fine and medium subangular blocky structure; soft, very friable, slightly sticky and moderately plastic; common very fine and few fine roots; many very fine and few fine tubular pores; 30 percent gravel and 10 percent cobbles; noneffervescent; neutral (pH 7.2); clear wavy boundary.

Bw2—7 to 13 inches; brown (10YR 5/3) very stony loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and moderately plastic; common very fine and few fine roots; many very fine and few fine tubular pores; 20 percent gravel, 10 percent cobbles, and 25 percent stones; noneffervescent; neutral (pH 7.2); clear wavy boundary.

Bk1—13 to 17 inches; yellowish brown (10YR 5/4) very gravelly loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; 45 percent gravel and 10 percent cobbles; strongly effervescent; slightly alkaline (pH 7.8); clear wavy boundary.

Bk2—17 to 23 inches; pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; 60 percent gravel and 20 percent cobbles; strongly effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.

R—23 to 33 inches; unweathered bedrock.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

A horizon:

Organic matter content—2 to 4 percent

Texture (less than 2 millimeters)—loam

Clay content—14 to 25 percent

Rock fragment content—15 to 40 percent gravel, 5 to 15 percent cobbles, 10 to 30 percent stones

Reaction—pH 6.6 to 7.4

Bw1 and Bw2 horizons:

Organic matter content—1 to 2 percent

Texture (less than 2 millimeters)—loam

Clay content—14 to 25 percent

Rock fragment content—15 to 45 percent gravel, 0 to 15 percent cobbles, 0 to 40 percent stones

Reaction—pH 6.6 to 7.4

Bk1 and Bk2 horizons:

Organic matter content—0.5 to 1.0 percent

Texture (less than 2 millimeters)—loam

Clay content—12 to 20 percent

Rock fragment content—35 to 70 percent gravel, 10 to 35 percent cobbles

Calcium carbonate equivalent—15 to 40 percent

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.6 to 8.4

R horizon:

Type of material—unweathered bedrock

Cumulic Endoaquolls

Depth class: Very deep

Drainage class: Poorly drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Valleys

Landform: Flood plains, stream terraces

Parent material: Mixed alluvium

Slope range: 0 to 4 percent

Elevation: 5,800 to 5,910 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Cumulic Endoaquolls

Typical Pedon

Cumulic Endoaquolls clay loam in the soil survey of Cassia County, Idaho, Eastern Part, but referred to as Cumulic Haplaquolls in that survey. (Colors are for moist soil unless otherwise noted.)

A1—0 to 4 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; strong very fine and fine subangular blocky structure; slightly hard, friable, nonsticky

- and slightly plastic; many very fine roots; many very fine and fine irregular pores; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.
- A2—4 to 8 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak coarse subangular blocky structure parting to strong medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 30 percent worm casts; slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.
- A3—8 to 28 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and common medium tubular pores; 30 percent worm casts; noneffervescent; slightly alkaline (pH 7.6); clear wavy boundary.
- Bg—28 to 40 inches; very dark grayish brown (10YR 3/2) sandy clay loam, dark gray (10YR 4/1) dry; 30 percent medium distinct grayish brown (10YR 5/2) redoximorphic features; weak coarse subangular blocky structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and moderately plastic; common very fine roots; many very fine irregular pores; noneffervescent; slightly alkaline (pH 7.4); gradual smooth boundary.
- Cg1—40 to 46 inches; dark brown (10YR 3/3) sandy loam, grayish brown (10YR 5/2) dry; massive; hard, very friable, slightly sticky and moderately plastic; few very fine roots; many very fine tubular pores; noneffervescent; slightly alkaline (pH 7.4); abrupt smooth boundary.
- Cg2—46 to 55 inches; dark yellowish brown (10YR 4/4) sandy loam, pale brown (10YR 6/3) dry; massive; hard, very friable, slightly sticky and slightly plastic; noneffervescent; slightly alkaline (pH 7.4); gradual smooth boundary.
- Cg3—55 to 60 inches; dark yellowish brown (10YR 4/4) sandy loam, pale brown (10YR 6/3) dry; massive; slightly hard, very friable, slightly sticky and nonplastic; noneffervescent; slightly alkaline (pH 7.4).

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches to strongly contrasting textural stratification

Water features: Seasonal high water table—at a depth of 1.5 to 2.5 feet in December through July; flooding—brief, occasional periods in December through May

A1, A2, and A3 horizons:

Organic matter content—5 to 10 percent
Texture (less than 2 millimeters)—clay loam
Clay content—28 to 35 percent
Calcium carbonate equivalent—0 to 5 percent
Reaction—pH 6.6 to 7.8

Bg horizon:

Organic matter content—1 to 3 percent
Texture (less than 2 millimeters)—sandy clay loam
Clay content—18 to 30 percent
Reaction—pH 6.6 to 7.8

Cg1, Cg2, and Cg3 horizons:

Organic matter content—0.5 to 2.0 percent
Texture (less than 2 millimeters)—sandy loam
Clay content—5 to 15 percent
Reaction—pH 6.6 to 7.8

Doodlelink Taxadjunct

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes

Parent material: Loess-influenced colluvium derived from quartz-monzonite

Slope range: 40 to 60 percent

Elevation: 6,340 to 7,060 feet

Mean annual precipitation: 14 to 18 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, mixed, superactive, frigid Pachic Haploxerolls

Typical Pedon

Doodlelink gravelly loam in the soil survey of Cassia County, Idaho, Eastern Part.
(Colors are for dry soil unless otherwise noted.)

A—0 to 6 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; many very fine irregular pores; 20 percent gravel and 2 percent stones; noneffervescent; slightly acid (pH 6.4); clear wavy boundary.

AB—6 to 10 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and common fine roots; many very fine and fine and common medium tubular pores; 25 percent gravel; noneffervescent; slightly acid (pH 6.4); clear wavy boundary.

Bw1—10 to 15 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine tubular pores; 15 percent gravel and 25 percent cobbles; noneffervescent; neutral (pH 6.6); gradual wavy boundary.

Bw2—15 to 22 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and common fine tubular pores; 20 percent gravel and 30 percent cobbles; noneffervescent; neutral (pH 6.6); gradual wavy boundary.

Bw3—22 to 60 inches; light yellowish brown (10YR 6/4) very cobbly loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and common fine tubular pores; 20 percent gravel and 20 percent cobbles; noneffervescent; neutral (pH 6.8).

Range in Characteristics

A and AB horizons:

Organic matter content—1 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—13 to 21 percent

Rock fragment content—10 to 30 percent gravel, 0 to 5 percent stones

Reaction—pH 6.1 to 6.5

Bw1, Bw2, and Bw3 horizons:

Organic matter content—0.5 to 2.0 percent

Texture (less than 2 millimeters)—loam, clay loam

Clay content—17 to 31 percent

Rock fragment content—15 to 35 percent gravel, 20 to 45 percent cobbles

Reaction—pH 6.1 to 7.2

Taxadjunct Feature

The soils in the Doodlelink series are classified as Pachic Ultic Haploxerolls. This pedon, however, has a base saturation of more than 75 percent and is classified as a Pachic Haploxeroll. This difference does not significantly affect use and management.

Earcree Series

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): High

Landscape: Mountains

Landform: Mountain slopes

Parent material: Mixed alluvium and colluvium derived from metamorphic rock, quartz-diorite, and granodiorite

Slope range: 3 to 55 percent

Elevation: 5,770 to 8,460 feet

Mean annual precipitation: 14 to 28 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 30 to 65 days

Taxonomic class: Coarse-loamy, mixed, superactive Pachic Haplocryolls

Typical Pedon

Earcree gravelly coarse sandy loam ([fig. 22](#)) in the soil survey of Blaine County Area, Idaho. (Colors are for moist soil unless otherwise noted.)

A1—0 to 12 inches; black (10YR 2/1) gravelly coarse sandy loam, dark grayish brown (10YR 4/2) dry; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine interstitial pores; 30 percent gravel; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.

A2—12 to 24 inches; very dark grayish brown (10YR 3/2) gravelly coarse sandy loam, brown (10YR 4/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; common very fine and fine interstitial pores; 30 percent gravel; noneffervescent; neutral (pH 6.6); abrupt wavy boundary.

A3—24 to 37 inches; dark brown (10YR 3/3) gravelly coarse sandy loam, brown (10YR 5/3) dry; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores; 30 percent gravel; noneffervescent; neutral (pH 6.8); clear wavy boundary.

C1—37 to 52 inches; brown (10YR 4/3) gravelly coarse sandy loam, pale brown (10YR 6/3) dry; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine interstitial pores; 34 percent gravel; noneffervescent; neutral (pH 6.8); diffuse irregular boundary.

C2—52 to 60 inches; brown (10YR 5/3) very gravelly loamy coarse sand, pale brown (10YR 6/3) dry; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine interstitial pores; 55 percent gravel; noneffervescent; neutral (pH 6.8).

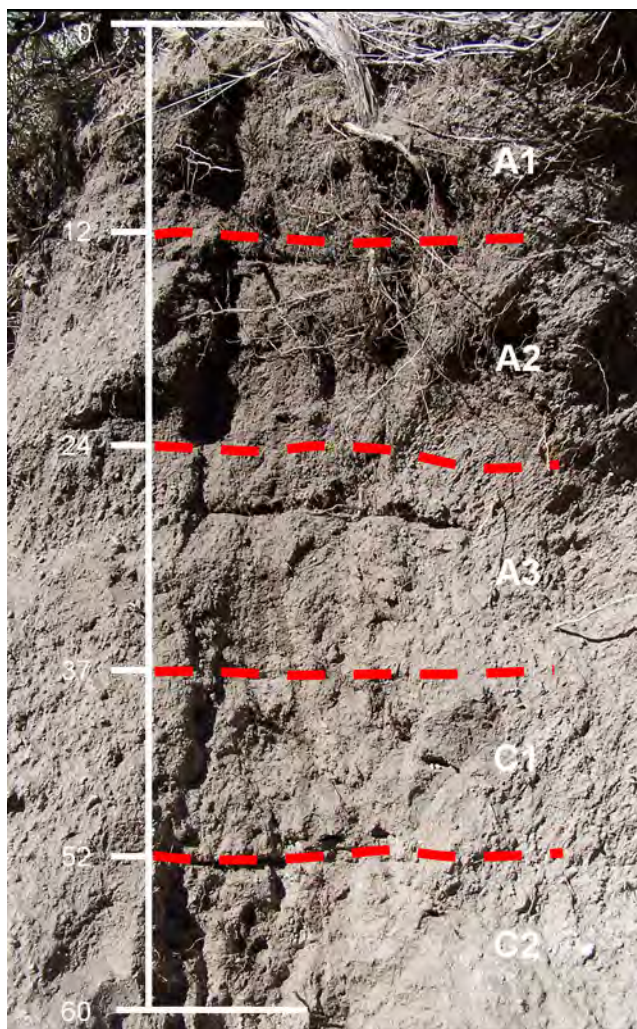


Figure 22.—Typical pedon of Earcree gravelly coarse sandy loam. Depth is in inches.

Range in Characteristics

A1, A2, and A3 horizons:

Organic matter content—3 to 6 percent
 Texture (less than 2 millimeters)—coarse sandy loam
 Clay content—10 to 18 percent
 Rock fragment content—15 to 30 percent gravel
 Reaction—pH 6.1 to 7.3

C1 horizon:

Organic matter content—0.5 to 1.0 percent
 Texture (less than 2 millimeters)—coarse sandy loam, sandy loam, loamy coarse sand
 Clay content—5 to 15 percent
 Rock fragment content—15 to 34 percent gravel
 Reaction—pH 6.1 to 7.3

C2 horizon:

Organic matter content—0 to 0.5 percent
 Texture (less than 2 millimeters)—loamy coarse sand

Clay content—5 to 10 percent
Rock fragment content—35 to 59 percent gravel
Reaction—pH 6.1 to 7.3

Howcan Series

Depth class: Very deep
Drainage class: Well drained
Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high
Landscape: Mountains
Landform: Mountain slopes
Parent material: Mixed alluvium and colluvium derived from igneous rock
Slope range: 4 to 55 percent
Elevation: 6,590 to 7,760 feet
Mean annual precipitation: 18 to 28 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, mixed, superactive, frigid Typic Argixerolls

Typical Pedon

Howcan very gravelly loam in the soil survey of Franklin County Area, Idaho.
(Colors are for dry soil unless otherwise noted.)

- A—0 to 10 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and fine and few medium roots; many very fine and fine and common medium tubular pores; 30 percent gravel and 5 percent stones; noneffervescent; neutral (pH 6.6); clear smooth boundary.
- Bt1—10 to 25 inches; yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and fine tubular pores; 70 percent prominent clay films on surfaces along pores and 70 percent prominent clay films on all faces of peds; 25 percent gravel, 10 percent cobbles, and 3 percent stones; noneffervescent; neutral (pH 6.8); gradual wavy boundary.
- Bt2—25 to 36 inches; light olive brown (2.5Y 5/4) very cobbly loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and fine tubular pores; 35 percent prominent clay films on surfaces along pores and 35 percent prominent clay films on all faces of peds; 20 percent gravel, 20 percent cobbles, and 3 percent stones; noneffervescent; neutral (pH 6.8); gradual wavy boundary.
- BC—36 to 60 inches; light yellowish brown (2.5Y 6/4) very stony loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine tubular pores; 20 percent gravel, 15 percent cobbles, and 20 percent stones; noneffervescent; neutral (pH 6.8).

Range in Characteristics

A horizon:
Organic matter content—2 to 4 percent
Texture (less than 2 millimeters)—loam
Clay content—8 to 15 percent
Rock fragment content—25 to 40 percent gravel, 0 to 5 percent stones
Reaction—pH 6.6 to 7.3

Bt1 horizon:

Organic matter content—2 to 4 percent

Texture (less than 2 millimeters)—loam

Clay content—18 to 26 percent

Rock fragment content—20 to 40 percent gravel, 0 to 25 percent cobbles, 0 to 5 percent stones

Reaction—pH 6.6 to 7.3

Bt2 horizon:

Organic matter content—2 to 4 percent

Texture (less than 2 millimeters)—loam

Clay content—18 to 26 percent

Rock fragment content—20 to 40 percent gravel, 0 to 25 percent cobbles, 0 to 5 percent stones

Reaction—pH 6.6 to 7.3

BC horizon:

Organic matter content—0 to 1 percent

Texture (less than 2 millimeters)—loam

Clay content—10 to 21 percent

Rock fragment content—10 to 25 percent gravel, 15 to 20 percent cobbles, 5 to 25 percent stones

Reaction—pH 6.6 to 7.3

Hymas Series

Depth class: Shallow

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Hills

Landform: Hillslopes

Parent material: Mixed alluvium and colluvium over limestone

Slope range: 10 to 30 percent

Elevation: 5,880 to 6,400 feet

Mean annual precipitation: 14 to 18 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, carbonatic, frigid Lithic Haploxerolls

Typical Pedon

Hymas very stony loam in the soil survey of Cassia County, Idaho, Eastern Part.
(Colors are for dry soil unless otherwise noted.)

A—0 to 11 inches; brown (10YR 5/3) very stony loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; 3 percent gravel, 20 percent cobbles, and 25 percent stones; strongly effervescent; 10 percent calcium carbonate equivalent; moderately alkaline (pH 8.0); clear smooth boundary.

Bk—11 to 15 inches; pale brown (10YR 6/3) very stony loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; 3 percent gravel, 20 percent cobbles, and 25 percent stones; violently effervescent; 40 percent calcium carbonate equivalent; moderately alkaline (pH 8.4); abrupt wavy boundary.

R—15 to 25 inches; unweathered bedrock.

Range in Characteristics

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

A horizon:

Organic matter content—1 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—10 to 15 percent

Rock fragment content—2 to 5 percent gravel, 10 to 30 percent cobbles, 15 to 40 percent stones

Calcium carbonate equivalent—5 to 15 percent

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.8 to 8.4

Bk horizon:

Organic matter content—0.5 to 1.0 percent

Texture (less than 2 millimeters)—loam

Clay content—10 to 18 percent

Rock fragment content—2 to 5 percent gravel, 10 to 30 percent cobbles, 15 to 40 percent stones

Calcium carbonate equivalent—40 to 50 percent

Sodium adsorption ratio—2 to 5

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 8.0 to 8.6

R horizon:

Type of material—unweathered bedrock

Itca Series

Depth class: Shallow

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately low

Landscape: Mountains

Landform: Mountain slopes

Parent material: Mixed alluvium and colluvium over quartzite and mica schist

Slope range: 25 to 55 percent

Elevation: 5,500 to 7,560 feet

Mean annual precipitation: 12 to 18 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Clayey-skeletal, smectitic, frigid Lithic Argixerolls

Typical Pedon

Itca very stony loam in the soil survey of Cassia County, Idaho, Eastern Part.
(Colors are for dry soil unless otherwise noted.)

A—0 to 3 inches; brown (10YR 5/3) very stony loam, very dark brown (10YR 2/2) moist; weak thick platy structure parting to moderate thin platy; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine vesicular pores; 10 percent gravel, 15 percent cobbles, and 20 percent stones; noneffervescent; neutral (pH 7.2); abrupt smooth boundary.

Bt1—3 to 8 inches; brown (10YR 5/3) extremely stony clay loam, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, very friable, moderately sticky and moderately plastic; many very fine and common fine and medium roots; many very fine and

common fine tubular pores; 35 percent discontinuous clay films on all faces of peds and 35 percent discontinuous clay films on surfaces along pores; 20 percent gravel, 25 percent cobbles, and 25 percent stones; noneffervescent; neutral (pH 7.2); clear wavy boundary.

Bt2—8 to 12 inches; yellowish brown (10YR 5/4) extremely stony clay, brown (10YR 4/3) moist; strong fine and medium angular blocky structure; very hard, friable, very sticky and very plastic; common very fine and medium roots; many very fine and few fine tubular pores; 70 percent continuous clay films on all faces of peds and 70 percent continuous clay films on surfaces along pores; 20 percent gravel, 25 percent cobbles, and 25 percent stones; noneffervescent; neutral (pH 7.2); clear wavy boundary.

Bt3—12 to 17 inches; yellowish brown (10YR 5/4) extremely stony clay, brown (10YR 4/3) moist; strong fine and medium subangular blocky structure; very hard, friable, very sticky and very plastic; common very fine and fine roots; many very fine and common fine tubular pores; 35 percent discontinuous clay films on all faces of peds and 35 percent discontinuous clay films on surfaces along pores; 20 percent gravel, 25 percent cobbles, and 25 percent stones; noneffervescent; slightly alkaline (pH 7.4); abrupt wavy boundary.

R—17 to 27 inches; unweathered bedrock.

Range in Characteristics

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

A horizon:

Organic matter content—2 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—12 to 20 percent

Rock fragment content—2 to 25 percent gravel, 5 to 25 percent cobbles, 10 to 35 percent stones

Reaction—pH 6.6 to 7.3

Bt1, Bt2, and Bt3 horizons:

Organic matter content—1 to 2 percent

Texture (less than 2 millimeters)—clay, clay loam

Clay content—35 to 45 percent

Rock fragment content—10 to 35 percent gravel, 20 to 30 percent cobbles, 20 to 30 percent stones

Reaction—pH 6.6 to 7.8

R horizon:

Type of material—unweathered bedrock

Jimsage Series

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes

Parent material: Loess-influenced colluvium derived from quartz-monzonite

Slope range: 40 to 60 percent

Elevation: 6,340 to 7,060 feet

Mean annual precipitation: 14 to 18 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, mixed, superactive, frigid Calcic Pachic Haploxerolls

Typical Pedon

Jimsage gravelly loam in the soil survey of Cassia County, Idaho, Eastern Part.
(Colors are for dry soil unless otherwise noted.)

- A—0 to 6 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; 25 percent gravel; noneffervescent; neutral (pH 7.2); clear smooth boundary.
- Bw1—6 to 14 inches; brown (10YR 4/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; 30 percent gravel and 5 percent cobbles; noneffervescent; slightly alkaline (pH 7.6); clear wavy boundary.
- Bw2—14 to 23 inches; brown (10YR 4/3) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; 50 percent gravel and 15 percent cobbles; noneffervescent; slightly alkaline (pH 7.6); clear wavy boundary.
- Bk—23 to 60 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; 45 percent gravel and 20 percent cobbles; strongly effervescent; 10 percent calcium carbonate equivalent; strongly alkaline (pH 8.6).

Range in Characteristics

A horizon:

Organic matter content—2 to 4 percent
Texture (less than 2 millimeters)—loam
Rock fragment content—15 to 30 percent gravel
Clay content—10 to 15 percent
Reaction—pH 6.6 to 7.8

Bw1 horizon:

Organic matter content—1 to 3 percent
Texture (less than 2 millimeters)—loam
Rock fragment content—20 to 45 percent gravel, 5 to 25 percent cobbles
Clay content—12 to 18 percent
Electrical conductivity—0 to 2 millimhos per centimeter
Reaction—pH 7.4 to 7.8

Bw2 horizon:

Organic matter content—0.5 to 1.5 percent
Texture (less than 2 millimeters)—loam
Rock fragment content—40 to 65 percent gravel, 10 to 30 percent cobbles
Clay content—12 to 18 percent
Electrical conductivity—0 to 2 millimhos per centimeter
Reaction—pH 7.4 to 7.8

Bk horizon:

Organic matter content—0.5 to 1.0 percent
Texture (less than 2 millimeters)—sandy loam
Clay content—10 to 15 percent
Rock fragment content—30 to 55 percent gravel, 20 to 45 percent cobbles
Calcium carbonate equivalent—5 to 15 percent
Sodium adsorption ratio—2 to 10
Electrical conductivity—2 to 4 millimhos per centimeter
Reaction—pH 8.2 to 8.6

Kanlee Series

Depth class: Moderately deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes, pediments

Parent material: Mixed alluvium and colluvium over quartz-monzonite and granodiorite

Slope range: 3 to 30 percent

Elevation: 5,610 to 7,360 feet

Mean annual precipitation: 14 to 20 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Argixerolls

Typical Pedon

Kanlee sandy loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 2 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate thick platy structure parting to weak very fine granular; slightly hard, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine and common fine irregular pores; noneffervescent; neutral (pH 7.2); abrupt smooth boundary.

Bt1—2 to 11 inches; brown (10YR 5/3) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; many very fine and few fine tubular pores; 15 percent discontinuous clay films on surfaces along pores and 15 percent clay bridges between sand grains; noneffervescent; slightly alkaline (pH 7.6); clear wavy boundary.

Bt2—11 to 19 inches; yellowish brown (10YR 5/4) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium and coarse subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine, common fine, and few medium tubular pores; 35 percent discontinuous clay films on surfaces along pores and 35 percent clay bridges between sand grains; noneffervescent; slightly alkaline (pH 7.6); gradual wavy boundary.

Bt3—19 to 24 inches; pale brown (10YR 6/3) coarse sandy loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine and coarse and few fine and medium roots; many very fine, common fine, and few medium tubular pores; 35 percent discontinuous clay films on surfaces along pores and 35 percent clay bridges between sand grains; noneffervescent; slightly alkaline (pH 7.6); gradual wavy boundary.

Cr—24 to 35 inches; weathered bedrock; gradual wavy boundary.

R—35 to 45 inches; unweathered bedrock.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock, 35 to 60 inches to lithic bedrock

A horizon:

Organic matter content—2 to 4 percent

Texture (less than 2 millimeters)—sandy loam

Clay content—10 to 18 percent

Reaction—pH 6.1 to 7.3

Bt1 and Bt2 horizons:

Organic matter content—1 to 3 percent

Texture (less than 2 millimeters)—sandy clay loam, sandy loam

Clay content—18 to 30 percent

Reaction—pH 6.6 to 7.8

Bt3 horizon:

Organic matter content—0.5 to 2.0 percent

Texture (less than 2 millimeters)—coarse sandy loam, sandy loam

Clay content—15 to 30 percent

Rock fragment content—0 to 30 percent gravel

Reaction—pH 6.6 to 7.8

Cr horizon:

Type of material—weathered bedrock

R horizon:

Type of material—unweathered bedrock

Middlehill Series

Depth class: Moderately deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes

Parent material: Mixed alluvium and colluvium over mica schist and quartzite

Slope range: 20 to 55 percent

Elevation: 7,060 to 7,270 feet

Mean annual precipitation: 16 to 18 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 30 to 60 days

Taxonomic class: Loamy-skeletal, mixed, superactive Xeric Haplocryolls

Typical Pedon

Middlehill extremely stony sandy loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 3 inches; brown (10YR 5/3) extremely stony sandy loam, dark brown (10YR 3/3) moist; strong fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine irregular pores; 30 percent gravel, 15 percent cobbles, and 35 percent stones; noneffervescent; neutral (pH 7.2); abrupt smooth boundary.

AB—3 to 9 inches; brown (10YR 5/3) extremely stony loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 30 percent gravel, 10 percent cobbles, and 40 percent stones; noneffervescent; slightly alkaline (pH 7.4); clear wavy boundary.

Bw—9 to 16 inches; yellowish brown (10YR 5/4) extremely cobbly sandy loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and few fine roots; many very fine tubular pores; 25 percent gravel, 30 percent cobbles, and 15 percent stones; noneffervescent; slightly alkaline (pH 7.6); abrupt wavy boundary.

Bk—16 to 24 inches; yellowish brown (10YR 5/4) extremely stony loamy coarse sand, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; 60 percent carbonate coatings on bottom surface of rock fragments; 10 percent gravel, 15 percent cobbles, and 60 percent stones; slightly effervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.
R—24 to 34 inches; unweathered bedrock.

Range in Characteristics

Depth to restrictive features: 15 to 20 inches to strongly contrasting textural change, 20 to 40 inches to lithic bedrock

A horizon:

Organic matter content—1 to 2 percent
Texture (less than 2 millimeters)—sandy loam
Clay content—10 to 18 percent
Rock fragment content—15 to 40 percent gravel, 10 to 20 percent cobbles, 20 to 45 percent stones
Reaction—pH 6.6 to 7.8

AB horizon:

Organic matter content—0.5 to 1.0 percent
Texture (less than 2 millimeters)—loam, sandy loam
Clay content—10 to 18 percent
Rock fragment content—20 to 45 percent gravel, 5 to 15 percent cobbles, 30 to 55 percent stones
Reaction—pH 6.6 to 7.8

Bw horizon:

Organic matter content—0.5 to 1.0 percent
Texture (less than 2 millimeters)—sandy loam, loam
Clay content—5 to 18 percent
Rock fragment content—10 to 35 percent gravel, 20 to 45 percent cobbles, 10 to 35 percent stones
Reaction—pH 6.6 to 7.8

Bk horizon:

Organic matter content—0 to 0.5 percent
Texture (less than 2 millimeters)—loamy coarse sand
Clay content—5 to 15 percent
Rock fragment content—5 to 30 percent gravel, 10 to 35 percent cobbles, 40 to 65 percent stones
Calcium carbonate equivalent—5 to 15 percent
Sodium adsorption ratio—0 to 5
Electrical conductivity—0 to 2 millimhos per centimeter
Reaction—pH 7.9 to 8.4

R horizon:

Type of material—unweathered bedrock

Nurkey Series

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Soil Survey of City of Rocks National Reserve, Idaho

Landform: Mountain slopes

Parent material: Colluvium derived from calcareous conglomerate

Slope range: 15 to 55 percent

Elevation: 6,570 to 8,550 feet

Mean annual precipitation: 16 to 18 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, mixed, superactive Calcic Argicryolls

Typical Pedon

Nurkey sandy loam in an area of Povey-Nurkey complex, 15 to 55 percent slopes; about 600 feet north and 1,500 feet east of the southwest corner of section 26, T. 15 S., R. 23 E. (Colors are for moist soil unless otherwise noted.)

A1—0 to 2 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak very fine granular structure; loose, nonsticky and nonplastic; many very fine and common fine roots; common very fine irregular and tubular pores; 5 percent gravel and 2 percent cobbles; noneffervescent; neutral (pH 7.0); clear wavy boundary.

A2—2 to 6 inches; dark brown (7.5YR 3/2) cobbly loam, dark grayish brown (10YR 4/2) dry; weak very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine irregular pores; 5 percent gravel and 10 percent cobbles; noneffervescent; neutral (pH 7.0); abrupt wavy boundary.

AB—6 to 12 inches; dark brown (10YR 3/3) cobbly loam, brown (10YR 4/3) dry; strong fine and medium subangular blocky structure; slightly hard, very friable, moderately sticky and moderately plastic; common very fine and few fine roots; common very fine tubular and irregular pores; 10 percent patchy distinct clay films on all faces of peds; 15 percent gravel and 15 percent cobbles; noneffervescent; neutral (pH 7.2); clear wavy boundary.

Bt1—12 to 18 inches; dark yellowish brown (10YR 3/4) very cobbly loam, yellowish brown (10YR 5/4) dry; strong medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine and few fine roots; many very fine irregular and common very fine tubular pores; 10 percent patchy distinct clay films on all faces of peds; 20 percent gravel and 15 percent cobbles; noneffervescent; slightly alkaline (pH 7.4); gradual wavy boundary.

Bt2—18 to 28 inches; dark yellowish brown (10YR 3/4) very gravelly loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; very hard, friable, moderately sticky and slightly plastic; few very fine and fine roots; many very fine irregular and common very fine tubular pores; 5 percent patchy distinct clay films on all faces of peds; 35 percent gravel and 15 percent cobbles; noneffervescent; slightly alkaline (pH 7.4); clear wavy boundary.

Bt3—28 to 35 inches; dark yellowish brown (10YR 4/4) very gravelly loam, pale yellow (2.5Y 7/3) dry; weak fine subangular blocky structure; hard, very friable, slightly sticky and nonplastic; few very fine and fine roots; common very fine and fine irregular pores; 35 percent gravel and 15 percent cobbles; noneffervescent; slightly alkaline (pH 7.8); clear wavy boundary.

BC—35 to 39 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, light gray (2.5Y 7/2) dry; weak fine and medium subangular blocky structure; hard, very friable, slightly sticky and nonplastic; few very fine roots; common very fine and fine irregular pores; 30 percent gravel and 25 percent cobbles; noneffervescent; slightly alkaline (pH 7.8); clear wavy boundary.

Bk—39 to 60 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, pale yellow (2.5Y 7/3) dry; weak fine and medium subangular blocky structure; hard, very friable, slightly sticky and nonplastic; carbonate coatings on bottom surface of rock fragments; 5 percent carbonate masses; 30 percent gravel and 25 percent cobbles; slightly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

A1 horizon:

Organic matter content—1 to 3 percent
Texture (less than 2 millimeters)—sandy loam
Clay content—5 to 12 percent
Rock fragment content—0 to 10 percent gravel, 0 to 5 percent cobbles
Reaction—pH 6.6 to 7.3

A2 horizon:

Organic matter content—1 to 3 percent
Texture (less than 2 millimeters)—loam, sandy loam
Clay content—5 to 25 percent
Rock fragment content—5 to 30 percent gravel, 5 to 30 percent cobbles
Reaction—pH 6.6 to 7.3

AB horizon:

Organic matter content—0.5 to 2.0 percent
Texture (less than 2 millimeters)—loam, sandy loam
Clay content—5 to 25 percent
Rock fragment content—5 to 30 percent gravel, 5 to 30 percent cobbles
Reaction—pH 6.6 to 7.3

Bt1 horizon:

Organic matter content—0.25 to 1.00 percent
Texture (less than 2 millimeters)—loam, sandy clay loam
Clay content—18 to 27 percent
Rock fragment content—15 to 40 percent gravel, 10 to 35 percent cobbles
Reaction—pH 6.6 to 7.4

Bt2 horizon:

Organic matter content—0.1 to 0.5 percent
Texture (less than 2 millimeters)—loam, sandy clay loam
Clay content—18 to 27 percent
Rock fragment content—30 to 50 percent gravel, 5 to 15 percent cobbles
Reaction—pH 6.6 to 7.4

Bt3 horizon:

Organic matter content—0.05 to 0.25 percent
Texture (less than 2 millimeters)—loam
Clay content—10 to 23 percent
Rock fragment content—30 to 50 percent gravel, 5 to 15 percent cobbles
Reaction—pH 7.4 to 7.8

BC horizon:

Organic matter content—0.01 to 0.10 percent
Texture (less than 2 millimeters)—sandy loam
Clay content—2 to 15 percent
Rock fragment content—20 to 40 percent gravel, 15 to 35 percent cobbles
Reaction—pH 7.4 to 7.8

Bk horizon:

Organic matter content—0.01 to 0.10 percent

Texture (less than 2 millimeters)—sandy loam

Clay content—2 to 15 percent

Rock fragment content—20 to 40 percent gravel, 15 to 35 percent cobbles

Calcium carbonate equivalent—15 to 30 percent

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.8 to 8.2

Ola Series

Depth class: Moderately deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Hills, mountains

Landform: Hillslopes, mountain slopes

Parent material: Mixed alluvium and colluvium over granodiorite and metamorphic rock

Slope range: 6 to 60 percent

Elevation: 5,770 to 8,820 feet

Mean annual precipitation: 14 to 28 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Pachic Haploxerolls

Typical Pedon

Ola coarse sandy loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 6 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark gray (10YR 3/1) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine irregular pores; noneffervescent; slightly acid (pH 6.4); clear smooth boundary.

AB—6 to 16 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine and few fine tubular pores; noneffervescent; slightly acid (pH 6.4); abrupt smooth boundary.

Bw—16 to 22 inches; grayish brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine and few fine tubular pores; 10 percent gravel; noneffervescent; slightly acid (pH 6.5); abrupt smooth boundary.

C—22 to 30 inches; grayish brown (10YR 5/2) gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; 20 percent gravel; noneffervescent; neutral (pH 6.8); clear wavy boundary.

Cr—30 to 40 inches; weathered bedrock.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

A and AB horizons:

Organic matter content—2 to 4 percent

Texture (less than 2 millimeters)—coarse sandy loam, sandy loam

Clay content—8 to 15 percent

Reaction—pH 6.1 to 7.3

Bw horizon:

Organic matter content—2 to 4 percent

Texture (less than 2 millimeters)—coarse sandy loam, sandy loam

Clay content—8 to 15 percent

Rock fragment content—0 to 10 percent gravel

Reaction—pH 6.1 to 7.3

C horizon:

Organic matter content—0.5 to 3.0 percent

Texture (less than 2 millimeters)—coarse sandy loam, sandy loam, loam

Clay content—5 to 20 percent

Rock fragment content—5 to 30 percent gravel

Reaction—pH 6.1 to 7.3

Cr horizon:

Type of material—weathered bedrock

Pachic Haplocryolls

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes

Parent material: Mixed alluvium and colluvium

Slope range: 15 to 45 percent

Elevation: 6,470 to 8,810 feet

Mean annual precipitation: 16 to 28 inches

Mean annual air temperature: 36 to 39 degrees F

Frost-free period: 30 to 60 days

Taxonomic class: Pachic Haplocryolls

Typical Pedon

Pachic Haplocryolls stony loam in the soil survey of Cassia County, Idaho, Eastern Part, but referred to as Pachic Cryoborolls in that survey. (Colors are for moist soil unless otherwise noted.)

A—0 to 3 inches; very dark brown (10YR 2/2) stony loam, dark brown (10YR 3/3) dry; strong fine granular structure; soft, very friable, slightly sticky and moderately plastic; many very fine and few fine roots; many very fine irregular and few fine tubular pores; 10 percent gravel, 5 percent cobbles, and 15 percent stones; noneffervescent; neutral (pH 7.3); abrupt smooth boundary.

AB—3 to 13 inches; very dark brown (10YR 2/2) gravelly loam, brown (10YR 4/3) dry; moderate coarse subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and moderately plastic; common very fine and few fine roots; many very fine and few fine and medium tubular pores; 10 percent gravel and 5 percent cobbles; noneffervescent; neutral (pH 6.8); gradual smooth boundary.

BA—13 to 24 inches; very dark brown (10YR 2/2) very gravelly clay loam, brown (10YR 4/3) dry; strong medium and coarse subangular blocky structure; soft, very friable, moderately sticky and moderately plastic; common very fine and few fine roots; many medium and coarse and common very fine and fine tubular pores;

30 percent gravel and 5 percent cobbles; noneffervescent; neutral (pH 7.3); clear wavy boundary.

Bw1—24 to 31 inches; brown (10YR 4/3) extremely stony loam, pale brown (10YR 6/3) dry; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and moderately plastic; many coarse and common very fine and fine roots; many very fine and coarse and few fine and medium tubular pores; 25 percent gravel, 35 percent cobbles, and 25 percent stones; noneffervescent; neutral (pH 7.0); gradual wavy boundary.

Bw2—31 to 45 inches; dark yellowish brown (10YR 4/4) extremely cobbly loam, light yellowish brown (10YR 6/4) dry; weak coarse prismatic structure parting to moderate coarse subangular blocky; hard, friable, slightly sticky and moderately plastic; few very fine and fine and many medium roots; many very fine and coarse and few fine and medium tubular pores; 15 percent gravel, 35 percent cobbles, and 20 percent stones; noneffervescent; neutral (pH 7.2); gradual wavy boundary.

Bw3—45 to 60 inches; dark yellowish brown (10YR 4/4) extremely stony clay loam, light yellowish brown (10YR 6/4) dry; moderate coarse prismatic structure parting to moderate coarse subangular blocky; hard, friable, moderately sticky and moderately plastic; common very fine roots; many very fine and common fine tubular pores; 25 percent gravel, 15 percent cobbles, and 25 percent stones; noneffervescent; neutral (pH 7.3).

Range in Characteristics

A horizon:

Organic matter content—4 to 6 percent

Texture (less than 2 millimeters)—loam

Clay content—20 to 27 percent

Rock fragment content—3 to 20 percent gravel, 2 to 10 percent cobbles, 10 to 20 percent stones

Reaction—pH 6.6 to 7.3

AB horizon:

Organic matter content—2 to 4 percent

Texture (less than 2 millimeters)—loam

Clay content—20 to 27 percent

Rock fragment content—10 to 25 percent gravel, 5 to 10 percent cobbles

Reaction—pH 6.6 to 7.3

BA horizon:

Organic matter content—1 to 2 percent

Texture (less than 2 millimeters)—clay loam, loam

Clay content—10 to 35 percent

Rock fragment content—30 to 55 percent gravel, 5 to 10 percent cobbles

Reaction—pH 6.6 to 7.3

Bw1, Bw2, and Bw3 horizons:

Organic matter content—0.5 to 2.0 percent

Texture (less than 2 millimeters)—loam, clay loam

Clay content—10 to 35 percent

Rock fragment content—15 to 35 percent gravel, 15 to 35 percent cobbles, 15 to 30 percent stones

Reaction—pH 6.6 to 7.3

Poisonhol Series

Depth class: Moderately deep to a duripan

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Very low

Landscape: Hills

Landform: Hillslopes

Parent material: Mixed alluvium with some loess influence

Slope range: 8 to 15 percent

Elevation: 5,590 to 6,130 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, mixed, superactive, frigid Haploxerollic Durixerolls

Typical Pedon

Poisonhol loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 5 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak very thick platy structure parting to moderate very fine granular; soft, very friable, slightly sticky and slightly plastic; 10 percent gravel; noneffervescent; moderately alkaline (pH 7.9); abrupt smooth boundary.

Bw—5 to 11 inches; brown (10YR 5/3) very cobbly clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, very friable, moderately sticky and moderately plastic; 20 percent gravel, 25 percent cobbles, and 5 percent stones; slightly effervescent; 3 percent calcium carbonate equivalent; moderately alkaline (pH 7.9); clear wavy boundary.

Bk1—11 to 15 inches; light yellowish brown (10YR 6/4) very cobbly loam, yellowish brown (10YR 5/4) moist; moderate very thick platy structure parting to strong fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; 10 percent gravel, 35 percent cobbles, and 10 percent stones; strongly effervescent; 20 percent calcium carbonate equivalent; moderately alkaline (pH 8.5); gradual wavy boundary.

Bk2—15 to 39 inches; very pale brown (10YR 8/3) extremely cobbly loam, light yellowish brown (10YR 6/4) moist; moderate very thick platy structure parting to strong fine subangular blocky; slightly hard, friable, nonsticky and nonplastic; 15 percent gravel, 35 percent cobbles, and 15 percent stones; violently effervescent; 25 percent calcium carbonate equivalent; moderately alkaline (pH 8.5); abrupt wavy boundary.

Bkqm—39 to 43 inches; very pale brown (10YR 8/2) indurated duripan.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches to a duripan

A horizon:

Organic matter content—2 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—15 to 25 percent

Rock fragment content—0 to 14 percent gravel

Calcium carbonate equivalent—0 to 5 percent

Sodium adsorption ratio—0 to 5

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.4 to 8.4

Bw horizon:

Organic matter content—1 to 2 percent

Texture (less than 2 millimeters)—clay loam, loam

Soil Survey of City of Rocks National Reserve, Idaho

Clay content—25 to 32 percent

Rock fragment content—10 to 35 percent gravel, 10 to 35 percent cobbles, 0 to 10 percent stones

Calcium carbonate equivalent—0 to 5 percent

Sodium adsorption ratio—0 to 5

Electrical conductivity—0 to 2 millimhos per centimeter

Reaction—pH 7.4 to 8.4

Bk1 and Bk2 horizons:

Organic matter content—0.5 to 1.0 percent

Texture (less than 2 millimeters)—loam

Clay content—10 to 18 percent

Rock fragment content—10 to 40 percent gravel, 25 to 50 percent cobbles, 10 to 40 percent stones

Calcium carbonate equivalent—10 to 30 percent

Sodium adsorption ratio—2 to 10

Electrical conductivity—2 to 4 millimhos per centimeter

Reaction—pH 7.9 to 9.0

Bkqm horizon:

Type of material—cemented

Povey Series

Depth class: Deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes

Parent material: Mixed alluvium and colluvium over igneous and metamorphic rock

Slope range: 15 to 60 percent

Elevation: 6,570 to 8,820 feet

Mean annual precipitation: 16 to 28 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 30 to 60 days

Taxonomic class: Loamy-skeletal, mixed, superactive Pachic Haplocryolls

Typical Pedon

Povey very stony loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) very stony loam, black (10YR 2/1) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; 15 percent gravel, 10 percent cobbles, and 20 percent stones; noneffervescent; neutral (pH 7.0); clear wavy boundary.

A2—3 to 25 inches; very dark grayish brown (10YR 3/2) extremely stony loam, very dark brown (10YR 2/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; 20 percent gravel, 15 percent cobbles, and 30 percent stones; noneffervescent; neutral (pH 7.2); clear wavy boundary.

Bw1—25 to 36 inches; brown (10YR 4/3) extremely stony loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; 35 percent gravel, 20 percent cobbles, and 20 percent stones; noneffervescent; neutral (pH 7.3); clear wavy boundary.

Bw2—36 to 50 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; 15 percent gravel, 30 percent cobbles, and 10 percent stones; noneffervescent; slightly alkaline (pH 7.4); abrupt wavy boundary.

R—50 to 60 inches; unweathered bedrock.

Range in Characteristics

Depth to restrictive feature: 40 to 50 inches to lithic bedrock

A1 and A2 horizons:

Organic matter content—4 to 6 percent

Texture (less than 2 millimeters)—loam

Clay content—12 to 18 percent

Rock fragment content—5 to 25 percent gravel, 5 to 20 percent cobbles, 15 to 45 percent stones

Reaction—pH 6.1 to 7.3

Bw1 and Bw2 horizons:

Organic matter content—0 to 0.5 percent

Texture (less than 2 millimeters)—loam, sandy loam

Clay content—10 to 18 percent

Rock fragment content—15 to 50 percent gravel, 15 to 45 percent cobbles, 10 to 40 percent stones

Reaction—pH 6.6 to 7.6

R horizon:

Type of material—unweathered bedrock

Rafriver Taxadjunct

Depth class: Moderately deep to a duripan

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Very low

Landscape: Hills

Landform: Fan remnants

Parent material: Mixed alluvium with some loess influence

Slope range: 2 to 4 percent

Elevation: 5,920 to 6,170 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Xeric Haplodurids

Typical Pedon

Rafriver loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 4 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; strong very thick platy structure parting to strong fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine and few fine vesicular pores; 10 percent gravel and 2 percent cobbles; noneffervescent; slightly alkaline (pH 7.5); abrupt smooth boundary.

Bw—4 to 8 inches; pale brown (10YR 6/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate fine subangular

blocky; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 10 percent gravel; noneffervescent; slightly alkaline (pH 7.7); clear smooth boundary.

Bk1—8 to 13 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine and few fine tubular pores; 10 percent gravel; strongly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

Bk2—13 to 23 inches; very pale brown (10YR 7/3) loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine and few fine tubular pores; 30 percent fine irregular carbonate masses; violently effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

2Bkq—23 to 29 inches; very pale brown (10YR 7/3) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak very thick platy structure; hard, friable, nonsticky and nonplastic; few very fine roots; many very fine irregular pores; carbonate coatings on rock fragments; 35 percent gravel and 15 percent gravel-sized duripan fragments; violently effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

2Bkqm—29 to 39 inches; pink (7.5YR 7/4) indurated duripan, brown (7.5YR 5/4) moist; strong very thick platy structure; extremely hard, extremely firm; few very fine roots between plates; violently effervescent.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches to a duripan

A horizon:

Organic matter content—1 to 3 percent

Texture (less than 2 millimeters)—loam

Clay content—10 to 20 percent

Rock fragment content—5 to 14 percent gravel, 0 to 5 percent cobbles

Reaction—pH 7.2 to 7.6

Bw horizon:

Organic matter content—0.5 to 1.5 percent

Texture (less than 2 millimeters)—silt loam, loam

Clay content—10 to 18 percent

Rock fragment content—5 to 14 percent gravel

Reaction—pH 7.4 to 7.8

Bk1 and Bk2 horizons:

Organic matter content—0.25 to 1.00 percent

Texture (less than 2 millimeters)—silt loam, loam

Clay content—10 to 20 percent

Rock fragment content—0 to 14 percent gravel

Calcium carbonate equivalent—15 to 30 percent

Sodium adsorption ratio—2 to 10

Electrical conductivity—2 to 4 millimhos per centimeter

Reaction—pH 7.9 to 8.5

2Bkq horizon:

Organic matter content—0 to 0.5 percent

Texture (less than 2 millimeters)—sandy loam, loam

Clay content—5 to 15 percent

Rock fragment content—35 to 50 percent gravel

Calcium carbonate equivalent—15 to 30 percent
Sodium adsorption ratio—2 to 10
Electrical conductivity—2 to 4 millimhos per centimeter
Reaction—pH 7.9 to 8.5

2Bkqm horizon:

Type of material—cemented

Taxadjunct Feature

The soils in the Raft River series are classified as Xereptic Haplodurids. This pedon, however, has an indurated duripan and is classified as a Xeric Haplodurid. This difference does not significantly affect use and management.

Riceton Taxadjunct

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): High

Landscape: Hills

Landform: Fan remnants

Parent material: Mixed alluvium derived from igneous rock and granodiorite

Slope range: 4 to 12 percent

Elevation: 5,720 to 6,600 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Typic Haploxerolls

Typical Pedon

Riceton loamy coarse sand in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

- A1—0 to 4 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark gray (10YR 3/1) moist; weak very fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine irregular pores; noneffervescent; slightly acid (pH 6.2); clear smooth boundary.
- A2—4 to 7 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; noneffervescent; neutral (pH 6.6); clear smooth boundary.
- Bw1—7 to 14 inches; grayish brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine tubular pores; noneffervescent; slightly alkaline (pH 7.6); clear wavy boundary.
- Bw2—14 to 23 inches; brown (10YR 5/3) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine tubular pores; noneffervescent; slightly alkaline (pH 7.6); clear wavy boundary.
- Bw3—23 to 33 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; 25 percent gravel; noneffervescent; slightly alkaline (pH 7.6); clear smooth boundary.

- C—33 to 44 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; 15 percent gravel; noneffervescent; slightly alkaline (pH 7.4); abrupt wavy boundary.
- Ab—44 to 60 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; 15 percent gravel; noneffervescent; slightly alkaline (pH 7.4).

Range in Characteristics

A1 and A2 horizons:

Organic matter content—2 to 3 percent
Texture (less than 2 millimeters)—loamy coarse sand
Clay content—2 to 10 percent
Reaction—pH 6.1 to 7.3

Bw1 and Bw2 horizons:

Organic matter content—1 to 2 percent
Texture (less than 2 millimeters)—coarse sandy loam
Clay content—5 to 15 percent
Reaction—pH 7.4 to 7.6

Bw3 horizon:

Organic matter content—1 to 2 percent
Texture (less than 2 millimeters)—coarse sandy loam
Clay content—5 to 15 percent
Rock fragment content—15 to 30 percent gravel
Reaction—pH 7.4 to 7.6

C horizon:

Organic matter content—0 to 0.5 percent
Texture (less than 2 millimeters)—coarse sandy loam, loamy coarse sand
Clay content—5 to 15 percent
Rock fragment content—15 to 30 percent gravel
Reaction—pH 7.4 to 7.6

Ab horizon:

Organic matter content—0 to 0.5 percent
Texture (less than 2 millimeters)—loamy coarse sand
Clay content—5 to 15 percent
Rock fragment content—15 to 30 percent gravel
Reaction—pH 7.4 to 7.6

Taxadjunct Features

The soils in the Riceton series are classified as Pachic Ultic Haploxerolls. This pedon, however, has base saturation of more than 75 percent and has less than 1 percent organic matter in some part of the upper 20 inches. It is classified as a Typic Haploxeroll. These differences do not significantly affect use and management.

Searla Series

Depth class: Very deep

Drainage class: Well drained

Capacity of the most limiting soil layer to transmit water (Ksat): Moderately high

Landscape: Mountains

Landform: Mountain slopes

Soil Survey of City of Rocks National Reserve, Idaho

Parent material: Mixed alluvium and colluvium derived from igneous rock

Slope range: 4 to 55 percent

Elevation: 6,590 to 7,760 feet

Mean annual precipitation: 18 to 28 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 65 to 95 days

Taxonomic class: Loamy-skeletal, mixed, superactive, frigid Calcic Argixerolls

Typical Pedon

Searla cobbly loam in the soil survey of Cassia County, Idaho, Eastern Part. (Colors are for dry soil unless otherwise noted.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; 10 percent gravel and 10 percent cobbles; noneffervescent; neutral (pH 7.3); clear smooth boundary.

Bt1—5 to 12 inches; dark grayish brown (10YR 4/2) cobbly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and common fine tubular pores; 35 percent discontinuous clay films on all faces of peds; 10 percent gravel and 10 percent cobbles; noneffervescent; neutral (pH 7.3); clear smooth boundary.

Bt2—12 to 19 inches; brown (10YR 5/3) gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; 35 percent clay bridges between sand grains; 25 percent gravel and 5 percent cobbles; noneffervescent; neutral (pH 7.3); gradual smooth boundary.

Btk—19 to 32 inches; brown (10YR 5/3) very cobbly sandy clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; few very fine tubular pores; 35 percent clay bridges between sand grains; 25 percent gravel and 20 percent cobbles; strongly effervescent; neutral (pH 7.9); clear wavy boundary.

Bk1—32 to 39 inches; light yellowish brown (10YR 6/4) very cobbly sandy clay loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; few fine tubular pores; carbonate coatings on bottom surface of rock fragments; 20 percent gravel and 25 percent cobbles; strongly effervescent; neutral (pH 7.9); gradual wavy boundary.

Bk2—39 to 60 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; 25 percent gravel and 30 percent cobbles; strongly effervescent; moderately alkaline (pH 8.0).

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification

A horizon:

Organic matter content—2 to 4 percent

Texture (less than 2 millimeters)—loam

Clay content—12 to 20 percent

Rock fragment content—10 to 25 percent gravel, 5 to 15 percent cobbles

Reaction—pH 6.6 to 7.6

Soil Survey of City of Rocks National Reserve, Idaho

Bt1 and Bt2 horizons:

Organic matter content—0.5 to 1.0 percent
Texture (less than 2 millimeters)—clay loam, sandy clay loam
Clay content—27 to 35 percent
Rock fragment content—10 to 34 percent gravel, 0 to 15 percent cobbles
Reaction—pH 6.6 to 7.6

Btk horizon:

Organic matter content—0.5 to 1.0 percent
Texture (less than 2 millimeters)—sandy clay loam
Clay content—27 to 35 percent
Rock fragment content—20 to 35 percent gravel, 10 to 35 percent cobbles
Calcium carbonate equivalent—1 to 15 percent
Reaction—pH 7.8 to 8.4

Bk1 and Bk2 horizons:

Organic matter content—0 to 0.5 percent
Texture (less than 2 millimeters)—sandy clay loam, sandy loam
Clay content—5 to 22 percent
Rock fragment content—15 to 40 percent gravel, 15 to 45 percent cobbles
Calcium carbonate equivalent—1 to 15 percent
Sodium adsorption ratio—0 to 5
Electrical conductivity—0 to 2 millimhos per centimeter
Reaction—pH 7.8 to 8.4

Formation of the Soils

By Francis R. Kukachka, Natural Resources Conservation Service.

Soil is a natural, three-dimensional body on the earth's surface that supports, or is capable of supporting, plants. It is a fundamental part of the ecosystem and exists in balance with other components of the environment. It is a mixture of minerals, organic matter, water, and air, all of which occur in varying proportions.

Soils are characterized by a vertical sequence of layers, or horizons, that vary in color, texture, chemistry, or structure or a combination of these properties. Horizons continually form and evolve, generally over long periods of time, as a result of environmental forces.

Soils differ in their appearance, productivity, and management requirements in different areas and within short distances. The characteristics of soil are determined by the interaction of five factors—(1) the parent material; (2) the climate in which the soil material has accumulated and has existed since accumulation; (3) the relief, which influences the drainage, moisture content, and aeration of the soil, the susceptibility of the soil to erosion, and the exposure of the soil to sun and wind; (4) the living organisms, or plants and animals living on and in the soil, that act on the soil material; and (5) the length of time the climate, plants, and animals have acted on the soil material (Jenny, 1941). This section discusses how these five soil-forming factors have influenced soil development in the City of Rocks National Reserve.

The reserve is in the southwestern part of Cassia County, Idaho ([fig. 23](#)). It consists of an undulating central valley surrounded by mountains and hills. Elevation ranges from about 6,100 feet above sea level on the valley bottom to about 8,900 feet at the top of Graham Peak. The elevation gain to the east and west is about 1,000 feet in less than 2 miles and to the north about 2,700 feet in less than 4 miles. This rapid change in elevation has had a significant effect on the development of the soils in the reserve.

Parent Material

Soils are strongly influenced by the characteristics of the parent material (the unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of a soil is developed by pedogenic processes), particularly the mineralogy and texture. The soils in the reserve formed in residual, alluvial, and colluvial material along with some loess influence ([fig. 24](#)).

The main part of the reserve, containing the impressive rock structures, is primarily made up of Oligocene granite of the Almo Pluton. Generally surrounding this formation and outcropping on the northeast, east, and south parts of the reserve are Precambrian granite and granite gneiss structures of the Green Creek Complex. The mountains on the perimeter of the reserve are primarily made up of Elba quartzite and, to a lesser degree, interbedded schist (Miller and others, 2008).

In the central part of the reserve is Oligocene granite. The soils formed in residuum and alluvium derived from this material. This granitic material is easily eroded, and the soils are generally moderately deep to very deep, do not have calcium carbonate,



Figure 23.—Overhead, three-dimensional view of City of Rocks National Reserve, Idaho. Photograph developed using Environmental Systems Research Institute (ESRI) Arc Explorer software.

have a weakly developed profile, and have a sandy texture. Soils that formed in this material include the Kanlee, Ola, and Riceton series.

On fan remnants and hillslopes, the soils formed in deposits of Holocene and Pleistocene mixed alluvium derived from igneous, sedimentary, and metamorphic rock with some loess influence. The soils are generally moderately deep to very deep, have a layer of carbonate accumulation, have a weakly developed to moderately developed profile, and a loamy texture. Some of the soils have a duripan. Arbone soils are very deep and have a layer of carbonate accumulation. Chayson and Poisonhol soils have a moderately developed B horizon with an accumulation of clay, a layer of carbonate accumulation, a duripan, and texture modified by rock fragments.

Soils on Smokey Mountain, the Cedar Hills, and to a lesser extent, Graham Peak formed primarily in residuum and colluvium derived from Elba quartzite and mica schist (Miller and others, 2008). Quartzite weathers very slowly, thus resulting in the stones, cobbles, and gravel in these soils. As the mica schist material weathers, smectitic clay forms. The resulting soils are shallow to very deep, have a moderately developed to strongly developed loamy to clayey subsoil, and do not have an accumulation of carbonate. Birchcreek and Itca soils are moderately deep and shallow, respectively. They have a clayey, strongly developed B horizon. Moderately developed, very deep soils that formed in quartzite and schist colluvium include the Howcan and Searla soils. Howcan soils have a moderately developed B horizon and do not have carbonate. Searla soils also have a moderately developed B horizon but have an accumulation of carbonate in the subsoil. Holocene loess has influenced the associated Conneridge soils. These soils are moderately developed, moderately deep, and have an accumulation of carbonate in the subsoil.

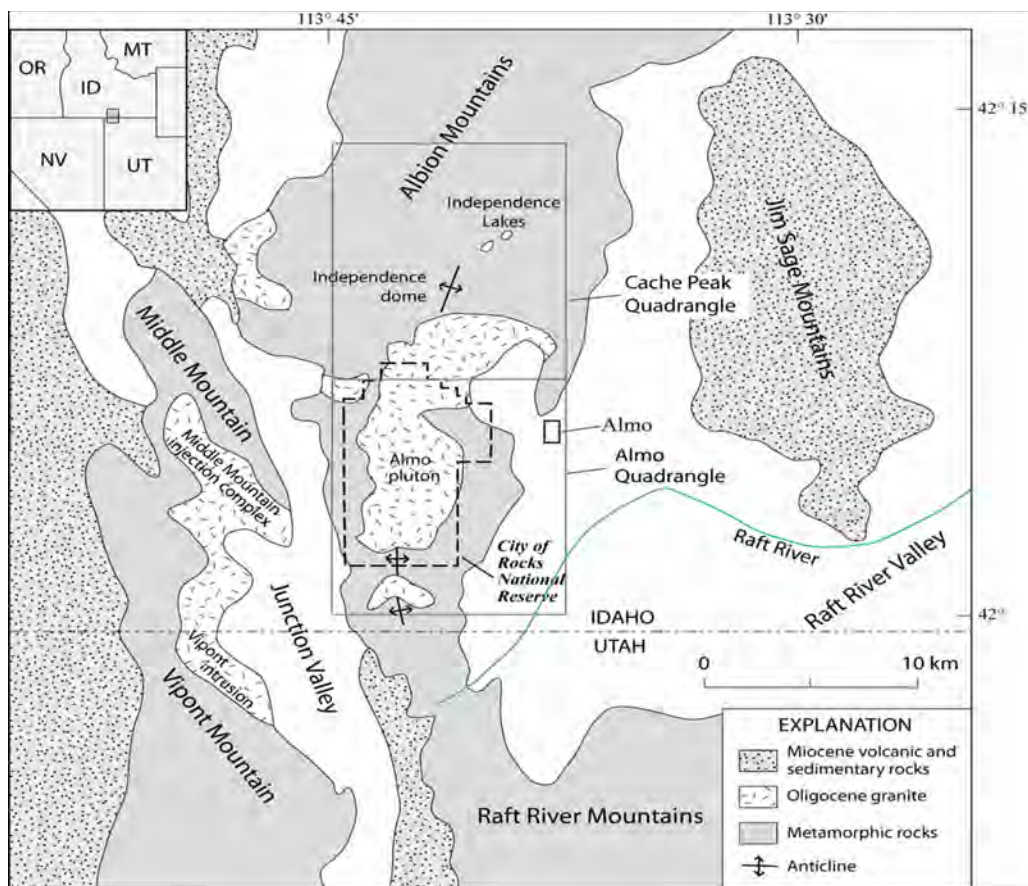


Figure 24.—Location map showing general geologic features in the vicinity of the City of Rocks National Reserve. Almo and Cache Peak 7.5-minute quadrangles are outlined by boxes. The dashed line indicates the boundary of the reserve.

Climate

Climate has a strong influence on soil formation. Temperature and precipitation affect the weathering of rock and its constituent minerals, the eluviation (leaching) and illuviation (deposition) of soluble or colloidal material, the kinds and amount of vegetation, and the accumulation and decomposition of organic matter. The climate in the reserve is characterized by warm, dry summers and cold, moist winters.

The reserve consists of a southwest- to northeast-trending valley surrounded by mountains and hills. This varied topography affects the amount of precipitation the area receives and its effectiveness. The prevailing wind is from the southwest. It comes from the arid northern part of Utah, which further affects the effectiveness of the precipitation in the area (<http://www.wrcc.dri.edu/>).

Precipitation in the reserve, as modeled by the Oregon State University Parameter-elevation Regressions on Independent Slopes Model (PRISM), shows a general southwest to northeast trend that approximately follows the orientation of the Albion Mountains (<http://www.prism.oregonstate.edu/>) (fig. 25). To the east of this line, the area is generally drier. Precipitation increases rapidly to the west and northwest of the line as elevation increases. Below an elevation of about 6,800 feet, the precipitation ranges from about 14 to 16 inches, the mean annual air temperature is about 42 degrees F, and the frost-free period is about 80 days. From about 6,800 to 7,400 feet, the precipitation increases to about 22 inches, the mean annual air temperature decreases to about 40 degrees F, and the frost-free period decreases to

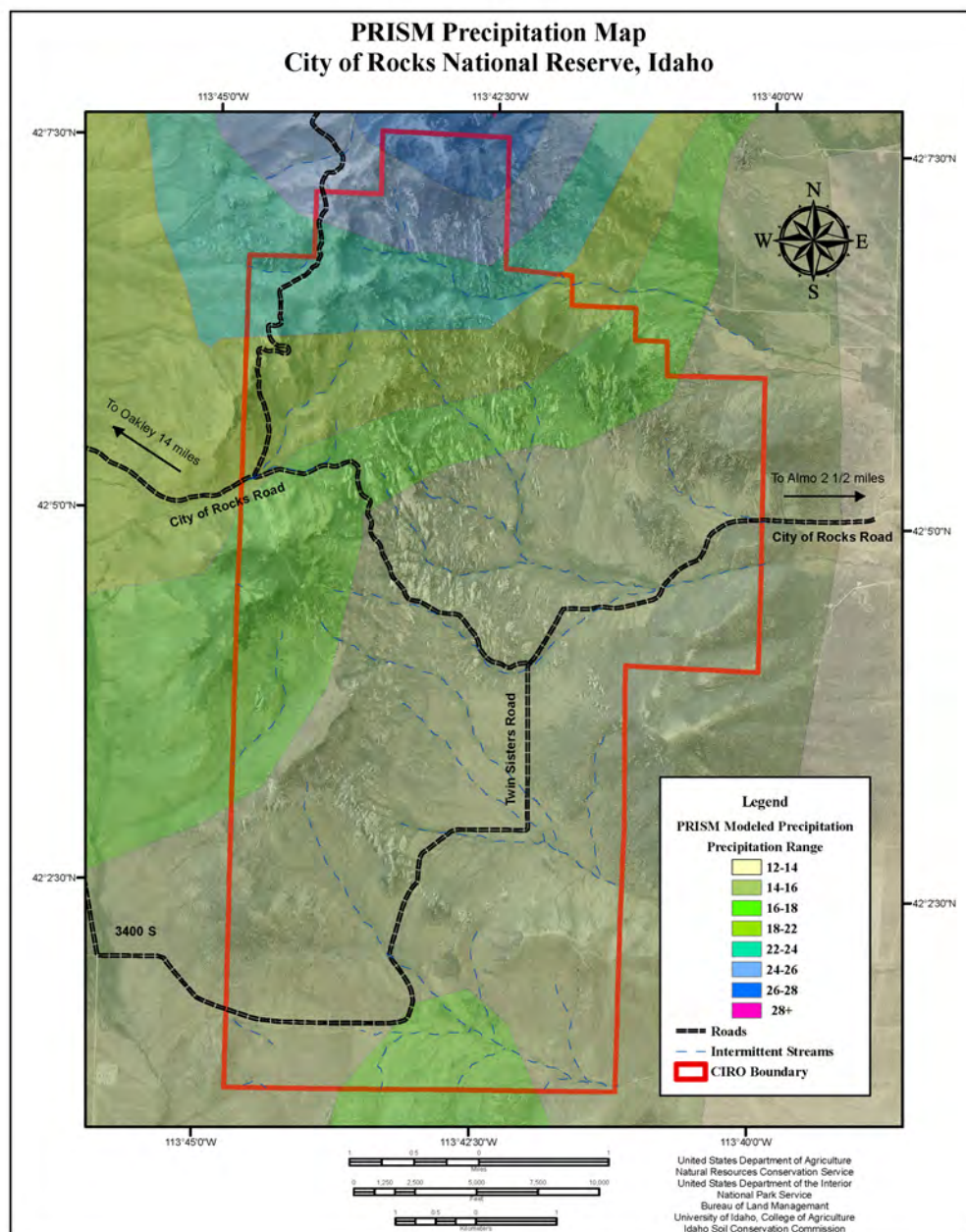


Figure 25.—Parameter-elevation Regressions on Independent Slopes Model (PRISM) precipitation map.

about 65 days. At elevations above 7,400 feet to the maximum elevation in the reserve of about 8,900 feet at the summit of Graham Peak, the precipitation is about 27 inches, the mean annual air temperature is about 38 degrees F, and the frost-free period is about 45 days.

The general climate of the reserve favors the development of Mollisols. Mollisols have a dark-colored surface horizon, more than 1 percent organic matter, and high base saturation.

The warmest, driest part of the reserve is in the southwestern corner. This area receives about 14 to 18 inches of precipitation annually, but the effective precipitation is less due to the prevailing southwesterly winds and the southerly aspects. The soils

in this area are dominantly drier Mollisols. They have a dark-colored surface layer, have free carbonates at or near the surface, and support limited stands of shrubs and grasses, resulting in a low to moderate amount of organic carbon being produced and incorporated into the soils. Microbial action is low because of the dry conditions. The Bezzant and Hymas series are examples of these drier Mollisols. These soils have free carbonates at the surface and have layers of carbonate accumulation.

Further to the north in this same precipitation zone, the effective precipitation is higher because of the more easterly aspects, resulting in somewhat lower soil temperatures. These soils differ from those in the slightly drier area by having a thicker, darker colored surface layer that is free of carbonates, having a layer of carbonate accumulation deeper in the profile or lacking one altogether, and supporting relatively good stands of shrubs and grasses, resulting in an increased amount of organic carbon. The Arbone, Kanlee, and Riceton soils are examples.

Because of the increase in elevation, precipitation increases from about 16 inches to 27 inches or more over a short distance. As the elevation increases and the mean annual temperature decreases, the rate of evapotranspiration is reduced. This results in an increase in the amount of moisture available for plant growth and in soil leaching, but microbial activity diminishes because of the lower soil temperatures. The soils that developed under these conditions are also Mollisols. Carbonates have been leached out of the soil profile. These soils support vigorous plant growth, especially grasses. Aspen trees are common in small, concave pockets and on north-facing slopes. Because of the increased plant growth, organic matter has accumulated, and because the microbial activity is insufficient to break down the organic matter, the surface layer of these soils is thicker and darker. Leaching of carbonates from these soils has also promoted, in varying degrees, the formation and movement of clay. Povey soils formed under these conditions. Soils in the concave areas that support aspen trees are classified as Pachic Haplocryolls. In other areas on mountain slopes, the temperatures are warmer and water flowing through the soils moves the accumulation of clay deeper into the profile. Howcan and Hutchley soils formed under these conditions.

Soils that are exposed to wind much of the time are on convex ridges and mountaintops that have westerly aspects. This exposure leads to a very high rate of evapotranspiration, which drastically reduces the amount of effective moisture. The vegetation is sparse, microbial activity is low, and the content of organic matter is low. Chokecherry soils formed on a windswept ridge.

Topography and Relief

Topography, or the shape of the landscape, and relief, or the differences in elevation, influence soil formation by affecting the rate of erosion, effective precipitation, soil drainage, and exposure (aspect) to the sun and wind. About 60 percent of the reserve is on steep mountain slopes and hillslopes. Soils in these positions commonly vary in depth of the profile and thickness of the A horizon. Soils on north and east aspects receive less solar radiation than those on south and west aspects, resulting in lower soil temperatures and more winter snowpack. Because the soils receive moisture from the snowpack later in the growing season, they have more available water for plant growth during the hotter, drier part of the summer. They support more plant cover, which helps to control erosion. Consequently, the soils can be deeper than those on south and west aspects. The lower soil temperatures inhibit the breakdown of the organic matter produced by the abundant vegetation, and organic matter accumulates on the surface and in the soil, producing a thick, dark-colored A horizon. Povey soils and Pachic Haplocryolls exhibit these characteristics. Soils on south and west aspects generally are shallower and have a thinner A horizon than those on north and east aspects. Direct sunlight heats and dries the soils quickly during the growing season. The heat speeds up the breakdown of organic matter

and limits plant growth, resulting in a thinner A horizon. The rate of erosion is higher because of the reduced amount of protective ground cover; thus, these soils are shallower.

The soils of the mountains generally have a high percentage of rock fragments throughout the profile, are shallow to deep to bedrock, and are well drained. These characteristics reflect the steep landscapes on which the soils formed and the accelerated rate of erosion resulting from the steepness of the slope. Examples are Chokecherry, Ola, and Povey soils. Soils on convex, south- and west-facing ridges and summits are subject to the highest rate of geologic erosion and have the least effective available moisture. They have higher soil temperatures and commonly dry out quickly. These soils are generally shallow to moderately deep and vary in their degree of soil development depending on parent material. Examples of less developed soils are Conneridge and Hymas soils. Examples of well developed soils are Birchcreek and Itca soils.

Eroded soil particles are moved downslope by streamwater, rills, and sheet erosion and deposited on alluvial fans. The coarsest material is dominant on the upper slopes of the fans while finer sand and silt are deposited on the lower slopes. Streams continue to erode and dissect the fans, creating fan remnants. Riceton and Arbone soils are on fan remnants.

Living Organisms

Living organisms include plants, soil microbes, insects, worms, and other organisms that affect soil development by adding organic matter, stirring and aerating the soil, and cycling nutrients and energy. The kinds and amount of living organisms are largely determined by climatic factors.

Soils that developed in the southwestern part of the reserve, where the mean annual precipitation is about 14 to 18 inches, support limited vegetation and soil biologic activity. The soils are dry for much of the growing season and the effective precipitation is not sufficient to leach carbonates deep into the soil. Wyoming big sagebrush and bluebunch wheatgrass are the main plants on the driest soils, and mountain big sagebrush and bluebunch wheatgrass are the main plants in the slightly moister areas. Because the production of vegetation is limited, the annual addition of organic matter is also limited. Consequently, these soils have a thin A horizon and carbonates close to or at the surface. Hymas, Bezzant, and Raft River soils are examples. The soils further to the north in the same precipitation zone support a mountain big sagebrush and bluebunch wheatgrass plant community, but the moisture is more effective and plant production is higher. More organic matter is produced, and there is a corresponding increase in soil biologic activity. The soils have a thicker, dark-colored surface layer with carbonates leached from the surface or completely out of the profile. Typical soils are those of the Arbone, Ola, and Riceton series. As elevation increases, the precipitation increases to about 16 to 28 inches. In this precipitation zone, plants can grow vigorously. There is an abundance of grasses, which adds appreciable amounts of organic matter to the soil surface, resulting in soils that have a thicker A horizon. Micro-organisms are also very active in this environment, and they influence the color of the soil, its structure, and its physical appearance. Earcree soils, Pachic Haplocryolls, and Povey soils are examples. The highest elevations are also the coolest and are subject to more continuous winds. The wind tends to dry the soils out, greatly reducing the amount of water available to plants and micro-organisms. The soils at these high elevations also have cooler temperatures, which further retards soil biologic activity and plant growth. The soils in the windswept positions support mainly low sagebrush and Sandberg bluegrass. Chokecherry soils are typical in these positions.

Time

The length of time that landforms in the reserve have been exposed to weathering and erosion and the variability of parent material, climate, relief, and vegetation all contribute to the wide variety of soils in the reserve; however, the different horizons in the soil profile and the degree of their development can be directly related to time. The longer the soil-forming factors are active, the more the parent material can be altered and, generally, the more the soil can develop. The relative age of a soil is determined through observation of the soil horizons. The more the horizons are differentiated and expressed, the longer the soil has been forming. The soils in the reserve vary greatly in age. Soils on the alluvial fans and stream terraces are generally young. These soils have formed in recent alluvium derived from sheet and rill erosion and active stream deposition. Soils that are relatively young include Arbone soils, Cumulic Endoaquolls, and Riceton soils. They have little horizon development other than the accumulation of calcium carbonates in the Arbone soils and organic matter in the surface layer of the Cumulic Endoaquolls.

Soils on the fan remnants in the southwestern corner of the reserve have a more stable environment in which to develop. Although they receive less moisture, carbonates have had time to accumulate and concentrate below the surface layer. These layers, or calcic horizons, have been cemented by silica in some of the older soils, forming a duripan. Chayson, Poisonhol, and Rafriver soils have a duripan.

Soils on mountain slopes and hillslopes differ greatly in age and degree of development. The relative age depends on the parent material and its components after weathering; aspect, which greatly determines how much solar heat the soil receives; and landscape position. Soils that formed in granite of the Almo Pluton generally are less developed than those that formed in schist-influenced material. Granite tends to break down into its crystalline components, but these minerals resist weathering and persist in the soil as sand-sized material. This sandy material erodes more easily, resulting in less developed soils.

Soils that developed in convex landscape positions and on ridges and summits are young in appearance. They have either been subjected to geologic erosion or are cold enough to retard soil formation. They generally have a sparse vegetative cover and carbonates near or at the surface. They are shallow to moderately deep. Conneridge, Chokecherry, and Hymas soils are examples.

Soils that developed in parent material containing mica schist tend to have a high content of clay and a well developed argillic horizon. They are generally older than adjacent soils and exhibit good structure. They tend to be more resistant to erosion than less developed soils and help to stabilize steeper slopes. Birchcreek and Itca soils are examples.

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the “National Soil Survey Handbook” (available in local offices of the Natural Resources Conservation Service or on the Internet).

ABC soil. A soil having an A, a B, and a C horizon.

Abrupt textural change. A soil horizon boundary or thin transitional zone characterized by a considerable increase in clay that occurs at the contact between a surface layer, subsurface layer, subsoil, or substratum.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial cone. A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Andesite. A fine-grained volcanic rock consisting mainly of plagioclase feldspar with small amounts of pyroxene, hornblende, or biotite. It is dark colored, mainly shades of gray or green.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Anticline. A unit of folded strata that is a convex upland. In a single anticline, beds forming the opposite limbs of the fold dip away from its axial plane.

Apite. Light-colored, finely grained granite made up of quartz and feldspar.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Arkose. Sandstone containing unaltered feldspar; usually formed in mountainous regions from weathered granite.

Ash (volcanic). Unconsolidated, pyroclastic material less than 2 millimeters in all dimensions; commonly called volcanic ash.

Aspect. The direction toward which a slope faces. Also called slope aspect.

Aspect, north. All compass directions with a northerly aspect, including west-northwest, northwest, north-northwest, north, north-northeast, northeast, and east-northeast. North aspects have less solar radiation than south aspects and consequently are cooler and more moist.

Aspect, south. All compass directions with a southerly aspect, including east-southeast, southeast, south-southeast, south, south-southwest, southwest, and west-southwest. South aspects have more solar radiation than north aspects and consequently are warmer and more droughty.

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.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology). A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Basin. A low area in the earth's crust, of tectonic origin, in which sediment has accumulated.

Batholith. A large, domed mass of intrusive igneous rock such as granite.

Bedding plane. A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bottom land. An informal term loosely applied to various portions of a flood plain.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

- Breaks.** A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.
- Breccia.** Coarse grained, clastic rock made up of angular broken rock fragments that are held together by mineral cement or are in a fine-grained matrix.
- Brush management.** Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.
- Bulk density.** The mass of soil per unit bulk volume. Moist bulk density refers to the oven-dry weight of a given volume of soil with moisture content at or near field moisture capacity.
- 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.** A subsurface horizon that has an accumulation of calcium carbonate or of calcium and magnesium carbonate.
- Calcium carbonate equivalent.** The quantity of carbonates (CO_3) in the soil, expressed as CaCO_3 and as a percentage by weight of the fraction less than 2 millimeters in size.
- Caliche.** A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.
- Cambic horizon.** A mineral soil horizon that is loamy very fine sand or finer textured and has soil structure rather than rock structure. The cambic horizon contains some weatherable minerals, and it is characterized by alterations or removals as indicated by redoximorphic features or by stronger chroma or redder hue than that of the underlying horizons.
- Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.
- Carbonates.** Chemical compounds containing the carbonate ion CO_3 in combination with bases such as calcium, magnesium, potassium, and sodium.
- Catena.** A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.
- Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
- Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.
- Catsteps.** See Terracettes.
- 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 chanter.
- Clastic.** Pertaining to rock or sediment composed mainly of fragments derived from pre-existing rock or minerals and moved from their place of origin.

- 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.** See Redoximorphic features.
- 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 dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.
- Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
- Coarse textured soil.** Sand or loamy sand.
- Coarse-loamy.** A loamy particle-size class that is 15 percent or more fine sand or coarser, including fragments as much as 3 inches in diameter, and is less than 18 percent clay in the fine-earth fraction.
- Coarse-silty.** A loamy particle-size class that is less than 15 percent fine sand or coarser, including fragments as much as 3 inches in diameter, and is less than 18 percent clay in the fine-earth fraction.
- 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.** Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (for example, direct gravitational action) and by local, unconcentrated runoff.
- Compaction.** The increase in soil bulk density as a result of applied loads or pressure. Compaction reduces porosity, water infiltration, and root penetration.
- 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.** See Redoximorphic features.
- Conglomerate.** A coarse grained, clastic sedimentary 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 (geomorphology).** A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent

action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cryic. A soil temperature regime in which the mean annual soil temperature at a depth of 20 inches ranges from 33 to 46 degrees F. The mean summer soil temperature is less than 47 degrees for soils that have an O horizon, and it is less than 59 degrees for soils that do not have an O horizon.

Cryoturbate. A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, 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.

Diagnostic horizons. Combinations of specific soil characteristics that are indicative of certain classes of soils. Those that occur at the soil surface are called epipedons, and those that occur below the soil surface are called diagnostic subsurface horizons.

Diamict. A nonsorted or poorly sorted, unconsolidated deposit that contains a wide range of particle sizes, commonly from clay to cobble- or boulder-sized, rounded and/or angular fragments with a clayey, silty, or sandy matrix, depending on the local source bedrock.

Dike. An intrusion of rock that cuts across the bedding or foliation of the pre-existing rock.

Diorite. A coarse-grained igneous rock consisting mainly of plagioclase but with smaller amounts of hornblende, biotite, and pyroxene. Quartz is absent or sparse. See Quartz diorite.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

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.

Draw. A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

- Duripan.** A subsurface soil horizon that is cemented by illuvial silica, commonly opal or microcrystalline forms of silica, to the degree that less than 50 percent of the volume of air-dry fragments will slake in water or hydrochloric acid.
- 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.** The gaseous response exhibited as bubbles on the soil ped when drops of dilute (1:10) hydrochloric acid (HCl) are applied. This response typically indicates the presence of calcium carbonates (CaCO₃).
- Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.
- 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.
- Eolian deposit.** Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.
- Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.
- 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.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.
- Erosion pavement.** A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.
- Erosion surface.** A land surface shaped by the action of erosion, especially by running water.
- 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. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.
- Extrusive rock.** Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.
- Fan remnant.** A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.
- Fault.** A fracture or fracture zone of the earth with displacement along one side in respect to the other.
- Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry 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*.

- Fill slope.** A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.
- Fine textured soil.** Sandy clay, silty clay, or clay.
- Fine-loamy.** A loamy particle-size class that is 15 percent or more fine sand or coarser, including fragments as much as 3 inches in diameter, and is 18 to 34 percent clay in the fine-earth fraction.
- Fine-silty.** A loamy particle-size class that is less than 15 percent fine sand or coarser, including fragments as much as 3 inches in diameter, and is 18 to 34 percent clay in the fine-earth fraction.
- Firebreak.** An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.
- First bottom.** An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.
- Flaggy soil material.** Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.
- Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.
- Flood plain.** The nearly level plain that borders a stream and is subject to flooding unless protected artificially.
- Flood-plain landforms.** A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.
- Flood-plain splay.** A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.
- Flood-plain step.** An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.
- Fluvial.** Of or pertaining to rivers or streams; produced by stream or river action.
- Foliated.** Refers to metamorphic rock that exhibits parallel structure or layering.
- Foothills.** A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).
- Footslope.** The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).
- Forb.** Any herbaceous plant not a grass or a sedge.
- Fragmental.** A particle-size class used to classify mineral soils that have less than 10 percent by volume fine-earth soil material.
- Frigid.** A soil temperature regime in which the mean annual soil temperature at a depth of 20 inches ranges from 33 to 46 degrees F. The mean summer soil temperature is more than 47 degrees for soils that have an O horizon. The difference between the mean winter soil temperature and the mean summer soil temperature is more than 9 degrees F.
- 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.
- Geomorphic surface.** A mappable area of the earth's surface that has a common history; the area is of similar age and is formed by a set of processes during an episode of landscape evolution.

- Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.
- Granite.** A coarse-grained igneous rock consisting mainly of quartz and feldspar, with more orthoclase than plagioclase. See Granodiorite.
- Granitic.** Term generally applied to granite or granitelike rock. It is used when referring to granite, granodiorite, quartz monzonite, quartz diorite, diorite, and granitic gneiss.
- Granitic gneiss.** A crystalline, banded metamorphic rock of granitic composition.
- Granodiorite.** A coarse-grained igneous rock consisting mainly of quartz and feldspar, with more plagioclase than orthoclase. See Granite.
- 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.
- Grazing system, planned.** A system for managing rangeland in which three or more fields are alternately grazed and then rested in a planned sequence for a period of years.
- Ground water.** Water filling all the unblocked pores of the material below the water table.
- Grus.** The fundamental products of *in situ* granular disintegration of granite and granitic rock, dominated by intercrystal disintegration.
- Gully.** A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.
- Habitat type.** The collective area occupied by a single plant association. It is defined and described on the basis of the vegetation and its associated environment.
- Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.
- Hard to reclaim** (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.
- 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.
- Head slope** (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.
- Hill.** A generic term for an elevated area 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. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.
- Hillslope.** A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.
- Historic climax plant community.** The plant community that was best adapted to the unique combination of factors associated with the ecological site. It was in a natural dynamic equilibrium with the historic biotic, abiotic, and climatic factors on its ecological site in North America at the time of European immigration and settlement.
- 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:

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.—Consolidated bedrock beneath the soil that has an extremely weakly cemented to moderately cemented rupture-resistance class.

R horizon.—Consolidated bedrock beneath the soil that has a strongly cemented or stronger rupture-resistance class.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff 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 include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation.

Major varieties include plutonic and volcanic rock (e.g., 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.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Indurated. Refers to having a hard, brittle consistency as a result of particles being held together by cementing substances such as silica, calcium carbonate, and iron. An indurated layer can be broken by a sharp blow of a hammer.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Intermontane basin. A generic term for a wide structural depression between mountain ranges that is partly filled with alluvium.

Intrusive rock. Igneous rock derived from molten matter (magmas) that invaded pre-existing rock and cooled below the surface of the earth.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. See Redoximorphic features.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Ksat. 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.

Lamella. A thin, discontinuous or continuous, generally horizontal layer of fine material (especially clay and iron oxides) that has been pedogenically concentrated (illuviated) within a coarser (e.g., sandy), eluviated layer.

Landform. Any physical, recognizable form or feature on the earth's surface that has a characteristic shape and range in composition and is produced by natural causes; it can span a wide range in size. Landforms provide an empirical description of similar portions of the earth's surface.

Landscape (soils). An assemblage, group, or family of spatially related, natural landforms over a relatively large area; the land surface which the eye can comprehend in a single view.

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Leeward. Being in or facing the direction toward which the wind is blowing.

Limestone. Sedimentary rock consisting mainly of calcium carbonate (CaCO₃).

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 $1/3$ - 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.

Lithic contact. A boundary between soil and coherent underlying material, typically bedrock. The bedrock has a cementation class of strongly cemented or stronger and is typically referred to as an R horizon.

Lithologic discontinuity. A significant change in particle-size distribution or mineralogy that indicates a difference in the material from which the soil horizons have formed.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy-skeletal. A particle-size class in which rock fragments 2 millimeters in diameter or larger make up 35 percent or more by volume. The fine-earth fraction is loamy.

Loess. Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength. The soil is not strong enough to support loads.

Major Land Resource Area (MLRA). A broad geographic land area characterized by a particular pattern of soils, geology, climate, water resources, and land use. An area is typically continuous, but small separate areas can occur.

Mass movement. A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses. See Redoximorphic features.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesic. A soil temperature regime in which the mean annual temperature at a depth of 20 inches ranges from 47 to 58 degrees F. The difference between the mean winter soil temperature and the mean summer soil temperature is more than 9 degrees F.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

Microclimate. The climate of a small distinct area, as of a forest or city, or a confined space, as of a building or greenhouse.

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. A kind of map unit component 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.

Moisture control section. The layer within a soil profile used to determine the soil moisture regime. The upper boundary is the depth to which a dry soil is moistened by 1 inch of water in 24 hours. The lower boundary is the depth to which a dry soil is moistened by 3 inches of water in 48 hours.

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 generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) 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. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Mountain valleys. Any small, externally drained depression floored with either till or alluvium, that occurs on a mountain or within mountains. See intermontane basins.

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.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. See Redoximorphic features.

Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Ochric epipedon. A surface horizon of mineral soil that is too light in color, too high in chroma, too low in organic carbon, or too thin to be a mollic, umbric, or histic epipedon.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low.....	1.0 to 2.0 percent
Moderate.....	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high.....	more than 8.0 percent

Orogenic. Of or pertaining to the process of mountain formation.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Paralithic contact. A boundary between soil and coherent underlying material that can be dug with difficulty with a spade. It is referred to as weathered bedrock, has a cementation class of moderately cemented or weaker, and is typically referred to as a Cr horizon.

- Pararock fragments.** Fragments of rock that are 2 millimeters in diameter or more (e.g., paragravel, paracobble, or parastone). Pararock fragments have a moderately cemented to extremely weakly cemented rupture-resistance class.
- 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.
- Pedisediment.** A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.
- Pedologic.** Of or pertaining to the processes of soil formation.
- Pedon.** The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.
- Percolation.** The 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” and in this glossary. Terms describing permeability, measured in inches per hour, are as follows:
- | | |
|------------------------|------------------------|
| Impermeable..... | less than 0.0015 inch |
| Very slow | 0.0015 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 |
- See “Saturated hydraulic conductivity” for conversions of inches per hour to micrometers per second.
- pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)
- Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.
- Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.
- Pitting** (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.
- Plant association.** A kind of climax plant community consisting of stands with essentially the same dominant species in corresponding layers.
- Plant community.** An assemblage of plants living together, reflecting no particular ecological status; a vegetative complex unique in its combination of plants.
- Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.
- Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.
- Pleistocene.** The epoch of geologic time from approximately 10,000 to 2 million years ago. The earlier of the two epochs comprising the Quaternary period. Also called the Glacial epoch.
- Pluton.** A deep-seated igneous intrusive rock.
- 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.
- Pore linings.** See Redoximorphic features.

Potential native plant community. See Climax plant community.

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.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartz diorite. A coarse-grained igneous rock consisting mainly of plagioclase with smaller amounts of quartz, hornblende, and biotite. (See Granodiorite.)

Quartz latite. A fine-grained volcanic rock consisting mainly of quartz, plagioclase, and orthoclase with minor amounts of biotite and hornblende. Phenocrysts are common. This rock is the extrusive equivalent of quartz monzonite.

Quartz monzonite. A coarse-grained igneous rock consisting mainly of plagioclase, orthoclase, and quartz with minor amounts of biotite and hornblende. (See Granite and Granodiorite.)

Quartzite. A nonfoliated metamorphic rock consisting mainly of quartz sand cemented with quartz.

Quaternary. The period of the Cenozoic era of geologic time, extending from the end of the Tertiary (about 2 million years ago) to the present and comprising two epochs, the Pleistocene (Ice Age) and the Holocene (Recent).

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 as 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. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions

may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
 - A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
 - B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
 - C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chroma less than that of the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
 - A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
 - B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletalans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Restrictive feature. A nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly reduce the movement of water and/or air through the soil or that otherwise provide an unfavorable root environment.

Rhyodacite. A fine-grained volcanic rock consisting mainly of quartz and feldspar, with more plagioclase than orthoclase. Phenocrysts are common. Ryodacite is the extrusive equivalent of granodiorite.

Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riparian. Refers to areas adjacent to water or wetlands; vegetation is dependent on water or use and management directly impacts the water or wetlands.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments that are 2 millimeters in diameter or more (i.e., gravel, cobbles, stones, and boulders). Rock fragments have a strongly cemented or stronger rupture-resistance class.

Rock outcrop. Exposures of bare bedrock.

Rubble land. Areas that consist of cobbles, stones, and boulders, commonly at the base of mountains.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil that has soluble salts in an amount that impairs growth of plants. A saline soil does not have excess exchangeable sodium.

Salinity. The electrical conductivity of a saturation extract method is the standard measure of salinity. Electrical conductivity is related to the amount of salts in the soil that are more soluble than gypsum, but it may include a small contribution (as much as 2 decisiemens per meter [dS/m]) from dissolved gypsum. The standard international unit of measure is dS/m corrected to a temperature of 25 degrees C. Millimhos per centimeter (mmhos/cm) means the same as dS/m and may be used in some instances. If it has been measured, electrical conductivity is given in soil descriptions. The following salinity classes, expressed as decisiemens per meter or millimhos per centimeter, are used if electrical conductivity has not been determined, but salinity is inferred.

Nonsaline (class 0)	0 to 2
Very slightly saline (class 1).....	2 to 4
Slightly saline (class 2)	4 to 8
Moderately saline (class 3).....	8 to 16
Strongly saline (class 4).....	more than 16

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.

Sandy. A particle-size class in which the texture of the fine-earth fraction is sand or loamy sand but not loamy very fine sand or very fine sand; it is less than 35 percent rock fragments by volume.

Sandy-skeletal. A particle-size class that is 35 percent or more by volume rock fragments 2 millimeters in diameter or larger. The fine-earth fraction is sandy.

Saturated hydraulic conductivity (Ksat). The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are *very high*, 100 or more micrometers per second (14.17 or more inches per hour); *high*, 10 to 100 micrometers per second (1.417 to 14.17 inches per hour); *moderately high*, 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour); *moderately low*, 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour); *low*, 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour); and *very low*, less than 0.01 micrometer per second (less than 0.001417 inch per hour). To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

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.

- Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.
- Schist.** A medium- to coarse-grained foliated metamorphic rock in which the platy minerals are clearly visible. Micaceous minerals commonly are present.
- Secondary carbonates and silica.** Calcium carbonate and silica weathered from the soil matrix in upper soil horizons and then transported and deposited in the lower horizons by water moving through the soil profile.
- Sedimentary rock.** A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.
- Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)
- Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.
- Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.
- Shoulder.** The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.
- Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.
- Side slope** (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.
- Silica.** A combination of silicon and oxygen. The mineral form is called quartz.
- Silica-sesquioxide ratio.** The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.
- 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** (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.
- 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 |
| Moderately sloping..... | 3 to 12 percent |
| Moderately steep | 12 to 20 percent |
| Steep | 20 to 45 percent |
| Very steep..... | 45 percent and higher |
- Slope alluvium.** Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes)

and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded gravel or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill (in tables). The slow filling of ponds, resulting from restricted water transmission in the soil.

Slow water movement (in tables). Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

Slump. A mass movement process characterized by a landslide involving shearing and rotary movement of a generally independent mass of rock or earth along a curved slip surface. The mass (slump) has its axis parallel to the slope from which it descends. A slump surface commonly exhibits a reversed slope facing uphill.

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 $\text{Ca}^{++} + \text{Mg}^{++}$. 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 and by the passage 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.

Stone line. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

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.

Stoniness (or boulderiness). The relative proportion of larger rock fragments on the surface layer. Used as map unit phase designation for soils containing sufficient amounts of stones and boulders to impose important restrictions on use and management. These phases should not be confused with the use of fragments as textural modifiers. The four phases recognized in this survey are:

Stony (or bouldery).—The areas have enough stones and boulders at or near the surface to be a continuing nuisance during operations that mix the surface layer, but they do not make most such operations impractical. Conventional, wheeled vehicles can move with reasonable freedom over the area. Rocks may damage both the equipment that mixes the soil and the vehicles that move on the surface. Large rock fragments cover about 0.01 to 0.1 percent of the surface.

Very stony (or very bouldery).—The areas have so many stones and boulders at or near the surface that operations that mix the surface layer either require heavy equipment or use of implements that can operate between the larger ones. Tillage with conventionally powered farm equipment is impractical. Wheeled tractors and vehicles with high clearance can operate on carefully chosen routes over and around stones and boulders. Large rock fragments cover about 0.1 to 3 percent of the surface.

Extremely stony (or extremely bouldery).—The areas have so many stones and boulders at or near the surface that wheeled powered equipment, other than some special types, can operate only along selected routes. Tracked vehicles can be used in most places, although some routes have to be cleared. Large rock fragments cover about 3 to 15 percent of the surface.

Rubbly and very rubbly.—The areas have so many stones and boulders at or near the surface that tracked vehicles cannot be used in most places. Large rock fragments cover about 15 to 90 percent of the surface.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

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; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial 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.

Talus. Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

- Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts 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.
- Tectonic.** Pertaining to the forces involved in, or the resulting structures of, deformation of the earth's crust.
- Terrace.** (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.
- Terracettes.** Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.
- Terrane.** A group of related rocks and the area in which they are exposed at the earth's surface.
- Tertiary.** The period of geologic time from approximately 2 to 63 million years ago (radiometric dates). The earlier of the two geologic periods comprising the Cenozoic era.
- Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."
- Thin layer** (in tables). Otherwise suitable soil material that is too thin for the specified use.
- Thrust fault.** A fault with a dip of 45 degrees or less on which the hanging wall appears to have moved upward relative to the footwall.
- Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.
- Toeslope.** 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.
- Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.
- Tread.** The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.
- Udic.** A soil moisture regime common to a climate that has moisture throughout the year. The soil moisture control section is dry for less than 45 consecutive days during the 4 months following the summer solstice.
- Umbric epipedon.** A thick, dark-colored, humus-rich surface horizon that has low base saturation and pedogenic soil structure. It may include the upper part of the subsoil.
- Understory.** Plants in a forest community that grow to a height of 4.5 feet or less.
- Upland.** An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered 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 oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Xeric. A soil moisture regime common to a climate having moist winters and dry summers. The soils are dry in the moisture control section for more than 45 consecutive days during the 4 months following the summer solstice and are moist for more than 45 consecutive days during the 4 months following the winter solstice.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971 to 2000 at Oakley, Idaho [ID6542])

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
				°F	°F			In	In		
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	38.0	20.0	29.0	57	-8	10	0.81	0.32	1.22	2	7.4
February	43.8	23.9	33.9	64	-4	30	0.63	0.29	0.91	2	4.6
March	51.3	28.9	40.1	71	10	91	1.09	0.45	1.60	3	3.2
April	59.1	33.6	46.3	81	18	215	1.11	0.41	1.74	3	1.4
May	67.0	40.6	53.8	86	25	430	1.65	0.76	2.53	4	0.8
June	76.4	47.9	62.1	94	32	664	1.19	0.38	2.01	3	0.0
July	83.7	54.3	69.0	97	40	900	0.78	0.23	1.31	2	0.0
August	83.9	53.8	68.8	96	38	892	0.73	0.15	1.24	2	0.0
September	74.8	45.1	59.9	91	27	598	0.96	0.16	1.72	2	0.1
October	63.4	36.3	49.9	83	18	320	0.80	0.25	1.34	2	0.1
November	47.2	27.4	37.3	69	4	70	0.79	0.31	1.22	2	4.0
December	38.8	20.3	29.5	58	-7	11	0.70	0.13	1.19	2	5.6
Yearly:											
Average	60.6	36.0	48.3	---	---	---	---	---	---	---	---
Extreme	101.0	-24.0	---	98	-14	---	---	---	---	---	---
Total	---	---	---	---	---	4,231	11.25	8.91	13.36	29	27.1

Average number of days per year with at least 1 inch of snow on the ground: 17

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 40 degrees F).

Soil Survey of City of Rocks National Reserve, Idaho

Table 2.---Freeze Dates in Spring and Fall

(Recorded in the period 1971 to 2000 at Oakley, Idaho [ID6542])

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than-----	May 9	May 19	June 12
2 years in 10 later than----	April 30	May 12	June 6
5 years in 10 later than----	April 13	May 1	May 24
First freezing temperature in fall:			
1 year in 10 earlier than---	October 6	September 23	September 10
2 years in 10 earlier than--	October 12	September 29	September 16
5 years in 10 earlier than--	October 23	October 9	September 26

Table 3.---Growing Season

(Recorded in the period 1971 to 2000 at Oakley, Idaho [ID6542])

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	<i>Days</i>	<i>Days</i>	<i>Days</i>
9 years in 10	157	135	100
8 years in 10	169	143	109
5 years in 10	192	160	125
2 years in 10	215	177	141
1 year in 10	227	186	150

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Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
6	Arbone loam, 4 to 12 percent slopes-----	1,515	10.5
19	Birchcreek extremely stony loam, 20 to 55 percent slopes-----	55	0.4
21	Birchcreek-Itca complex, 25 to 55 percent slopes-----	962	6.7
26	Chayson gravelly silt loam, 2 to 10 percent slopes-----	165	1.1
32	Conneridge very gravelly loam, 20 to 50 percent slopes, extremely stony--	15	0.1
36	Cumulic Endoaquolls, 0 to 4 percent slopes-----	56	0.4
78	Hymas-Bezzant association, 10 to 30 percent slopes-----	30	0.2
84	Itca-Birchcreek-Rock outcrop complex, 25 to 55 percent slopes-----	1,908	13.2
86	Jimsage-Doodlelink complex, 40 to 60 percent slopes-----	189	1.3
89	Kanlee sandy loam, 4 to 12 percent slopes-----	510	3.5
101	Ola sandy loam, 6 to 20 percent slopes-----	737	5.1
102	Pachic Haplocryolls, 15 to 45 percent slopes-----	346	2.4
107	Poisonhol loam, 8 to 15 percent slopes, extremely stony-----	91	0.6
108	Povey very stony loam, 35 to 55 percent slopes-----	205	1.4
109	Povey-Middlehill complex, 20 to 55 percent slopes-----	9	*
111	Raftriver loam, 2 to 4 percent slopes-----	180	1.2
116	Riceton loamy coarse sand, 4 to 12 percent slopes-----	1,404	9.7
123	Kanlee-Rock outcrop-Earcree complex, 3 to 30 percent slopes-----	703	4.9
124	Ola-Rock outcrop-Earcree complex, 35 to 55 percent slopes-----	3,421	23.7
166	Chokecherry very channery sandy loam, 4 to 35 percent slopes-----	162	1.1
167	Povey-Nurkey complex 15 to 55 percent slopes-----	667	4.6
168	Kanlee sandy loam, 12 to 25 percent slopes-----	71	0.5
169	Povey-Ola complex, 35 to 60 percent slopes-----	228	1.6
170	Howcan-Searla complex, 4 to 12 percent slopes-----	64	0.4
171	Howcan-Searla complex, 12 to 55 percent slopes-----	714	5.0
	Total-----	14,407	100.0

* Less than 0.1 percent.

Soil Survey of City of Rocks National Reserve, Idaho

Table 5.--Land Capability Classification

(Land capability is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deteriorating over a long period of time.)

Map symbol and soil name	Land capability (nonirrigated)
6: Arbone-----	3e
19: Birchcreek, thin surface-----	7e
21: Birchcreek, moist-----	7e
Itca-----	7e
26: Chayson-----	4e
32: Conneridge, extremely stony surface-----	7e
36: Cumulic Endoaquolls-----	3w
78: Hymas-----	6e
Bezzant-----	4e
84: Itca-----	7e
Birchcreek, moist-----	7e
Rock outcrop-----	8
86: Jimsage-----	7e
Doodlelink-----	7e
89: Kanlee-----	4e
101: Ola-----	4e
102: Pachic Haplocryolls-----	7e
107: Poisonhol, extremely stony surface-----	6e
108: Povey-----	7e

Soil Survey of City of Rocks National Reserve, Idaho

Table 5.--Land Capability Classification--Continued

Map symbol and soil name	Land capability (nonirrigated)
109:	
Povey-----	7e
Middlehill-----	7e
111:	
Raftriver-----	5s
116:	
Riceton-----	3e
123:	
Kanlee-----	4e
Rock outcrop-----	8
Earcree-----	5e
124:	
Ola, cool-----	7e
Rock outcrop-----	8
Earcree-----	7e
166:	
Chokecherry-----	7e
167:	
Povey-----	7e
Nurkey-----	7e
168:	
Kanlee-----	4e
169:	
Povey-----	7e
Ola, cool-----	7e
170:	
Howcan-----	4e
Searla-----	4e
171:	
Howcan-----	7e
Searla-----	7e

Soil Survey of City of Rocks National Reserve, Idaho

Table 6.---Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Soil name
26	Chayson gravelly silt loam, 2 to 10 percent slopes (if irrigated)
36	Cumulic Endoaquolls, 0 to 4 percent slopes (if irrigated and drained)
89	Kanlee sandy loam, 4 to 12 percent slopes (if irrigated)
116	Riceton loamy coarse sand, 4 to 12 percent slopes (if irrigated)

Soil Survey of City of Rocks National Reserve, Idaho

Table 7.--Ecological Site-Soil Correlation

(Only the major soil components are given in this table; therefore, the percentages do not equal 100 percent. Miscellaneous areas components such as Rock outcrop are not assigned an ecological site and thus are not shown in the table.)

Map symbol and soil name (percentage of map unit)	Ecological site name	Ecological site type	Ecological site identi- fication number
6: Arbone (85 percent)-----	LOAMY 12-16 ARTRV/PSSPS-FEID	Rangeland	R013XY001ID
19: Birchcreek, thin surface (80 percent)-----	SHALLOW STONY 12-20 ARAR8/PSSPS	Rangeland	R013XY014ID
21: Birchcreek, moist (45 percent)----	LOAMY 13-16 ARTRV/PSSPS-FEID	Rangeland	R025XY011ID
Itca (30 percent)-----	Upland Stony Loam (Pinyon-Utah Juniper)	Rangeland	R028AY338UT
26: Chayson (90 percent)-----	LOAMY 13-16 ARTRV/PSSPS-FEID	Rangeland	R025XY011ID
32: Conneridge, extremely stony surface (85 percent)-----	SHALLOW STONY 12-20 ARAR8/PSSPS	Rangeland	R013XY014ID
36: Cumulic Endoaquolls (85 percent)-----	DRY MEADOW PONE3-PHAL2	Rangeland	R025XY039ID
78: Hymas (45 percent)-----	SHALLOW STONY 12-20 ARAR8/PSSPS	Rangeland	R013XY014ID
Bezzant (40 percent)-----	STONY LOAM 13-16 ARTRV/PSSPS	Rangeland	R013XY002ID
84: Itca (35 percent)-----	Upland Stony Loam (Pinyon-Utah Juniper)	Rangeland	R028AY338UT
Birchcreek, moist (25 percent)----	LOAMY 13-16 ARTRV/PSSPS-FEID	Rangeland	R025XY011ID
86: Jimsage (50 percent)-----	SHALLOW STONY 12-20 ARAR8/PSSPS	Rangeland	R013XY014ID
Doodlelink (30 percent)-----	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS	Rangeland	R013XY004ID
89: Kanlee (75 percent)-----	LOAMY 13-16 ARTRV/PSSPS-FEID	Rangeland	R025XY011ID
101: Ola (90 percent)-----	LOAMY 16+ ARTRV/FEID	Rangeland	R025XY022ID
102: Pachic Haplocryolls (90 percent)-----	ASPEN THICKET 16-22 POTR5	Rangeland	R025XY001ID
107: Poisonhol, extremely stony surface (90 percent)-----	STONY LOAM 13-16 ARTRV/PSSPS	Rangeland	R013XY002ID

Soil Survey of City of Rocks National Reserve, Idaho

Table 7.--Ecological Site-Soil Correlation--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name	Ecological site type	Ecological site identi- fication number
108: Povey (75 percent)-----	STEEP SOUTH 16-22 ARTRV/PSSPS	Rangeland	R013XY003ID
109: Povey (50 percent)-----	STEEP SOUTH 16-22 ARTRV/PSSPS	Rangeland	R013XY003ID
Middlehill (30 percent)-----	WINDSWEPT RIDGE 12-20 ARNO4/PSSPS	Rangeland	R013XY011ID
111: Raftriver (85 percent)-----	LOAMY 12-16 ARTRW8/PSSPS	Rangeland	R025XY003ID
116: Riceton (85 percent)-----	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS	Rangeland	R013XY004ID
123: Kanlee (35 percent)-----	LOAMY 13-16 ARTRV/PSSPS-FEID	Rangeland	R025XY011ID
Earcree (25 percent)-----	MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA	Rangeland	R025XY018ID
124: Ola, cool (35 percent)-----	LOAMY 16+ ARTRV/FEID	Rangeland	R025XY022ID
Earcree (25 percent)-----	MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA	Rangeland	R025XY018ID
166: Chokecherry (80 percent)-----	WINDSWEPT RIDGE 12-22 ARFR4-ARAR8/POA	Rangeland	R013XY046ID
167: Povey (40 percent)-----	STEEP SOUTH 16-22 ARTRV/PSSPS	Rangeland	R013XY003ID
Nurkey (30 percent)-----	LOAMY 13-16 ARTRV/PSSPS-FEID	Rangeland	R025XY011ID
168: Kanlee (80 percent)-----	LOAMY 13-16 ARTRV/PSSPS-FEID	Rangeland	R025XY011ID
169: Povey (60 percent)-----	STEEP SOUTH 16-22 ARTRV/PSSPS	Rangeland	R013XY003ID
Ola, cool (20 percent)-----	LOAMY 16+ ARTRV/FEID	Rangeland	R025XY022ID
170: Howcan (35 percent)-----	STONY LOAM 16-22 ARTRV/PSSPS	Rangeland	R013XY019ID
Searla (30 percent)-----	SHALLOW STONY 12-20 ARAR8/PSSPS	Rangeland	R013XY014ID
171: Howcan (40 percent)-----	STONY LOAM 16-22 ARTRV/PSSPS	Rangeland	R013XY019ID
Searla (25 percent)-----	SHALLOW STONY 12-20 ARAR8/PSSPS	Rangeland	R013XY014ID

Table 8.--Setting, Parent Material, and Ecological Site

(Miscellaneous areas components are not given in this table. Only the major soil components are given; therefore, the percentages do not equal 100 percent.)

Map symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landform	Parent material	Ecological site name and identification number
	Pct	Pct	Ft	In			
6: Arbone-----	85	4-12	5,800-6,330	14-18	Fan remnants	Mixed alluvium with some loess influence	LOAMY 12-16 ARTRV/PSSPS-FEID (R013XY001ID)
19: Birchcreek, thin surface-----	80	20-55	6,220-7,250	16-20	Mountain slopes	Mixed alluvium and colluvium over mica schist and quartzite	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)
21: Birchcreek, moist--	45	25-55	5,600-7,560	14-18	Mountain slopes	Mixed alluvium and colluvium over mica schist and quartzite	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)
Itca-----	30	25-55	5,600-7,560	14-18	Mountain slopes	Mixed alluvium and colluvium over quartzite and mica schist	Upland Stony Loam (Pinyon-Utah Juniper) (R028AY338UT)
26: Chayson-----	90	2-10	5,780-6,260	14-16	Fan remnants	Mixed alluvium with some loess influence	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)
32: Conneridge, extremely stony surface-----	85	20-50	6,220-7,370	18-20	Mountain slopes	Mixed alluvium and colluvium over mica schist and quartzite	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)
36: Cumulic Endoaquolls	85	0-4	5,800-5,910	14-16	Flood plains and stream terraces	Mixed alluvium	DRY MEADOW PONE3-PHAL2 (R025XY039ID)

Table 8.--Setting, Parent Material, and Ecological Site--Continued

Map symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landform	Parent material	Ecological site name and identification number
	<i>Pct</i>	<i>Pct</i>	<i>Ft</i>	<i>In</i>			
78: Hymas-----	45	10-30	5,880-6,400	14-18	Hillslopes	Mixed alluvium and colluvium over limestone	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)
Bezzant-----	40	10-20	5,880-6,400	14-18	Hillslopes	Mixed alluvium	STONY LOAM 13-16 ARTRV/PSSPS (R013XY002ID)
84: Itca-----	35	25-35	5,500-7,500	12-18	Mountain slopes	Mixed alluvium and colluvium over quartzite and mica schist	Upland Stony Loam (Pinyon-Utah Juniper) (R028AY338UT)
Birchcreek, moist--	25	25-55	5,500-7,500	12-18	Mountain slopes	Mixed alluvium and colluvium over mica schist and quartzite	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)
86: Jimsage-----	50	40-60	6,340-7,060	14-18	Mountain slopes	Loess-influenced colluvium derived from quartz- monzonite	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)
Doodlelink-----	30	40-60	6,340-7,060	14-18	Mountain slopes	Loess-influenced colluvium derived from quartz- monzonite	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)
89: Kanlee-----	75	4-12	5,610-7,140	14-20	Pediments	Mixed alluvium and colluvium over quartz-monzonite and granodiorite	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)
101: Ola-----	90	6-20	6,060-6,710	14-16	Hillslopes	Mixed alluvium and colluvium over granodiorite	LOAMY 16+ ARTRV/FEID (R025XY022ID)
102: Pachic Haplocryolls	90	15-45	6,470-8,810	16-28	Mountain slopes	Mixed alluvium and colluvium	ASPEN THICKET 16-22 POTR5 (R025XY001ID)

Table 8.--Setting, Parent Material, and Ecological Site--Continued

Map symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landform	Parent material	Ecological site name and identification number
	<i>Pct</i>	<i>Pct</i>	<i>Ft</i>	<i>In</i>			
107: Poisonhol, extremely stony surface-----	90	8-15	5,590-6,130	14-16	Hillslopes	Mixed alluvium with some loess influence	STONY LOAM 13-16 ARTRV/PSSPS (R013XY002ID)
108: Povey-----	75	35-55	6,780-7,350	16-18	Mountain slopes	Mixed alluvium and colluvium over igneous and metamorphic rock	STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)
109: Povey-----	50	20-55	7,060-7,270	16-18	Mountain slopes	Mixed alluvium and colluvium over igneous and metamorphic rock	STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)
Middlehill-----	30	20-55	7,060-7,270	16-18	Mountain slopes	Mixed alluvium and colluvium over mica schist and quartzite	WINDSWEPT RIDGE 12-20 ARNO4/PSSPS (R013XY011ID)
111: Raftriver-----	85	2-4	5,920-6,170	14-16	Fan remnants	Mixed alluvium with some loess influence	LOAMY 12-16 ARTRW8/PSSPS (R025XY003ID)
116: Riceton-----	85	4-12	5,720-6,600	14-16	Fan remnants	Mixed alluvium derived from igneous rock and granodiorite	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)
123: Kanlee-----	35	3-30	5,980-7,040	14-16	Mountain slopes	Mixed alluvium and colluvium over quartz-monzonite and granodiorite	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)
Earcree-----	25	3-30	5,980-7,040	14-16	Mountain slopes	Mixed alluvium and colluvium derived from metamorphic rock, quartz- diorite, and granodiorite	MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA (R025XY018ID)

Table 8.--Setting, Parent Material, and Ecological Site--Continued

Map symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landform	Parent material	Ecological site name and identification number
	<i>Pct</i>	<i>Pct</i>	<i>Ft</i>	<i>In</i>			
124: Ola, cool-----	35	35-55	5,770-8,460	14-28	Mountain slopes	Mixed alluvium and colluvium over granodiorite and metamorphic rock	LOAMY 16+ ARTRV/FEID (R025XY022ID)
Earcree-----	25	35-55	5,770-8,460	14-28	Mountain slopes	Mixed alluvium and colluvium derived metamorphic rock, quartz-diorite, and granodiorite	MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA (R025XY018ID)
166: Chokecherry-----	80	4-35	7,080-8,800	18-28	Mountain slopes	Mixed alluvium and colluvium over mica schist	WINDSWEPT RIDGE 12-22 ARFR4-ARAR8/POA (R013XY046ID)
167: Povey-----	40	15-55	6,570-8,550	16-18	Mountain slopes	Mixed alluvium and colluvium over igneous and metamorphic rock	STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)
Nurkey-----	30	15-55	6,570-8,550	16-18	Mountain slopes	Colluvium derived from calcareous conglomerate	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)
168: Kanlee-----	80	12-25	6,740-7,360	18-20	Pediments	Mixed alluvium and colluvium over quartz-monzonite and granodiorite	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)
169: Povey-----	60	35-60	7,060-8,820	20-28	Mountain slopes	Mixed alluvium and colluvium over igneous and metamorphic rock	STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)
Ola, cool-----	20	35-60	7,060-8,820	20-28	Mountain slopes	Mixed alluvium and colluvium over granodiorite and metamorphic rock	LOAMY 16+ ARTRV/FEID (R025XY022ID)

Table 8.--Setting, Parent Material, and Ecological Site--Continued

Map symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipi- tation	Landform	Parent material	Ecological site name and identification number
	<i>Pct</i>	<i>Pct</i>	<i>Ft</i>	<i>In</i>			
170: Howcan-----	35	4-12	6,930-7,290	18-28	Mountain slopes	Mixed alluvium and colluvium derived from igneous rock	STONY LOAM 16-22 ARTRV/PSSPS (R013XY019ID)
Searla-----	30	4-12	6,930-7,290	18-28	Mountain slopes	Mixed alluvium and colluvium derived from igneous rock	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)
171: Howcan-----	40	12-55	6,590-7,760	18-28	Mountain slopes	Mixed alluvium and colluvium derived from igneous rock	STONY LOAM 16-22 ARTRV/PSSPS (R013XY019ID)
Searla-----	25	12-55	6,590-7,760	18-28	Mountain slopes	Mixed alluvium and colluvium derived from igneous rock	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)

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Table 9.--Ecological Sites and Characteristic Plant Communities

(Range site composition is based on percent dry weight. Characteristic plants were taken from the "component existing plants" table in the National Soils Information System (NASIS). Miscellaneous areas components such as Rock outcrop are not assigned an ecological site and thus are not given in the table.)

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			<i>Lb/ac</i>		<i>Pct</i>
6: Arbone (85 percent)---	LOAMY 12-16 ARTRV/PSSPS-FEID (R013XY001ID)	Favorable Normal Unfavorable	1,800 1,200 800	Bluebunch wheatgrass Other perennial grasses Mountain big sagebrush Antelope bitterbrush Arrowleaf balsamroot Letterman's needlegrass Lupine Nevada bluegrass Other shrubs Other perennial forbs Prairie Junegrass	30 20 10 5 5 5 5 5 5 5 5
19: Birchcreek, thin surface (80 percent)---	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)	Favorable Normal Unfavorable	1,000 550 300	Bluebunch wheatgrass Other perennial grasses Low sagebrush Nevada bluegrass Other shrubs Arrowleaf balsamroot Other perennial forbs Sandberg bluegrass	35 15 10 10 10 5 5 5
21: Birchcreek, moist (45 percent)---	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)	Favorable Normal Unfavorable	1,400 1,100 800	Mountain big sagebrush Antelope bitterbrush Bluebunch wheatgrass Idaho fescue Other perennial grasses Sandberg bluegrass Arrowleaf balsamroot Other shrubs Other perennial forbs	20 15 15 15 10 10 5 5 5
Itca (30 percent)---	Upland Stony Loam (Pinyon-Utah Juniper) (R028AY338UT)	Favorable Normal Unfavorable	850 550 250	Idaho fescue Mountain big sagebrush Singleleaf pinyon Bluebunch wheatgrass Utah juniper Arrowleaf balsamroot Other shrubs Other perennial forbs Other perennial grasses Sandberg bluegrass	20 20 15 10 10 5 5 5 5 5

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Table 9.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			Lb/ac		Pct
26: Chayson (90 percent)---	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)	Favorable Normal Unfavorable	1,400 1,100 800	Mountain big sagebrush Antelope bitterbrush Bluebunch wheatgrass Idaho fescue Other perennial grasses Sandberg bluegrass Arrowleaf balsamroot Other shrubs Other perennial forbs	20 15 15 15 10 10 5 5 5
32: Conneridge, extremely stony surface (85 percent)---	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)	Favorable Normal Unfavorable	1,000 550 300	Bluebunch wheatgrass Other perennial grasses Low sagebrush Nevada bluegrass Other shrubs Arrowleaf balsamroot Other perennial forbs Sandberg bluegrass	35 15 10 10 10 5 5 5
36: Cumulic Endoaquolls (85 percent)---	DRY MEADOW PONE3-PHAL2 (R025XY039ID)	Favorable Normal Unfavorable	4,000 2,200 1,600	Sedge Slender wheatgrass Tufted hairgrass Basin wildrye Bluegrass Mountain brome Other shrubs Other perennial forbs Other perennial grasses Rush Shrubby cinquefoil	25 15 15 10 5 5 5 5 5 5 5
78: Hymas (45 percent)---	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)	Favorable Normal Unfavorable	1,000 550 300	Bluebunch wheatgrass Other perennial grasses Low sagebrush Nevada bluegrass Other shrubs Arrowleaf balsamroot Other perennial forbs Sandberg bluegrass	35 15 10 10 10 5 5 5
Bezzant (40 percent)---	STONY LOAM 13-16 ARTRV/PSSPS (R013XY002ID)	Favorable Normal Unfavorable	1,500 1,100 700	Bluebunch wheatgrass Idaho fescue Mountain big sagebrush Other perennial grasses Antelope bitterbrush Arrowleaf balsamroot Other shrubs Other perennial forbs	35 10 10 10 5 5 5 5

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Table 9.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			<i>Lb/ac</i>		<i>Pct</i>
84: Itca (35 percent)---	Upland Stony Loam (Pinyon-Utah Juniper) (R028AY338UT)	Favorable Normal Unfavorable	850 550 250	Idaho fescue Mountain big sagebrush Singleleaf pinyon Bluebunch wheatgrass Utah juniper Arrowleaf balsamroot Other shrubs Other perennial forbs Other perennial grasses Sandberg bluegrass	20 20 15 10 10 5 5 5 5 5
Birchcreek, moist (25 percent)---	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)	Favorable Normal Unfavorable	1,400 1,100 800	Mountain big sagebrush Antelope bitterbrush Bluebunch wheatgrass Idaho fescue Other perennial grasses Sandberg bluegrass Arrowleaf balsamroot Other shrubs Other perennial forbs	20 15 15 15 10 10 5 5 5
86: Jimsage (50 percent)---	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)	Favorable Normal Unfavorable	1,000 550 300	Bluebunch wheatgrass Other perennial grasses Low sagebrush Nevada bluegrass Other shrubs Arrowleaf balsamroot Other perennial forbs Sandberg bluegrass	35 15 10 10 10 5 5 5
Doodlelink (30 percent)---	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)	Favorable Normal Unfavorable	1,100 800 500	Bluebunch wheatgrass Mountain big sagebrush Western wheatgrass Antelope bitterbrush Arrowleaf balsamroot Idaho fescue Other shrubs Other perennial forbs Other perennial grasses Prairie Junegrass	40 15 10 5 5 5 5 5 5 5
89: Kanlee (75 percent)---	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)	Favorable Normal Unfavorable	1,400 1,100 800	Mountain big sagebrush Antelope bitterbrush Bluebunch wheatgrass Idaho fescue Other perennial grasses Sandberg bluegrass Arrowleaf balsamroot Other shrubs Other perennial forbs	20 15 15 15 10 10 5 5 5

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Table 9.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			<i>Lb/ac</i>		<i>Pct</i>
101: Ola (90 percent)---	LOAMY 16+ ARTRV/FEID (R025XY022ID)	Favorable	1,800	Idaho fescue	35
		Normal	1,200	Mountain big sagebrush	15
		Unfavorable	800	Other perennial grasses	15
				Bluebunch wheatgrass	10
				Arrowleaf balsamroot	5
				Longleaf hawksbeard	5
				Other shrubs	5
				Other perennial forbs	5
				Sandberg bluegrass	5
102: Pachic Haplocryolls (90 percent)---	ASPEN THICKET 16-22 POTR5 (R025XY001ID)	Favorable	1,100	Pinegrass	25
		Normal	800	Columbia needlegrass	10
		Unfavorable	500	Mountain brome	10
				Slender wheatgrass	10
				Cinquefoil	5
				Geranium	5
				Groundsel	5
				Other shrubs	5
				Other perennial forbs	5
				Other perennial grasses	5
				Quaking aspen	5
				Sedge	5
				Western needlegrass	5
107: Poisonhol, extremely stony surface (90 percent)---	STONY LOAM 13-16 ARTRV/PSSPS (R013XY002ID)	Favorable	1,500	Bluebunch wheatgrass	35
		Normal	1,100	Idaho fescue	10
		Unfavorable	700	Mountain big sagebrush	10
				Other perennial grasses	10
				Antelope bitterbrush	5
				Arrowleaf balsamroot	5
				Other shrubs	5
				Other perennial forbs	5
108: Povey (75 percent)---	STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)	Favorable	1,600	Bluebunch wheatgrass	20
		Normal	1,300	Mountain big sagebrush	20
		Unfavorable	1,100	Idaho fescue	10
				Antelope bitterbrush	5
				Arrowleaf balsamroot	5
				Longleaf hawksbeard	5
				Lupine	5
				Nevada bluegrass	5
				Other shrubs	5
				Other perennial forbs	5
				Other perennial grasses	5
				Prairie Junegrass	5
				Snowberry	5

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Table 9.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			<i>Lb/ac</i>		<i>Pct</i>
109: Povey (50 percent)---	STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)	Favorable Normal Unfavorable	1,600 1,300 1,100	Bluebunch wheatgrass Mountain big sagebrush Idaho fescue Antelope bitterbrush Arrowleaf balsamroot Longleaf hawksbeard Lupine Nevada bluegrass Other shrubs Other perennial forbs Other perennial grasses Prairie Junegrass Snowberry	20 20 10 5 5 5 5 5 5 5 5 5 5
Middlehill (30 percent)---	WINDSWEPT RIDGE 12-20 ARNO4/PSSPS (R013XY011ID)	Favorable Normal Unfavorable	600 350 200	Sagebrush Bluebunch wheatgrass Hood's phlox Other shrubs Other perennial forbs Other perennial grasses Sandberg bluegrass Stemless goldenweed	35 30 10 5 5 5 5 5
111: Raftriver (85 percent)---	LOAMY 12-16 ARTRW8/PSSPS (R025XY003ID)	Favorable Normal Unfavorable	1,200 950 600	Bluebunch wheatgrass Wyoming big sagebrush Arrowleaf balsamroot Green rabbitbrush Idaho fescue Lupine Nevada bluegrass Other shrubs Other perennial forbs Other perennial grasses Thurber needlegrass	35 15 5 5 5 5 5 5 5 5 5
116: Riceton (85 percent)---	SHALLOW GRAVELLY 12-16 ARTRV/PSSPS (R013XY004ID)	Favorable Normal Unfavorable	1,100 800 500	Bluebunch wheatgrass Mountain big sagebrush Western wheatgrass Antelope bitterbrush Arrowleaf balsamroot Idaho fescue Other shrubs Other perennial forbs Other perennial grasses Prairie Junegrass	40 15 10 5 5 5 5 5 5 5

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Table 9.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			<i>Lb/ac</i>		<i>Pct</i>
123: Kanlee (35 percent)---	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)	Favorable Normal Unfavorable	1,400 1,100 800	Mountain big sagebrush Antelope bitterbrush Bluebunch wheatgrass Idaho fescue Other perennial grasses Sandberg bluegrass Arrowleaf balsamroot Other shrubs Other perennial forbs	20 15 15 15 10 10 5 5 5
Earcree (25 percent)---	MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA (R025XY018ID)	Favorable Normal Unfavorable	1,300 900 600	Idaho fescue Bluebunch wheatgrass Mountain snowberry Mountain big sagebrush Antelope bitterbrush Arrowleaf balsamroot Lupine Other shrubs Other perennial forbs Other perennial grasses	25 15 15 10 5 5 5 5 5 5
124: Ola, cool (35 percent)---	LOAMY 16+ ARTRV/FEID (R025XY022ID)	Favorable Normal Unfavorable	1,800 1,200 800	Idaho fescue Mountain big sagebrush Other perennial grasses Bluebunch wheatgrass Arrowleaf balsamroot Longleaf hawksbeard Other shrubs Other perennial forbs Sandberg bluegrass	35 15 15 10 5 5 5 5 5
Earcree (25 percent)---	MAHOGANY SAVANNA 16-22 CELE3-SYOR2/FEID-ACHNA (R025XY018ID)	Favorable Normal Unfavorable	1,300 900 600	Idaho fescue Bluebunch wheatgrass Mountain snowberry Mountain big sagebrush Antelope bitterbrush Arrowleaf balsamroot Lupine Other shrubs Other perennial forbs Other perennial grasses	25 15 15 10 5 5 5 5 5 5
166: Chokecherry (80 percent)---	WINDSWEPT RIDGE 12-22 ARFR4-ARAR8/POA (R013XY046ID)	Favorable Normal Unfavorable	400 275 50	Sandberg bluegrass Bluebunch wheatgrass Hood's phlox Low sagebrush Goldenrod Mountain big sagebrush	25 20 20 5 3 3

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Table 9.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			<i>Lb/ac</i>		<i>Pct</i>
167: Povey (40 percent)---	STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)	Favorable Normal Unfavorable	1,600 1,300 1,100	Bluebunch wheatgrass Mountain big sagebrush Idaho fescue Antelope bitterbrush Arrowleaf balsamroot Longleaf hawksbeard Lupine Other shrubs Other perennial forbs Other perennial grasses Prairie Junegrass Sandberg bluegrass Snowberry	20 20 10 5 5 5 5 5 5 5 5 5 5
Nurkey (30 percent)---	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)	Favorable Normal Unfavorable	1,400 1,100 800	Mountain big sagebrush Antelope bitterbrush Bluebunch wheatgrass Idaho fescue Other perennial grasses Sandberg bluegrass Arrowleaf balsamroot Other shrubs Other perennial forbs	20 15 15 15 10 10 5 5 5
168: Kanlee (80 percent)---	LOAMY 13-16 ARTRV/PSSPS-FEID (R025XY011ID)	Favorable Normal Unfavorable	1,400 1,100 800	Mountain big sagebrush Antelope bitterbrush Bluebunch wheatgrass Idaho fescue Other perennial grasses Sandberg bluegrass Arrowleaf balsamroot Other shrubs Other perennial forbs	20 15 15 15 10 10 5 5 5
169: Povey (60 percent)---	STEEP SOUTH 16-22 ARTRV/PSSPS (R013XY003ID)	Favorable Normal Unfavorable	1,600 1,300 1,100	Bluebunch wheatgrass Mountain big sagebrush Idaho fescue Antelope bitterbrush Arrowleaf balsamroot Longleaf hawksbeard Lupine Other shrubs Other perennial forbs Other perennial grasses Prairie Junegrass Sandberg bluegrass Snowberry	20 20 10 5 5 5 5 5 5 5 5 5 5

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Table 9.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			<i>Lb/ac</i>		<i>Pct</i>
169: Ola, cool (20 percent)---	LOAMY 16+ ARTRV/FEID (R025XY022ID)	Favorable	1,300	Idaho fescue	35
		Normal	900	Mountain big sagebrush	15
		Unfavorable	600	Other perennial grasses	15
				Bluebunch wheatgrass	10
				Arrowleaf balsamroot	5
				Longleaf hawksbeard	5
				Other shrubs	5
				Other perennial forbs	5
				Sandberg bluegrass	5
170: Howcan (35 percent)---	STONY LOAM 16-22 ARTRV/PSSPS (R013XY019ID)	Favorable	1,800	Bluebunch wheatgrass	20
		Normal	1,100	Mountain big sagebrush	20
		Unfavorable	600	Idaho fescue	10
				Antelope bitterbrush	5
				Arrowleaf balsamroot	5
				Longleaf hawksbeard	5
				Lupine	5
				Other shrubs	5
				Other perennial forbs	5
				Other perennial grasses	5
				Prairie Junegrass	5
				Sandberg bluegrass	5
				Snowberry	5
Searla (30 percent)---	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)	Favorable	1,000	Bluebunch wheatgrass	35
		Normal	550	Other perennial grasses	15
		Unfavorable	300	Low sagebrush	10
				Other shrubs	10
				Sandberg bluegrass	10
				Arrowleaf balsamroot	5
				Other perennial forbs	5
				Sandberg bluegrass	5
171: Howcan (40 percent)---	STONY LOAM 16-22 ARTRV/PSSPS (R013XY019ID)	Favorable	1,800	Bluebunch wheatgrass	20
		Normal	1,100	Mountain big sagebrush	20
		Unfavorable	600	Idaho fescue	10
				Antelope bitterbrush	5
				Arrowleaf balsamroot	5
				Longleaf hawksbeard	5
				Lupine	5
				Other shrubs	5
				Other perennial forbs	5
				Other perennial grasses	5
				Prairie Junegrass	5
				Sandberg bluegrass	5
				Snowberry	5

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Table 9.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and soil name (percentage of map unit)	Ecological site name and identification number	Total production		Characteristic plants	Rangeland composition
		Kind of year	Dry weight		
			<i>Lb/ac</i>		<i>Pct</i>
171: Searla (25 percent)---	SHALLOW STONY 12-20 ARAR8/PSSPS (R013XY014ID)	Favorable	1,000	Bluebunch wheatgrass	35
		Normal	550	Other perennial grasses	15
		Unfavorable	300	Low sagebrush	10
				Other shrubs	10
				Sandberg bluegrass	10
				Arrowleaf balsamroot	5
				Other perennial forbs	5
				Sandberg bluegrass	5

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Table 10.--Plants by Common Name

(Plants shown in this table are in the National Soils Information System (NASIS) plant tables used for this soil survey. The common and scientific names are referenced in the U.S. Department of Agriculture PLANTS database available at plants.usda.gov.)

Local common name	Symbol	Scientific name
Antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>
Arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>
Basin wildrye	LECI4	<i>Leymus cinereus</i>
Bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>
Bluegrass	POA	<i>Poa</i>
Cinquefoil	POTEN	<i>Potentilla</i>
Columbia needlegrass	ACNEN2	<i>Achnatherum nelsonii ssp. nelsonii</i>
Geranium	GERAN	<i>Geranium</i>
Goldenrod	SOLID	<i>Solidago</i>
Green rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>
Groundsel	SENEC	<i>Senecio</i>
Hood's phlox	PHHO	<i>Phlox hoodii</i>
Idaho fescue	FEID	<i>Festuca idahoensis</i>
Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>
Longleaf hawksbeard	CRAC2	<i>Crepis acuminata</i>
Low sagebrush	ARAR8	<i>Artemisia arbuscula</i>
Lupine	LUPIN	<i>Lupinus</i>
Mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>
Mountain brome	BRMA4	<i>Bromus marginatus</i>
Mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>
Nevada bluegrass	PONE3	<i>Poa secunda</i>
Other perennial forbs	PPFF	
Other perennial grasses	PPGG	
Other shrubs	SSSS	
Pinegrass	CARU	<i>Calamagrostis rubescens</i>
Prairie Junegrass	KOMA	<i>Koeleria macrantha</i>
Quaking aspen	POTR5	<i>Populus tremuloides</i>
Rush	JUNCU	<i>Juncus</i>
Sagebrush	ARNON2	<i>Artemisia nova var. nova</i>
Sandberg bluegrass	POSE	<i>Poa secunda</i>
Sedge	CAREX	<i>Carex</i>
Shrubby cinquefoil	DAFL3	<i>Dasiphora floribunda</i>
Singleleaf pinyon	PIMO	<i>Pinus monophylla</i>
Slender wheatgrass	ELTRT	<i>Elymus trachycaulus ssp. trachycaulus</i>
Snowberry	SYMPH	<i>Symphoricarpos</i>
Stemless goldenweed	STACA	<i>Stenotus acaulis var. acaulis</i>
Thurber needlegrass	ACTH7	<i>Achnatherum thurberianum</i>
Tufted hairgrass	DECE	<i>Deschampsia caespitosa</i>
Utah juniper	JUOS	<i>Juniperus osteosperma</i>
Western needlegrass	ACOCO	<i>Achnatherum occidentale ssp. occidentale</i>
Western wheatgrass	PASM	<i>Pascopyrum smithii</i>
Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>

Soil Survey of City of Rocks National Reserve, Idaho

Table 11.--Plants by Symbol

(Plants shown in this table are in the National Soils Information System (NASIS) plant tables used for this soil survey. The common and scientific names are referenced in the U.S. Department of Agriculture PLANTS database available at plants.usda.gov)

Plant symbol	Local common name	Scientific name
ACLE9	Letterman's needlegrass	<i>Achnatherum lettermanii</i>
ACNEN2	Columbia needlegrass	<i>Achnatherum nelsonii ssp. nelsonii</i>
ACOCO	Western needlegrass	<i>Achnatherum occidentale ssp. occidentale</i>
ACTH7	Thurber needlegrass	<i>Achnatherum thurberianum</i>
ARAR8	Low sagebrush	<i>Artemisia arbuscula</i>
ARNON2	Sagebrush	<i>Artemisia nova var. nova</i>
ARTRV	Mountain big sagebrush	<i>Artemisia tridentata ssp. vaseyana</i>
ARTRW8	Wyoming big sagebrush	<i>Artemisia tridentata ssp. wyomingensis</i>
BASA3	Arrowleaf balsamroot	<i>Balsamorhiza sagittata</i>
BRMA4	Mountain brome	<i>Bromus marginatus</i>
CAREX	Sedge	<i>Carex</i>
CARU	Pinegrass	<i>Calamagrostis rubescens</i>
CHVI8	Green rabbitbrush	<i>Chrysothamnus viscidiflorus</i>
CRAC2	Longleaf hawksbeard	<i>Crepis acuminata</i>
DAFL3	Shrubby cinquefoil	<i>Dasiphora floribunda</i>
DECE	Tufted hairgrass	<i>Deschampsia caespitosa</i>
ELTRT	Slender wheatgrass	<i>Elymus trachycaulus ssp. trachycaulus</i>
FEID	Idaho fescue	<i>Festuca idahoensis</i>
GERAN	Geranium	<i>Geranium</i>
JUNCU	Rush	<i>Juncus</i>
JUOS	Utah juniper	<i>Juniperus osteosperma</i>
KOMA	Prairie Junegrass	<i>Koeleria macrantha</i>
LECI4	Basin wildrye	<i>Leymus cinereus</i>
LUPIN	Lupine	<i>Lupinus</i>
PASM	Western wheatgrass	<i>Pascopyrum smithii</i>
PHHO	Hood's phlox	<i>Phlox hoodii</i>
PIMO	Singleleaf pinyon	<i>Pinus monophylla</i>
POA	Bluegrass	<i>Poa</i>
PONE3	Nevada bluegrass	<i>Poa secunda</i>
POSE	Sandberg bluegrass	<i>Poa secunda</i>
POTEN	Cinquefoil	<i>Potentilla</i>
POTR5	Quaking aspen	<i>Populus tremuloides</i>
PPFF	Other perennial forbs	
PPGG	Other perennial grasses	
PSSPS	Bluebunch wheatgrass	<i>Pseudoroegneria spicata ssp. spicata</i>
PUTR2	Antelope bitterbrush	<i>Purshia tridentata</i>
SENEC	Groundsel	<i>Senecio</i>
SOLID	Goldenrod	<i>Solidago</i>
SSSS	Other shrubs	
STACA	Stemless goldenweed	<i>Stenotus acaulis var. acaulis</i>
SYMPH	Snowberry	<i>Symphoricarpos</i>
SYOR2	Mountain snowberry	<i>Symphoricarpos oreophilus</i>

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Table 12.--Planting

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting with equipment use	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Well suited		Moderately suited Slope	0.50	Severe Low strength	1.00
19: Birchcreek, thin surface-----	80	Moderately suited Slope Stickiness; high plasticity index Rock fragments	0.50 0.50 0.50	Unsuited Slope Rock fragments Stickiness; high plasticity index	1.00 1.00 0.50	Slight Strength	0.10
21: Birchcreek, moist---	45	Poorly suited Stickiness; high plasticity index Rock fragments Slope	0.75 0.50 0.50	Unsuited Slope Rock fragments Stickiness; high plasticity index	1.00 0.75 0.75	Slight Strength	0.10
Itca-----	30	Moderately suited Stickiness; high plasticity index Rock fragments Slope	0.50 0.50 0.50	Unsuited Slope Rock fragments Stickiness; high plasticity index	1.00 0.75 0.50	Slight Strength	0.10
26: Chayson-----	90	Well suited		Moderately suited Rock fragments Slope	0.50 0.50	Slight Strength	0.10
32: Conneridge, extremely stony surface-----	85	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Slight Strength	0.10
36: Cumulic Endoaquolls	85	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Stickiness; high plasticity index	0.50	Severe Low strength	1.00
78: Hymas-----	45	Moderately suited Rock fragments	0.50	Poorly suited Slope Rock fragments	0.75 0.75	Moderate Low strength	0.50
Bezzant-----	40	Moderately suited Rock fragments	0.50	Moderately suited Slope Rock fragments	0.50 0.50	Severe Low strength	1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 12.--Planting--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting with equipment use	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
84: Itca-----	35	Moderately suited Stickiness; high plasticity index Rock fragments	0.50 0.50	Unsuited Slope Rock fragments Stickiness; high plasticity index	1.00 0.75 0.50	Slight Strength	0.10
Birchcreek, moist---	25	Poorly suited Stickiness; high plasticity index Rock fragments Slope	0.75 0.50 0.50	Unsuited Slope Rock fragments Stickiness; high plasticity index	1.00 0.75 0.75	Slight Strength	0.10
Rock outcrop-----	20	Not rated		Not rated		Not rated	
86: Jimsage-----	50	Moderately suited Slope	0.50	Unsuited Slope Rock fragments	1.00 0.50	Moderate Low strength	0.50
Doodlelink-----	30	Moderately suited Slope Rock fragments	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Moderate Low strength	0.50
89: Kanee-----	75	Well suited		Moderately suited Slope	0.50	Moderate Low strength	0.50
101: Ola-----	90	Well suited		Moderately suited Slope	0.50	Moderate Low strength	0.50
102: Pachic Haplocryolls	90	Moderately suited Rock fragments	0.50	Unsuited Slope Rock fragments	1.00 0.50	Moderate Low strength	0.50
107: Poisonhol, extremely stony surface-----	90	Moderately suited Rock fragments Stickiness; high plasticity index	0.50 0.50	Unsuited Rock fragments Slope Stickiness; high plasticity index	1.00 0.50 0.50	Severe Low strength	1.00
108: Povey-----	75	Moderately suited Slope Rock fragments	0.50 0.50	Unsuited Slope Rock fragments	1.00 1.00	Slight Strength	0.10
109: Povey-----	50	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 1.00	Slight Strength	0.10

Soil Survey of City of Rocks National Reserve, Idaho

Table 12.--Planting--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting with equipment use	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
109: Middlehill-----	30	Moderately suited Sandiness Rock fragments Slope	0.50 0.50 0.50	Unsuited Rock fragments Slope Sandiness	1.00 1.00 0.50	Slight Strength	0.10
111: Raftriver-----	85	Well suited		Well suited		Severe Low strength	1.00
116: Riceton-----	85	Well suited		Moderately suited Slope	0.50	Moderate Low strength	0.50
123: Kanlee-----	35	Well suited		Poorly suited Slope	0.75	Moderate Low strength	0.50
Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Well suited		Poorly suited Slope Rock fragments	0.75 0.50	Slight Strength	0.10
124: Ola, cool-----	35	Moderately suited Slope	0.50	Unsuited Slope	1.00	Moderate Low strength	0.50
Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Moderately suited Slope	0.50	Unsuited Slope Rock fragments	1.00 0.50	Slight Strength	0.10
166: Chokecherry-----	80	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.75	Slight Strength	0.10
167: Povey-----	40	Moderately suited Rock fragments	0.50	Unsuited Rock fragments Slope	1.00 1.00	Slight Strength	0.10
Nurkey-----	30	Moderately suited Rock fragments	0.50	Moderately suited Slope Rock fragments	0.50 0.50	Severe Low strength	1.00
168: Kanlee-----	80	Well suited		Poorly suited Slope	0.75	Moderate Low strength	0.50
169: Povey-----	60	Moderately suited Slope Rock fragments	0.50 0.50	Unsuited Slope Rock fragments	1.00 1.00	Slight Strength	0.10
Ola, cool-----	20	Moderately suited Slope	0.50	Unsuited Slope	1.00	Moderate Low strength	0.50

Soil Survey of City of Rocks National Reserve, Idaho

Table 12.--Planting--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting with equipment use	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
170: Howcan-----	35	Well suited		Moderately suited Rock fragments Slope	0.50 0.50	Slight Strength	0.10
Searla-----	30	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Rock fragments Slope Stickiness; high plasticity index	0.50 0.50 0.50	Severe Low strength	1.00
171: Howcan-----	40	Well suited		Poorly suited Slope Rock fragments	0.75 0.50	Slight Strength	0.10
Searla-----	25	Moderately suited Stickiness; high plasticity index	0.50	Poorly suited Slope Rock fragments Stickiness; high plasticity index	0.75 0.50 0.50	Severe Low strength	1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 13.--Hazard of Erosion and Suitability for Roads

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Slight		Moderate Slope/erodibility	0.50	Moderately suited Low strength Slope	0.50 0.50
19: Birchcreek, thin surface-----	80	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
21: Birchcreek, moist---	45	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Itca-----	30	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
26: Chayson-----	90	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
32: Conneridge, extremely stony surface-----	85	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
36: Cumulic Endoaquolls	85	Slight		Slight		Poorly suited Flooding Low strength	1.00 0.50
78: Hymas-----	45	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Low strength	1.00 0.50
Bezzant-----	40	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Low strength	1.00 0.50
84: Itca-----	35	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Birchcreek, moist---	25	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Rock outcrop-----	20	Not rated		Not rated		Not rated	
86: Jimsage-----	50	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 13.--Hazard of Erosion and Suitability for Roads--Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
86: Doodlelink-----	30	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
89: Kanlee-----	75	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
101: Ola-----	90	Slight		Moderate Slope/erodibility	0.50	Poorly suited Slope	1.00
102: Pachic Haplocryolls	90	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Low strength	1.00 0.50
107: Poisonhol, extremely stony surface-----	90	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope Rock fragments Low strength	0.50 0.50 0.50
108: Povey-----	75	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
109: Povey-----	50	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Middlehill-----	30	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Sandiness	1.00 0.50
111: Raftriver-----	85	Slight		Moderate Slope/erodibility	0.50	Moderately suited Low strength	0.50
116: Riceton-----	85	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
123: Kanlee-----	35	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
124: Ola, cool-----	35	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Rock outcrop-----	30	Not rated		Not rated		Not rated	

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Table 13.--Hazard of Erosion and Suitability for Roads--Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
124: Earcree-----	25	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
166: Chokecherry-----	80	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
167: Povey-----	40	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Nurkey-----	30	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Low strength	1.00 0.50
168: Kanlee-----	80	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
169: Povey-----	60	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Ola, cool-----	20	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
170: Howcan-----	35	Slight		Slight		Moderately suited Slope	0.50
Searla-----	30	Slight		Slight		Moderately suited Low strength Slope	0.50 0.50
171: Howcan-----	40	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope	1.00
Searla-----	25	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Low strength	1.00 0.50

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Table 14.--Site Preparation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Well suited		Well suited	
19: Birchcreek, thin surface-----	80	Unsuited Slope Restrictive layer	1.00 0.50	Poorly suited Slope Rock fragments	1.00 0.50
21: Birchcreek, moist---	45	Unsuited Slope Restrictive layer	1.00 0.50	Poorly suited Slope Rock fragments Stickiness; high plasticity index	1.00 0.50 0.50
Itca-----	30	Unsuited Slope Restrictive layer	1.00 1.00	Poorly suited Slope Rock fragments	1.00 0.50
26: Chayson-----	90	Poorly suited Restrictive layer	0.50	Well suited	
32: Conneridge, extremely stony surface-----	85	Poorly suited Slope Rock fragments Restrictive layer	0.50 0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
36: Cumulic Endoaquolls	85	Well suited		Well suited	
78: Hymas-----	45	Unsuited Restrictive layer Slope	1.00 0.50	Poorly suited Rock fragments Slope	0.50 0.50
Bezzant-----	40	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
84: Itca-----	35	Unsuited Restrictive layer Slope	1.00 0.50	Poorly suited Slope Rock fragments	0.50 0.50

Soil Survey of City of Rocks National Reserve, Idaho

Table 14.--Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
84: Birchcreek, moist---	25	Unsuited Slope Restrictive layer	1.00 0.50	Poorly suited Slope Rock fragments Stickiness; high plasticity index	1.00 0.50 0.50
Rock outcrop-----	20	Not rated		Not rated	
86: Jimsage-----	50	Unsuited Slope	1.00	Poorly suited Slope	1.00
Doodlelink-----	30	Unsuited Slope	1.00	Poorly suited Slope Rock fragments	1.00 0.50
89: Kanlee-----	75	Poorly suited Restrictive layer	0.50	Well suited	
101: Ola-----	90	Well suited		Well suited	
102: Pachic Haplocryolls	90	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
107: Poisonhol, extremely stony surface-----	90	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
108: Povey-----	75	Unsuited Slope	1.00	Poorly suited Slope Rock fragments	1.00 0.50
109: Povey-----	50	Unsuited Slope	1.00	Poorly suited Slope Rock fragments	1.00 0.50
Middlehill-----	30	Unsuited Slope Rock fragments Restrictive layer	1.00 0.50 0.50	Poorly suited Slope Rock fragments	1.00 0.50
111: Raftriver-----	85	Poorly suited Restrictive layer	0.50	Well suited	
116: Riceton-----	85	Well suited		Well suited	

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Table 14.--Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
123: Kanlee-----	35	Poorly suited Slope Restrictive layer	0.50 0.50	Poorly suited Slope	0.50
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Poorly suited Slope	0.50	Poorly suited Slope	0.50
124: Ola, cool-----	35	Unsuited Slope	1.00	Poorly suited Slope	1.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Unsuited Slope	1.00	Poorly suited Slope	1.00
166: Chokecherry-----	80	Poorly suited Slope	0.50	Poorly suited Rock fragments Slope	0.50 0.50
167: Povey-----	40	Poorly suited Slope	0.50	Poorly suited Slope Rock fragments	0.50 0.50
Nurkey-----	30	Poorly suited Slope	0.50	Poorly suited Slope Rock fragments	0.50 0.50
168: Kanlee-----	80	Poorly suited Slope Restrictive layer	0.50 0.50	Poorly suited Slope	0.50
169: Povey-----	60	Unsuited Slope	1.00	Poorly suited Slope Rock fragments	1.00 0.50
Ola, cool-----	20	Unsuited Slope	1.00	Poorly suited Slope	1.00
170: Howcan-----	35	Well suited		Well suited	
Searla-----	30	Well suited		Well suited	
171: Howcan-----	40	Poorly suited Slope	0.50	Poorly suited Slope	0.50
Searla-----	25	Poorly suited Slope	0.50	Poorly suited Slope	0.50

Soil Survey of City of Rocks National Reserve, Idaho

Table 15.--Site Restoration

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Low Texture/rock fragments	0.10	Moderate Available water	0.50
19: Birchcreek, thin surface-----	80	High Texture/slope/rock fragments	1.00	High Available water	1.00
21: Birchcreek, moist---	45	Moderate Texture/slope/rock fragments	0.50	High Available water	1.00
Itca-----	30	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
26: Chayson-----	90	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
32: Conneridge, extremely stony surface-----	85	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
36: Cumulic Endoaquolls	85	Low		High Wetness	1.00
78: Hymas-----	45	Moderate Texture/rock fragments	0.50	High Available water Carbonate content Soil reaction	1.00 0.50 0.50
Bezzant-----	40	Low Texture/rock fragments	0.10	Moderate Available water Carbonate content Soil reaction	0.50 0.50 0.50

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Table 15.--Site Restoration--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire	Potential for seedling mortality		
		Rating class and limiting features	Value	Rating class and limiting features	Value
84: Itca-----	35	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Birchcreek, moist---	25	Moderate Texture/slope/rock fragments	0.50	High Available water	1.00
Rock outcrop-----	20	Not rated		Not rated	
86: Jimsage-----	50	Low Texture/slope/rock fragments	0.10	Low	
Doodlelink-----	30	Low Texture/rock fragments	0.10	Low	
89: Kanlee-----	75	Low Texture/rock fragments	0.10	High Available water	1.00
101: Ola-----	90	Low Texture/rock fragments	0.10	High Available water	1.00
102: Pachic Haplocryolls	90	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
107: Poisonhol, extremely stony surface-----	90	Low Texture/rock fragments	0.10	High Available water Carbonate content Soil reaction	1.00 0.50 0.50
108: Povey-----	75	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
109: Povey-----	50	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 15.--Site Restoration--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
109: Middlehill-----	30	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
111: Raftriver-----	85	Moderate Texture/surface depth/rock fragments	0.50	Moderate Carbonate content Available water	0.50 0.50
116: Riceton-----	85	Moderate Texture/rock fragments	0.50	High Available water	1.00
123: Kanlee-----	35	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Moderate Texture/rock fragments	0.50	High Available water	1.00
124: Ola, cool-----	35	Moderate Texture/rock fragments	0.50	High Available water	1.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Moderate Texture/rock fragments	0.50	High Available water	1.00
166: Chokecherry-----	80	Moderate Texture/rock fragments	0.50	High Available water	1.00
167: Povey-----	40	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Nurkey-----	30	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water	0.50
168: Kanlee-----	80	Low Texture/rock fragments	0.10	High Available water	1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 15.--Site Restoration--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
169: Povey-----	60	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Ola, cool-----	20	Moderate Texture/rock fragments	0.50	High Available water	1.00
170: Howcan-----	35	Moderate Texture/rock fragments	0.50	High Available water	1.00
Searla-----	30	Low Texture/rock fragments	0.10	High Available water	1.00
171: Howcan-----	40	Moderate Texture/rock fragments	0.50	High Available water	1.00
Searla-----	25	Low Texture/rock fragments	0.10	High Available water	1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 16.--Camp and Picnic Areas

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Not limited		Not limited	
19: Birchcreek, thin surface-----	80	Very limited Too steep Large stones content Slow water movement	1.00 0.94 0.41	Very limited Too steep Large stones content Slow water movement	1.00 0.94 0.41
21: Birchcreek, moist---	45	Very limited Too steep Large stones content Slow water movement	1.00 0.58 0.41	Very limited Too steep Large stones content Slow water movement	1.00 0.58 0.41
Itca-----	30	Very limited Too steep Depth to bedrock Large stones content Slow water movement	1.00 1.00 0.46 0.41	Very limited Too steep Depth to bedrock Large stones content Slow water movement	1.00 1.00 0.46 0.41
26: Chayson-----	90	Somewhat limited Gravel Depth to cemented pan	0.68 0.65	Somewhat limited Gravel Depth to cemented pan	0.68 0.65
32: Conneridge, extremely stony surface-----	85	Very limited Too steep Large stones content Gravel	1.00 1.00 0.23	Very limited Large stones content Too steep Gravel	1.00 1.00 0.23
36: Cumulic Endoaquolls	85	Very limited Flooding Slow water movement Depth to saturated zone	1.00 0.26 0.39	Somewhat limited Slow water movement Depth to saturated zone	0.26 0.19

Soil Survey of City of Rocks National Reserve, Idaho

Table 16.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
78: Hymas-----	45	Very limited Too steep Depth to bedrock Large stones content	1.00 1.00 0.84	Very limited Too steep Depth to bedrock Large stones content	1.00 1.00 0.84
Bezzant-----	40	Very limited Too steep	1.00	Very limited Too steep	1.00
84: Itca-----	35	Very limited Too steep Depth to bedrock Large stones content Slow water movement	1.00 1.00 0.46 0.41	Very limited Too steep Depth to bedrock Large stones content Slow water movement	1.00 1.00 0.46 0.41
Birchcreek, moist---	25	Very limited Too steep Large stones content Slow water movement	1.00 0.58 0.41	Very limited Too steep Large stones content Slow water movement	1.00 0.58 0.41
Rock outcrop-----	20	Not rated		Not rated	
86: Jimsage-----	50	Very limited Too steep Gravel	1.00 0.68	Very limited Too steep Gravel	1.00 0.68
Doodlelink-----	30	Very limited Too steep Gravel	1.00 0.16	Very limited Too steep Gravel	1.00 0.16
89: Kanlee-----	75	Not limited		Not limited	
101: Ola-----	90	Somewhat limited Slope	0.84	Somewhat limited Slope	0.84
102: Pachic Haplocryolls	90	Very limited Too steep Slow water movement Large stones content	1.00 0.26 0.02	Very limited Too steep Slow water movement Large stones content	1.00 0.26 0.02
107: Poisonhol, extremely stony surface-----	90	Very limited Large stones content Slope	1.00 0.63	Very limited Large stones content Slope	1.00 0.63

Soil Survey of City of Rocks National Reserve, Idaho

Table 16.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
108: Povey-----	75	Very limited Too steep Large stones content	1.00 0.18	Very limited Too steep Large stones content	1.00 0.18
109: Povey-----	50	Very limited Too steep Large stones content	1.00 0.18	Very limited Too steep Large stones content	1.00 0.18
Middlehill-----	30	Very limited Too steep Gravel Large stones content	1.00 0.26 0.65	Very limited Too steep Gravel Large stones content	1.00 0.26 0.65
111: Raftriver-----	85	Somewhat limited Depth to cemented pan Dusty	0.54 0.50	Somewhat limited Depth to cemented pan Dusty	0.54 0.50
116: Riceton-----	85	Somewhat limited Too sandy	0.77	Somewhat limited Too sandy	0.77
123: Kanlee-----	35	Very limited Too steep	1.00	Very limited Too steep	1.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Very limited Too steep Gravel	1.00 0.88	Very limited Too steep Gravel	1.00 0.88
124: Ola, cool-----	35	Very limited Too steep	1.00	Very limited Too steep	1.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Very limited Too steep Gravel	1.00 0.88	Very limited Too steep Gravel	1.00 0.88
166: Chokecherry-----	80	Very limited Too steep Depth to bedrock Gravel	1.00 1.00 0.36	Very limited Too steep Depth to bedrock Gravel	1.00 1.00 0.36
167: Povey-----	40	Very limited Too steep Large stones content	1.00 0.18	Very limited Too steep Large stones content	1.00 0.18

Soil Survey of City of Rocks National Reserve, Idaho

Table 16.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
167: Nurkey-----	30	Very limited Too steep	1.00	Very limited Too steep	1.00
168: Kanlee-----	80	Very limited Too steep	1.00	Very limited Too steep	1.00
169: Povey-----	60	Very limited Too steep Large stones content	1.00 0.18	Very limited Too steep Large stones content	1.00 0.18
Ola, cool-----	20	Very limited Too steep	1.00	Very limited Too steep	1.00
170: Howcan-----	35	Somewhat limited Gravel Slope	0.87 0.04	Somewhat limited Gravel Slope	0.87 0.04
Searla-----	30	Somewhat limited Slope	0.04	Somewhat limited Slope	0.04
171: Howcan-----	40	Very limited Too steep Gravel	1.00 0.87	Very limited Too steep Gravel	1.00 0.87
Searla-----	25	Very limited Too steep	1.00	Very limited Too steep	1.00

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Table 17.--Trail Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Not limited		Not limited	
19: Birchcreek, thin surface-----	80	Very limited Slope Large stones content	1.00 0.94	Somewhat limited Slope Large stones content	0.96 0.94
21: Birchcreek, moist---	45	Very limited Slope Large stones content	1.00 0.58	Very limited Slope Large stones content	1.00 0.58
Itca-----	30	Very limited Slope Large stones content	1.00 0.46	Very limited Slope Large stones content	1.00 0.46
26: Chayson-----	90	Not limited		Not limited	
32: Conneridge, extremely stony surface-----	85	Very limited Large stones content Slope	1.00 1.00	Very limited Large stones content Slope	1.00 0.78
36: Cumulic Endoaquolls	85	Not limited		Not limited	
78: Hymas-----	45	Somewhat limited Large stones content Slope	0.84 0.50	Somewhat limited Large stones content	0.84
Bezzant-----	40	Not limited		Not limited	
84: Itca-----	35	Very limited Slope Large stones content	1.00 0.46	Somewhat limited Large stones content Slope	0.46 0.22
Birchcreek, moist---	25	Very limited Slope Large stones content	1.00 0.58	Very limited Slope Large stones content	1.00 0.58

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Table 17.--Trail Management--Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
84: Rock outcrop-----	20	Not rated		Not rated	
86: Jimsage-----	50	Very limited Slope	1.00	Very limited Slope	1.00
Doodlelink-----	30	Very limited Slope	1.00	Very limited Slope	1.00
89: Kanlee-----	75	Not limited		Not limited	
101: Ola-----	90	Not limited		Not limited	
102: Pachic Haplocryolls	90	Very limited Slope Large stones content	1.00 0.02	Somewhat limited Slope Large stones content	0.22 0.02
107: Poisonhol, extremely stony surface-----	90	Very limited Large stones content	1.00	Very limited Large stones content	1.00
108: Povey-----	75	Very limited Slope Large stones content	1.00 0.18	Very limited Slope Large stones content	1.00 0.18
109: Povey-----	50	Very limited Slope Large stones content	1.00 0.18	Somewhat limited Slope Large stones content	0.96 0.18
Middlehill-----	30	Very limited Slope Large stones content	1.00 0.65	Somewhat limited Slope Large stones content	0.96 0.65
111: Raftdriver-----	85	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50
116: Riceton-----	85	Somewhat limited Too sandy	0.77	Somewhat limited Too sandy	0.77
123: Kanlee-----	35	Somewhat limited Slope	0.08	Not limited	
Rock outcrop-----	30	Not rated		Not rated	

Soil Survey of City of Rocks National Reserve, Idaho

Table 17.--Trail Management--Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
123: Earcree-----	25	Somewhat limited Slope	0.08	Not limited	
124: Ola, cool-----	35	Very limited Slope	1.00	Very limited Slope	1.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Very limited Slope	1.00	Very limited Slope	1.00
166: Chokecherry-----	80	Somewhat limited Slope	0.08	Not limited	
167: Povey-----	40	Very limited Slope	1.00	Somewhat limited Slope	0.22
		Large stones content	0.18	Large stones content	0.18
Nurkey-----	30	Not limited		Not limited	
168: Kanlee-----	80	Somewhat limited Slope	0.50	Not limited	
169: Povey-----	60	Very limited Slope	1.00	Very limited Slope	1.00
		Large stones content	0.18	Large stones content	0.18
Ola, cool-----	20	Very limited Slope	1.00	Very limited Slope	1.00
170: Howcan-----	35	Not limited		Not limited	
Searla-----	30	Not limited		Not limited	
171: Howcan-----	40	Very limited Slope	1.00	Not limited	
Searla-----	25	Very limited Slope	1.00	Not limited	

Soil Survey of City of Rocks National Reserve, Idaho

Table 18.--Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Not limited		Not limited		Very limited Slope	1.00
19: Birchcreek, thin surface-----	80	Very limited Too steep Shrink-swell Large stones Depth to hard bedrock	 1.00 0.50 0.44 0.97	Very limited Too steep Depth to hard bedrock Shrink-swell Large stones	 1.00 1.00 0.50 0.44	Very limited Slope Shrink-swell Large stones Depth to hard bedrock	 1.00 0.50 0.44 0.97
21: Birchcreek, moist---	45	Very limited Too steep Large stones Shrink-swell Depth to hard bedrock	 1.00 0.63 0.50 0.35	Very limited Too steep Depth to hard bedrock Large stones Shrink-swell	 1.00 1.00 0.63 0.50	Very limited Slope Large stones Shrink-swell Depth to hard bedrock	 1.00 0.63 0.50 0.35
Itca-----	30	Very limited Too steep Depth to hard bedrock Large stones Shrink-swell	 1.00 1.00 1.00 0.50	Very limited Too steep Depth to hard bedrock Large stones Shrink-swell	 1.00 1.00 1.00 0.50	Very limited Slope Depth to hard bedrock Large stones Shrink-swell	 1.00 1.00 1.00 0.50
26: Chayson-----	90	Somewhat limited Shrink-swell Depth to thick cemented pan	 0.50 0.65	Very limited Depth to thick cemented pan Shrink-swell Depth to thin cemented pan	 1.00 0.50 0.65	Somewhat limited Slope Shrink-swell Depth to thick cemented pan	 0.50 0.50 0.65
32: Conneridge, extremely stony surface-----	85	Very limited Too steep Depth to hard bedrock	 1.00 0.95	Very limited Too steep Depth to hard bedrock	 1.00 1.00	Very limited Slope Depth to hard bedrock	 1.00 0.95
36: Cumulic Endoaquolls	85	Very limited Flooding Shrink-swell Depth to saturated zone	 1.00 0.50 0.39	Very limited Flooding Depth to saturated zone	 1.00 1.00	Very limited Flooding Shrink-swell Depth to saturated zone	 1.00 0.50 0.39

Soil Survey of City of Rocks National Reserve, Idaho

Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
78: Hymas-----	45	Very limited Depth to hard bedrock Large stones Too steep	1.00 1.00 1.00	Very limited Depth to hard bedrock Large stones Too steep	1.00 1.00 1.00	Very limited Slope Depth to hard bedrock Large stones	1.00 1.00 1.00
Bezzant-----	40	Very limited Too steep Shrink-swell Large stones	1.00 0.50 0.44	Very limited Too steep Shrink-swell Large stones	1.00 0.50 0.44	Very limited Slope Shrink-swell Large stones	1.00 0.50 0.44
84: Itca-----	35	Very limited Too steep Depth to hard bedrock Large stones Shrink-swell	1.00 1.00 1.00 0.50	Very limited Too steep Depth to hard bedrock Large stones Shrink-swell	1.00 1.00 1.00 0.50	Very limited Slope Depth to hard bedrock Large stones Shrink-swell	1.00 1.00 1.00 0.50
Birchcreek, moist---	25	Very limited Too steep Large stones Shrink-swell Depth to hard bedrock	1.00 0.63 0.50 0.35	Very limited Too steep Depth to hard bedrock Large stones Shrink-swell	1.00 1.00 0.63 0.50	Very limited Slope Large stones Shrink-swell Depth to hard bedrock	1.00 0.63 0.50 0.35
Rock outcrop-----	20	Not rated		Not rated		Not rated	
86: Jimsage-----	50	Very limited Too steep	1.00	Very limited Too steep	1.00	Very limited Slope	1.00
Doodlelink-----	30	Very limited Too steep Shrink-swell	1.00 0.50	Very limited Too steep Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50
89: Kanlee-----	75	Somewhat limited Shrink-swell Depth to hard bedrock	0.50 0.10	Very limited Depth to hard bedrock Shrink-swell Depth to soft bedrock	1.00 0.50 0.54	Very limited Slope Shrink-swell Depth to hard bedrock	1.00 0.50 0.10
101: Ola-----	90	Somewhat limited Slope	0.84	Somewhat limited Slope Depth to soft bedrock	0.84 0.46	Very limited Slope	1.00
102: Pachic Haplocryolls	90	Very limited Too steep Shrink-swell Large stones	1.00 0.50 0.11	Very limited Too steep Shrink-swell Large stones	1.00 0.50 0.11	Very limited Slope Shrink-swell Large stones	1.00 0.50 0.11

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Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
107: Poisonhol, extremely stony surface-----	90	Somewhat limited Large stones Slope	0.97 0.63	Very limited Depth to thick cemented pan Large stones Slope	1.00 0.97 0.63	Very limited Slope Large stones	1.00 0.97
108: Povey-----	75	Very limited Too steep Large stones	1.00 1.00	Very limited Too steep Large stones Depth to hard bedrock	1.00 1.00 0.42	Very limited Slope Large stones	1.00 1.00
109: Povey-----	50	Very limited Too steep Large stones	1.00 1.00	Very limited Too steep Large stones Depth to hard bedrock	1.00 1.00 0.42	Very limited Slope Large stones	1.00 1.00
Middlehill-----	30	Very limited Too steep Large stones Depth to hard bedrock	1.00 1.00 0.90	Very limited Too steep Depth to hard bedrock Large stones	1.00 1.00 1.00	Very limited Slope Large stones Depth to hard bedrock	1.00 1.00 0.90
111: Raftriver-----	85	Somewhat limited Depth to thick cemented pan	0.54	Very limited Depth to thick cemented pan Depth to thin cemented pan	1.00 0.54	Somewhat limited Depth to thick cemented pan	0.54
116: Riceton-----	85	Not limited		Not limited		Very limited Slope	1.00
123: Kanlee-----	35	Very limited Too steep Shrink-swell Depth to hard bedrock	1.00 0.50 0.10	Very limited Depth to hard bedrock Too steep Shrink-swell Depth to soft bedrock	1.00 1.00 0.50 0.90	Very limited Slope Shrink-swell Depth to hard bedrock	1.00 0.50 0.10
Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Very limited Too steep	1.00	Very limited Too steep	1.00	Very limited Slope	1.00
124: Ola, cool-----	35	Very limited Too steep	1.00	Very limited Too steep Depth to soft bedrock	1.00 0.46	Very limited Slope	1.00

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Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
124: Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Very limited Too steep	1.00	Very limited Too steep	1.00	Very limited Slope	1.00
166: Chokecherry-----	80	Very limited Too steep Large stones Depth to soft bedrock	1.00 0.36 0.50	Very limited Depth to soft bedrock Too steep Large stones	1.00 1.00 0.36	Very limited Depth to soft bedrock Slope Large stones	1.00 1.00 0.36
167: Povey-----	40	Very limited Too steep Large stones	1.00 1.00	Very limited Too steep Large stones Depth to hard bedrock	1.00 1.00 0.42	Very limited Slope Large stones	1.00 1.00
Nurkey-----	30	Very limited Too steep Shrink-swell	1.00 0.50	Very limited Too steep	1.00	Very limited Slope Shrink-swell	1.00 0.50
168: Kanlee-----	80	Very limited Too steep Shrink-swell Depth to hard bedrock	1.00 0.50 0.10	Very limited Depth to hard bedrock Too steep Shrink-swell Depth to soft bedrock	1.00 1.00 0.50 0.54	Very limited Slope Shrink-swell Depth to hard bedrock	1.00 0.50 0.10
169: Povey-----	60	Very limited Too steep Large stones	1.00 1.00	Very limited Too steep Large stones Depth to hard bedrock	1.00 1.00 0.42	Very limited Slope Large stones	1.00 1.00
Ola, cool-----	20	Very limited Too steep	1.00	Very limited Too steep Depth to soft bedrock	1.00 0.46	Very limited Slope	1.00
170: Howcan-----	35	Somewhat limited Shrink-swell Slope	0.50 0.04	Somewhat limited Slope	0.04	Very limited Slope Shrink-swell	1.00 0.50
Searla-----	30	Somewhat limited Shrink-swell Slope	0.50 0.04	Somewhat limited Slope	0.04	Very limited Slope Shrink-swell	1.00 0.50
171: Howcan-----	40	Very limited Too steep Shrink-swell	1.00 0.50	Very limited Too steep	1.00	Very limited Slope Shrink-swell	1.00 0.50

Soil Survey of City of Rocks National Reserve, Idaho

Table 18.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
171: Searla-----	25	Very limited Too steep Shrink-swell	1.00 0.50	Very limited Too steep	1.00	Very limited Slope Shrink-swell	1.00 0.50

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Table 19.---Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Somewhat limited Frost action	0.50	Somewhat limited Unstable excavation walls	0.10	Not limited	
19: Birchcreek, thin surface-----	80	Very limited Too steep Shrink-swell Large stones Depth to hard bedrock Frost action	1.00 0.50 0.44 0.97 0.50	Very limited Depth to hard bedrock Too steep Unstable excavation walls Large stones Too clayey	1.00 1.00 1.00 1.00 0.44 0.28	Very limited Too steep Droughty Large stones Depth to bedrock	1.00 1.00 1.00 0.97
21: Birchcreek, moist---	45	Very limited Too steep Low strength Large stones Shrink-swell Frost action	1.00 1.00 0.63 0.50 0.50	Very limited Depth to hard bedrock Too steep Large stones Too clayey Unstable excavation walls	1.00 1.00 1.00 0.63 0.28 0.10	Very limited Too steep Large stones Droughty Depth to bedrock	1.00 1.00 0.88 0.35
Itca-----	30	Very limited Depth to hard bedrock Too steep Large stones Shrink-swell	1.00 1.00 1.00 1.00 0.50	Very limited Depth to hard bedrock Too steep Large stones Unstable excavation walls	1.00 1.00 1.00 1.00 0.10	Very limited Depth to bedrock Too steep Droughty Large stones	1.00 1.00 1.00 1.00
26: Chayson-----	90	Somewhat limited Shrink-swell Depth to thick cemented pan Frost action	0.50 0.65 0.50	Very limited Depth to thick cemented pan Unstable excavation walls Depth to thin cemented pan	1.00 1.00 1.00 0.65	Somewhat limited Gravel Droughty Depth to cemented pan	0.68 0.64 0.64
32: Conneridge, extremely stony surface-----	85	Very limited Too steep Depth to hard bedrock Frost action	1.00 0.95 0.50	Very limited Depth to hard bedrock Too steep Unstable excavation walls	1.00 1.00 1.00 1.00	Very limited Too steep Droughty Large stones Depth to bedrock Gravel	1.00 1.00 1.00 0.95 0.23

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Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
36: Cumulic Endoaquolls	85	Very limited Frost action Flooding Low strength Shrink-swell Depth to saturated zone	1.00 1.00 1.00 0.50 0.19	Very limited Depth to saturated zone Flooding Unstable excavation walls	1.00 1.00 0.60 0.10	Somewhat limited Flooding Depth to saturated zone	0.60 0.19
78: Hymas-----	45	Very limited Depth to hard bedrock Large stones Too steep Frost action	1.00 1.00 1.00 1.00 0.50	Very limited Depth to hard bedrock Large stones Too steep Unstable excavation walls	1.00 1.00 1.00 1.00 0.10	Very limited Depth to bedrock Large stones Droughty Too steep	1.00 1.00 1.00 1.00
Bezzant-----	40	Very limited Too steep Shrink-swell Large stones Frost action	1.00 0.50 0.44 0.50	Very limited Too steep Large stones Unstable excavation walls	1.00 0.44 0.10	Very limited Too steep Large stones Droughty	1.00 0.95 0.01
84: Itca-----	35	Very limited Depth to hard bedrock Too steep Large stones Shrink-swell	1.00 1.00 1.00 1.00 0.50	Very limited Depth to hard bedrock Too steep Large stones Unstable excavation walls	1.00 1.00 1.00 1.00 0.10	Very limited Depth to bedrock Too steep Droughty Large stones	1.00 1.00 1.00 1.00
Birchcreek, moist---	25	Very limited Too steep Low strength Large stones Shrink-swell Frost action	1.00 1.00 0.63 0.50 0.50	Very limited Depth to hard bedrock Too steep Large stones Too clayey Unstable excavation walls	1.00 1.00 1.00 0.63 0.28 0.10	Very limited Too steep Large stones Droughty Depth to bedrock	1.00 1.00 0.88 0.35
Rock outcrop-----	20	Not rated		Not rated		Not rated	
86: Jimsage-----	50	Very limited Too steep Frost action	1.00 0.50	Very limited Too steep Unstable excavation walls	1.00 1.00	Very limited Too steep Droughty Gravel	1.00 0.61 0.68
Doodlelink-----	30	Very limited Too steep Shrink-swell Frost action	1.00 0.50 0.50	Very limited Too steep Unstable excavation walls	1.00 0.10	Very limited Too steep Gravel Droughty	1.00 0.16 0.01

Soil Survey of City of Rocks National Reserve, Idaho

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
89: Kanlee-----	75	Somewhat limited Shrink-swell Frost action Depth to hard bedrock	0.50 0.50 0.10	Very limited Depth to hard bedrock Unstable excavation walls Depth to soft bedrock	1.00 1.00 0.54	Somewhat limited Depth to bedrock Droughty	0.54 0.79
101: Ola-----	90	Somewhat limited Slope Frost action	0.84 0.50	Very limited Unstable excavation walls Slope Depth to soft bedrock	1.00 0.84 0.46	Somewhat limited Droughty Slope Depth to bedrock	0.98 0.84 0.46
102: Pachic Haplocryolls	90	Very limited Too steep Frost action Shrink-swell Large stones	1.00 1.00 0.50 0.11	Very limited Too steep Unstable excavation walls Large stones	1.00 1.00 0.11	Very limited Too steep Large stones Droughty	1.00 1.00 0.30
107: Poisonhol, extremely stony surface-----	90	Somewhat limited Large stones Slope Frost action	0.97 0.63 0.50	Very limited Depth to thick cemented pan Large stones Slope Unstable excavation walls	1.00 0.97 0.63 0.10	Somewhat limited Slope Droughty	0.63 0.83
108: Povey-----	75	Very limited Too steep Large stones Frost action	1.00 1.00 0.50	Very limited Too steep Large stones Depth to hard bedrock Unstable excavation walls	1.00 1.00 0.42 0.10	Very limited Too steep Large stones Droughty	1.00 1.00 0.97
109: Povey-----	50	Very limited Too steep Large stones Frost action	1.00 1.00 0.50	Very limited Too steep Large stones Depth to hard bedrock Unstable excavation walls	1.00 1.00 0.42 0.10	Very limited Too steep Large stones Droughty	1.00 1.00 0.97
Middlehill-----	30	Very limited Too steep Large stones Depth to hard bedrock Frost action	1.00 1.00 0.90 0.50	Very limited Depth to hard bedrock Too steep Unstable excavation walls Large stones	1.00 1.00 1.00 1.00 1.00	Very limited Too steep Large stones Droughty Depth to bedrock Gravel	1.00 1.00 1.00 0.90 0.26

Soil Survey of City of Rocks National Reserve, Idaho

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
111: Raftriver-----	85	Somewhat limited Depth to thick cemented pan Frost action	0.54 0.50	Very limited Depth to thick cemented pan Unstable excavation walls Depth to thin cemented pan	1.00 1.00 0.54	Somewhat limited Depth to cemented pan	0.54
116: Riceton-----	85	Somewhat limited Frost action	0.50	Very limited Unstable excavation walls	1.00	Very limited Droughty Too sandy	1.00 0.50
123: Kanlee-----	35	Very limited Too steep Shrink-swell Frost action Depth to hard bedrock	1.00 0.50 0.50 0.10	Very limited Depth to hard bedrock Too steep Depth to soft bedrock Unstable excavation walls	1.00 1.00 1.00 0.90 0.10	Very limited Too steep Depth to bedrock Droughty	1.00 0.90 0.90
Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Very limited Too steep Frost action	1.00 0.50	Very limited Unstable excavation walls Too steep	1.00 1.00	Very limited Droughty Too steep Gravel	1.00 1.00 0.88
124: Ola, cool-----	35	Very limited Too steep Frost action	1.00 0.50	Very limited Too steep Unstable excavation walls Depth to soft bedrock	1.00 1.00 0.46	Very limited Too steep Droughty Depth to bedrock	1.00 1.00 0.46
Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Very limited Too steep Frost action	1.00 0.50	Very limited Too steep Unstable excavation walls	1.00 1.00	Very limited Too steep Droughty Gravel	1.00 1.00 0.88
166: Chokecherry-----	80	Very limited Depth to soft bedrock Too steep Large stones Frost action	1.00 1.00 0.36 0.50	Very limited Depth to soft bedrock Too steep Large stones Unstable excavation walls	1.00 1.00 0.36 0.10	Very limited Depth to bedrock Droughty Too steep Large stones Gravel	1.00 1.00 1.00 0.61 0.36

Soil Survey of City of Rocks National Reserve, Idaho

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
167: Povey-----	40	Very limited Too steep Large stones Frost action	1.00 1.00 0.50	Very limited Too steep Large stones Depth to hard bedrock Unstable excavation walls	1.00 1.00 0.42 0.10	Very limited Too steep Large stones Droughty	1.00 1.00 0.97
Nurkey-----	30	Very limited Too steep Shrink-swell Frost action	1.00 0.50 0.50	Very limited Too steep Unstable excavation walls	1.00 1.00	Very limited Too steep	1.00
168: Kanlee-----	80	Very limited Too steep Shrink-swell Frost action Depth to hard bedrock	1.00 0.50 0.50 0.10	Very limited Depth to hard bedrock Unstable excavation walls Too steep Depth to soft bedrock	1.00 1.00 1.00 1.00 0.54	Very limited Too steep Depth to bedrock Droughty	1.00 0.54 0.79
169: Povey-----	60	Very limited Too steep Large stones Frost action	1.00 1.00 0.50	Very limited Too steep Large stones Depth to hard bedrock Unstable excavation walls	1.00 1.00 0.42 0.10	Very limited Too steep Large stones Droughty	1.00 1.00 0.97
Ola, cool-----	20	Very limited Too steep Frost action	1.00 0.50	Very limited Too steep Unstable excavation walls Depth to soft bedrock	1.00 1.00 0.46	Very limited Too steep Droughty Depth to bedrock	1.00 1.00 0.46
170: Howcan-----	35	Somewhat limited Shrink-swell Slope Frost action	0.50 0.04 0.50	Very limited Unstable excavation walls Slope	1.00 0.04	Somewhat limited Gravel Slope Droughty Large stones	0.87 0.04 0.14 0.05
Searla-----	30	Somewhat limited Shrink-swell Slope Frost action	0.50 0.04 0.50	Somewhat limited Slope Unstable excavation walls	0.04 0.10	Somewhat limited Droughty Large stones Slope	0.40 0.32 0.04
171: Howcan-----	40	Very limited Too steep Shrink-swell Frost action	1.00 0.50 0.50	Very limited Unstable excavation walls Too steep	1.00 1.00	Very limited Too steep Gravel Droughty Large stones	1.00 0.87 0.14 0.05

Soil Survey of City of Rocks National Reserve, Idaho

Table 19.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
171: Searla-----	25	Very limited Too steep Shrink-swell Frost action	1.00 0.50 0.50	Very limited Too steep Unstable excavation walls	1.00 0.10	Very limited Too steep Droughty Large stones	1.00 0.40 0.32

Soil Survey of City of Rocks National Reserve, Idaho

Table 20.--Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Somewhat limited Slow water movement	0.48	Very limited Slope Seepage	1.00 0.52
19: Birchcreek, thin surface-----	80	Very limited Shallow depth to bedrock Too steep Large stones	1.00 1.00 0.44	Very limited Depth to hard bedrock Slope Large stones	1.00 1.00 1.00
21: Birchcreek, moist---	45	Very limited Shallow depth to bedrock Slow water movement Too steep Large stones	1.00 1.00 1.00 0.63	Very limited Depth to hard bedrock Slope Large stones	1.00 1.00 1.00
Itca-----	30	Very limited Shallow depth to bedrock Too steep Large stones	1.00 1.00 1.00	Very limited Depth to hard bedrock Slope Large stones	1.00 1.00 1.00
26: Chayson-----	90	Very limited Depth to cemented pan Slow water movement	1.00 0.48	Very limited Depth to cemented pan Slope Seepage	1.00 0.92 0.52
32: Conneridge, extremely stony surface-----	85	Very limited Shallow depth to bedrock Too steep	1.00 1.00	Very limited Depth to hard bedrock Slope Seepage Large stones	1.00 1.00 0.52 0.41
36: Cumulic Endoaquolls	85	Very limited Flooding Depth to saturated zone Slow water movement Seepage, bottom layer	1.00 1.00 1.00 1.00	Very limited Flooding Seepage Depth to saturated zone	1.00 1.00 1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
78: Hymas-----	45	Very limited Shallow depth to bedrock Large stones Too steep	1.00 1.00 1.00	Very limited Depth to hard bedrock Slope Large stones Seepage	1.00 1.00 1.00 0.52
Bezzant-----	40	Very limited Slow water movement Too steep Large stones	1.00 1.00 0.44	Very limited Slope Large stones Seepage	1.00 0.84 0.52
84: Itca-----	35	Very limited Shallow depth to bedrock Too steep Large stones	1.00 1.00 1.00	Very limited Depth to hard bedrock Slope Large stones	1.00 1.00 1.00
Birchcreek, moist---	25	Very limited Shallow depth to bedrock Slow water movement Too steep Large stones	1.00 1.00 1.00 0.63	Very limited Depth to hard bedrock Slope Large stones	1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated	
86: Jimsage-----	50	Very limited Too steep Seepage, bottom layer	1.00 1.00	Very limited Slope Seepage	1.00 1.00
Doodlelink-----	30	Very limited Too steep Slow water movement	1.00 0.48	Very limited Slope Seepage	1.00 0.52
89: Kanlee-----	75	Very limited Shallow depth to bedrock Slow water movement	1.00 1.00	Very limited Depth to hard bedrock Depth to soft bedrock Slope Seepage	1.00 1.00 1.00 1.00
101: Ola-----	90	Very limited Shallow depth to bedrock Slope Slow water movement	1.00 0.84 0.48	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
102: Pachic Haplocryolls	90	Very limited Too steep Slow water movement Large stones	 1.00 1.00 0.11	Very limited Slope Seepage	 1.00 0.52
107: Poisonhol, extremely stony surface-----	90	Very limited Depth to cemented pan Large stones Slope Slow water movement	 1.00 0.97 0.63 0.48	Very limited Depth to cemented pan Slope Large stones Seepage	 1.00 1.00 1.00 0.52
108: Povey-----	75	Very limited Too steep Large stones Moderate depth to bedrock Slow water movement	 1.00 1.00 0.77 0.48	Very limited Slope Large stones Seepage Depth to hard bedrock	 1.00 1.00 0.52 0.42
109: Povey-----	50	Very limited Too steep Large stones Moderate depth to bedrock Slow water movement	 1.00 1.00 0.77 0.48	Very limited Slope Large stones Seepage Depth to hard bedrock	 1.00 1.00 0.52 0.42
Middlehill-----	30	Very limited Shallow depth to bedrock Too steep Seepage, bottom layer Large stones Filtering capacity	 1.00 1.00 1.00 1.00 1.00	Very limited Depth to hard bedrock Slope Large stones Seepage	 1.00 1.00 1.00 1.00
111: Raftriver-----	85	Very limited Depth to cemented pan Slow water movement	 1.00 0.48	Very limited Depth to cemented pan Seepage Slope	 1.00 0.52 0.08
116: Riceton-----	85	Very limited Seepage, bottom layer	 1.00	Very limited Seepage Slope	 1.00 1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
123: Kanlee-----	35	Very limited Shallow depth to bedrock Too steep Seepage, bottom layer	1.00 1.00 1.00	Very limited Depth to hard bedrock Depth to soft bedrock Seepage Slope	1.00 1.00 1.00 1.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Very limited Seepage, bottom layer Too steep	1.00 1.00	Very limited Seepage Slope	1.00 1.00
124: Ola, cool-----	35	Very limited Shallow depth to bedrock Too steep Seepage, bottom layer	1.00 1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 1.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Very limited Too steep Seepage, bottom layer	1.00 1.00	Very limited Slope Seepage	1.00 1.00
166: Chokecherry-----	80	Very limited Shallow depth to bedrock Too steep Seepage, bottom layer Large stones	1.00 1.00 1.00 0.36	Very limited Depth to soft bedrock Seepage Large stones Slope	1.00 1.00 1.00 1.00
167: Povey-----	40	Very limited Too steep Large stones Moderate depth to bedrock Slow water movement	1.00 1.00 0.77 0.48	Very limited Slope Large stones Seepage Depth to hard bedrock	1.00 1.00 0.52 0.42
Nurkey-----	30	Very limited Too steep Seepage, bottom layer Slow water movement	1.00 1.00 0.48	Very limited Slope Seepage	1.00 1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 20.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
168: Kanlee-----	80	Very limited Shallow depth to bedrock Too steep Slow water movement	1.00 1.00 1.00	Very limited Depth to hard bedrock Depth to soft bedrock Slope Seepage	1.00 1.00 1.00 1.00
169: Povey-----	60	Very limited Too steep Large stones Moderate depth to bedrock Slow water movement	1.00 1.00 0.77 0.48	Very limited Slope Large stones Seepage Depth to hard bedrock	1.00 1.00 0.52 0.42
Ola, cool-----	20	Very limited Shallow depth to bedrock Too steep Seepage, bottom layer	1.00 1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 1.00
170: Howcan-----	35	Somewhat limited Slow water movement Slope	0.48 0.04	Very limited Slope Seepage	1.00 0.52
Searla-----	30	Very limited Slow water movement Seepage, bottom layer Slope	1.00 1.00 0.04	Very limited Slope Seepage	1.00 1.00
171: Howcan-----	40	Very limited Too steep Slow water movement	1.00 0.48	Very limited Slope Seepage	1.00 0.52
Searla-----	25	Very limited Slow water movement Too steep Seepage, bottom layer	1.00 1.00 1.00	Very limited Slope Seepage	1.00 1.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 21.--Construction Materials (Part I)

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the values columns range from 0.00 to 1.00. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Fair	
19: Birchcreek, thin surface-----	80	Fair Thickest layer Bottom layer	0.00 0.37	Poor Bottom layer Thickest layer	0.00 0.00	Poor Slope Rock fragments Depth to bedrock	0.00 0.00 0.03
21: Birchcreek, moist---	45	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Too clayey Slope Rock fragments Depth to bedrock	0.00 0.00 0.00 0.65
Itca-----	30	Fair Thickest layer Bottom layer	0.07 0.20	Poor Bottom layer Thickest layer	0.00 0.00	Poor Depth to bedrock Slope Rock fragments Too clayey	0.00 0.00 0.00 0.00
26: Chayson-----	90	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Depth to cemented pan Rock fragments	0.36 0.00
32: Conneridge, extremely stony surface-----	85	Fair Thickest layer Bottom layer	0.00 0.37	Poor Bottom layer Thickest layer	0.00 0.00	Poor Slope Rock fragments Depth to bedrock	0.00 0.00 0.05
36: Cumulic Endoaquolls	85	Poor Thickest layer Bottom layer	0.00 0.00	Poor Thickest layer Bottom layer	0.00 0.01	Fair Wetness depth Too clayey	0.53 0.96
78: Hymas-----	45	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Depth to bedrock Rock fragments Slope	0.00 0.00 0.00
Bezzant-----	40	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Hard to reclaim (rock fragments) Rock fragments Slope Carbonate content	0.00 0.00 0.00 0.82

Soil Survey of City of Rocks National Reserve, Idaho

Table 21.--Construction Materials (Part I)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
84: Itca-----	35	Fair Thickest layer Bottom layer	0.07 0.20	Poor Bottom layer Thickest layer	0.00 0.00	Poor Depth to bedrock Slope Rock fragments Too clayey	0.00 0.00 0.00 0.00
Birchcreek, moist---	25	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Too clayey Slope Rock fragments Depth to bedrock	0.00 0.00 0.00 0.65
Rock outcrop-----	20	Not rated		Not rated		Not rated	
86: Jimsage-----	50	Fair Thickest layer Bottom layer	0.34 0.34	Poor Thickest layer Bottom layer	0.00 0.04	Poor Hard to reclaim (rock fragments) Rock fragments Slope	0.00 0.00 0.00
Doodlelink-----	30	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Hard to reclaim (rock fragments) Rock fragments Slope	0.00 0.00 0.00
89: Kanlee-----	75	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Rock fragments Depth to bedrock	0.00 0.46
101: Ola-----	90	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.02	Fair Slope Depth to bedrock	0.16 0.54
102: Pachic Haplocryolls	90	Fair Thickest layer Bottom layer	0.00 0.10	Poor Bottom layer Thickest layer	0.00 0.00	Poor Rock fragments Slope Hard to reclaim (rock fragments)	0.00 0.00 0.00
107: Poisonhol, extremely stony surface-----	90	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Rock fragments Slope Sodium content Carbonate content	0.00 0.37 0.90 0.97
108: Povey-----	75	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Hard to reclaim (rock fragments) Slope Rock fragments	0.00 0.00 0.00

Soil Survey of City of Rocks National Reserve, Idaho

Table 21.--Construction Materials (Part I)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
109: Povey-----	50	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Hard to reclaim (rock fragments) Slope Rock fragments	0.00 0.00 0.00
Middlehill-----	30	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Slope Rock fragments Too sandy Depth to bedrock	0.00 0.00 0.00 0.10
111: Raftriver-----	85	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Fair Depth to cemented pan Sodium content Carbonate content	0.46 0.90 0.98
116: Riceton-----	85	Poor Thickest layer Bottom layer	0.00 0.00	Fair Thickest layer Bottom layer	0.05 0.27	Fair	
123: Kanlee-----	35	Poor Thickest layer Bottom layer	0.00 0.00	Poor Thickest layer Bottom layer	0.00 0.04	Poor Slope Depth to bedrock	0.00 0.10
Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Fair Thickest layer Bottom layer	0.00 0.43	Fair Thickest layer Bottom layer	0.06 0.12	Poor Rock fragments Hard to reclaim (rock fragments) Slope	0.00 0.00 0.00
124: Ola, cool-----	35	Poor Thickest layer Bottom layer	0.00 0.00	Poor Thickest layer Bottom layer	0.04 0.05	Poor Slope Depth to bedrock	0.00 0.54
Rock outcrop-----	30	Not rated		Not rated		Not rated	
Earcree-----	25	Fair Thickest layer Bottom layer	0.00 0.43	Fair Thickest layer Bottom layer	0.06 0.12	Poor Slope Rock fragments Hard to reclaim (rock fragments)	0.00 0.00 0.00
166: Chokecherry-----	80	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Rock fragments Depth to bedrock Slope	0.00 0.00 0.00

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Table 21.--Construction Materials (Part I)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
167: Povey-----	40	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Hard to reclaim (rock fragments) Slope Rock fragments	0.00 0.00 0.00
Nurkey-----	30	Fair Thickest layer Bottom layer	0.11 0.10	Poor Thickest layer Bottom layer	0.00 0.01	Poor Rock fragments Slope Hard to reclaim (rock fragments)	0.00 0.00 0.00
168: Kanlee-----	80	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Slope Rock fragments Depth to bedrock	0.00 0.00 0.46
169: Povey-----	60	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Hard to reclaim (rock fragments) Slope Rock fragments	0.00 0.00 0.00
Ola, cool-----	20	Poor Thickest layer Bottom layer	0.00 0.00	Poor Thickest layer Bottom layer	0.04 0.05	Poor Slope Depth to bedrock	0.00 0.54
170: Howcan-----	35	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Rock fragments Hard to reclaim (rock fragments) Slope	0.00 0.00 0.96
Searla-----	30	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Hard to reclaim (rock fragments) Rock fragments Too clayey Slope	0.00 0.00 0.70 0.96
171: Howcan-----	40	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Rock fragments Slope Hard to reclaim (rock fragments)	0.00 0.00 0.00
Searla-----	25	Poor Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00	Poor Hard to reclaim (rock fragments) Rock fragments Slope Too clayey	0.00 0.00 0.00 0.70

Soil Survey of City of Rocks National Reserve, Idaho

Table 22.--Construction Materials (Part II)

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the values columns range from 0.00 to 1.00. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Fair Water erosion Carbonate content	0.90 0.97	Good	
19: Birchcreek, thin surface-----	80	Poor Droughty Stone content Depth to bedrock	0.00 0.00 0.03	Poor Depth to bedrock Slope Stones Cobble content Shrink-swell	0.00 0.00 0.00 0.76 0.87
21: Birchcreek, moist---	45	Poor Too clayey Droughty Stone content Depth to bedrock Low organic matter content	0.00 0.00 0.00 0.65 0.88	Poor Depth to bedrock Slope Stones Low strength Shrink-swell	0.00 0.00 0.00 0.00 0.87
Itca-----	30	Poor Stone content Droughty Depth to bedrock Too clayey Cobble content	0.00 0.00 0.00 0.00 0.99	Poor Depth to bedrock Slope Stones Cobble content Shrink-swell	0.00 0.00 0.00 0.35 0.87
26: Chayson-----	90	Poor Droughty Depth to cemented pan Sodium content Carbonate content	0.00 0.36 0.22 0.97	Poor Depth to cemented pan Shrink-swell	0.00 0.87
32: Conneridge, extremely stony surface-----	85	Poor Droughty Stone content Depth to bedrock Carbonate content	0.00 0.32 0.05 0.46	Poor Depth to bedrock Slope Stones	0.00 0.00 0.32
36: Cumulic Endoaquolls	85	Fair Too clayey	0.96	Fair Wetness depth Shrink-swell	0.53 0.99

Soil Survey of City of Rocks National Reserve, Idaho

Table 22.--Construction Materials (Part II)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
78: Hymas-----	45	Poor Stone content Droughty Depth to bedrock Carbonate content Cobble content	 0.00 0.00 0.00 0.32 0.99	Poor Depth to bedrock Stones Cobble content Slope	 0.00 0.00 0.34 0.50
Bezzant-----	40	Fair Carbonate content Low organic matter content Cobble content Droughty	 0.01 0.50 0.50 0.95	Poor Cobble content Shrink-swell	 0.00 0.87
84: Itca-----	35	Poor Stone content Droughty Depth to bedrock Too clayey Cobble content	 0.00 0.00 0.00 0.00 0.99	Poor Depth to bedrock Slope Stones Cobble content Shrink-swell	 0.00 0.00 0.00 0.35 0.87
Birchcreek, moist---	25	Poor Too clayey Droughty Stone content Depth to bedrock Low organic matter content	 0.00 0.00 0.00 0.65 0.88	Poor Depth to bedrock Slope Stones Low strength Shrink-swell	 0.00 0.00 0.00 0.00 0.87
Rock outcrop-----	20	Not rated		Not rated	
86: Jimsage-----	50	Fair Droughty Low organic matter content	 0.12 0.88	Poor Slope	 0.00
Doodlelink-----	30	Fair Droughty	 0.99	Poor Slope Cobble content Shrink-swell	 0.00 0.86 0.87
89: Kanlee-----	75	Poor Droughty Depth to bedrock	 0.00 0.46	Poor Depth to bedrock Shrink-swell	 0.00 0.87
101: Ola-----	90	Poor Droughty Depth to bedrock	 0.00 0.54	Poor Depth to bedrock	 0.00
102: Pachic Haplocryolls	90	Poor Stone content Droughty Low organic matter content	 0.00 0.28 0.88	Poor Stones Slope Shrink-swell Cobble content	 0.27 0.00 0.87 0.90

Soil Survey of City of Rocks National Reserve, Idaho

Table 22.--Construction Materials (Part II)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
107: Poisonhol, extremely stony surface-----	90	Poor Droughty Stone content Carbonate content Cobble content Low organic matter content	 0.00 0.12 0.68 0.71 0.88	Poor Depth to cemented pan Stones Cobble content	 0.00 0.12 0.00
108: Povey-----	75	Poor Stone content Droughty	 0.00 0.00	Poor Slope Stones Depth to bedrock Cobble content	 0.00 0.00 0.58 0.86
109: Povey-----	50	Poor Stone content Droughty	 0.00 0.00	Poor Stones Slope Depth to bedrock Cobble content	 0.00 0.00 0.58 0.86
Middlehill-----	30	Poor Stone content Droughty Low organic matter content Too sandy Depth to bedrock	 0.00 0.00 0.12 0.00 0.10	Poor Depth to bedrock Stones Slope Cobble content	 0.00 0.00 0.00 0.87
111: Raftriver-----	85	Fair Depth to cemented pan Droughty Low organic matter content Carbonate content Sodium content	 0.46 0.33 0.50 0.68 0.90	Poor Depth to cemented pan	 0.00
116: Riceton-----	85	Poor Wind erosion Droughty	 0.00 0.00	Good	
123: Kanlee-----	35	Poor Droughty Depth to bedrock	 0.00 0.10	Poor Depth to bedrock Shrink-swell Slope	 0.00 0.87 0.92
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Poor Droughty	 0.00	Fair Slope	 0.92

Soil Survey of City of Rocks National Reserve, Idaho

Table 22.--Construction Materials (Part II)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
124: Ola, cool-----	35	Poor Droughty Depth to bedrock	0.00 0.54	Poor Depth to bedrock Slope	0.00 0.00
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Poor Droughty	0.00	Poor Slope	0.00
166: Chokecherry-----	80	Poor Droughty Depth to bedrock Cobble content	0.00 0.00 0.64	Poor Depth to bedrock Cobble content Slope	0.00 0.00 0.92
167: Povey-----	40	Poor Stone content Droughty	0.00 0.00	Poor Stones Depth to bedrock Slope Cobble content	0.00 0.58 0.00 0.86
Nurkey-----	30	Fair Low organic matter content Droughty	0.01 0.79	Fair Cobble content	0.84
168: Kanlee-----	80	Poor Droughty Depth to bedrock	0.00 0.46	Poor Depth to bedrock Slope Shrink-swell	0.00 0.50 0.87
169: Povey-----	60	Poor Stone content Droughty	0.00 0.00	Poor Slope Stones Depth to bedrock Cobble content	0.00 0.00 0.58 0.86
Ola, cool-----	20	Poor Droughty Depth to bedrock	0.00 0.54	Poor Depth to bedrock Slope	0.00 0.00
170: Howcan-----	35	Poor Stone content Low organic matter content Droughty	0.00 0.50 0.76	Fair Stones Cobble content	0.79 0.99
Searla-----	30	Fair Low organic matter content Droughty Too clayey	0.12 0.30 0.98	Fair Cobble content	0.85

Soil Survey of City of Rocks National Reserve, Idaho

Table 22.--Construction Materials (Part II)--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
171: Howcan-----	40	Poor Stone content Low organic matter content Droughty	 0.00 0.50 0.76	Poor Slope Stones Cobble content	 0.00 0.79 0.99
Searla-----	25	Fair Low organic matter content Droughty Too clayey	 0.12 0.30 0.98	Poor Slope Cobble content	 0.00 0.85

Soil Survey of City of Rocks National Reserve, Idaho

Table 23.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6: Arbone-----	85	Very limited Slope Seepage	1.00 0.72	Very limited Piping	1.00
19: Birchcreek, thin surface-----	80	Very limited Slope Depth to bedrock	1.00 0.99	Somewhat limited Large stones Thin layer Seepage	0.44 0.99 0.68
21: Birchcreek, moist---	45	Very limited Slope Depth to bedrock	1.00 0.83	Somewhat limited Large stones Thin layer	0.63 0.83
Itca-----	30	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Thin layer Large stones Seepage	1.00 1.00 0.10
26: Chayson-----	90	Somewhat limited Seepage Slope Depth to cemented pan	0.72 0.68 0.91	Somewhat limited Piping Thin layer	0.78 0.91
32: Conneridge, extremely stony surface-----	85	Very limited Slope Seepage Depth to bedrock	1.00 0.72 0.99	Very limited Seepage Thin layer	1.00 0.99
36: Cumulic Endoaquolls	85	Very limited Seepage	1.00	Very limited Depth to saturated zone Piping	1.00 0.40
78: Hymas-----	45	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Thin layer Piping Large stones	1.00 1.00 1.00
Bezzant-----	40	Very limited Slope Seepage	1.00 0.72	Somewhat limited Large stones	0.44

Soil Survey of City of Rocks National Reserve, Idaho

Table 23.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees	
		Rating class and limiting features	Value	Rating class and limiting features	Value
84: Itca-----	35	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Thin layer Large stones Seepage	1.00 1.00 0.10
Birchcreek, moist---	25	Very limited Slope Depth to bedrock	1.00 0.83	Somewhat limited Large stones Thin layer	0.63 0.83
Rock outcrop-----	20	Not rated		Not rated	
86: Jimsage-----	50	Very limited Seepage Slope	1.00 1.00	Very limited Seepage	1.00
Doodlelink-----	30	Very limited Slope Seepage	1.00 0.72	Not limited	
89: Kanlee-----	75	Very limited Slope Seepage Depth to bedrock	1.00 0.03 0.69	Somewhat limited Thin layer	0.88
101: Ola-----	90	Very limited Seepage Slope Depth to bedrock	1.00 1.00 0.11	Somewhat limited Thin layer	0.86
102: Pachic Haplocryolls	90	Very limited Slope Seepage	1.00 0.72	Somewhat limited Large stones	0.11
107: Poisonhol, extremely stony surface-----	90	Very limited Slope Seepage Depth to cemented pan	1.00 0.72 0.52	Somewhat limited Large stones Piping Thin layer	0.97 0.10 0.52
108: Povey-----	75	Very limited Slope Seepage Depth to bedrock	1.00 0.72 0.10	Very limited Large stones Seepage Thin layer	1.00 0.39 0.11
109: Povey-----	50	Very limited Slope Seepage Depth to bedrock	1.00 0.72 0.10	Very limited Large stones Seepage Thin layer	1.00 0.39 0.11

Soil Survey of City of Rocks National Reserve, Idaho

Table 23.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees	
		Rating class and limiting features	Value	Rating class and limiting features	Value
109: Middlehill-----	30	Very limited Seepage Slope Depth to bedrock	 1.00 1.00 0.98	Very limited Seepage Large stones Thin layer	 1.00 1.00 0.98
111: Raftriver-----	85	Somewhat limited Seepage Depth to cemented pan	 0.72 0.88	Very limited Piping Thin layer	 1.00 0.88
116: Riceton-----	85	Very limited Seepage Slope	 1.00 1.00	Somewhat limited Seepage	 0.58
123: Kanlee-----	35	Very limited Seepage Slope Depth to bedrock	 1.00 1.00 0.69	Somewhat limited Thin layer	 0.98
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Very limited Seepage Slope	 1.00 1.00	Very limited Seepage	 1.00
124: Ola, cool-----	35	Very limited Seepage Slope Depth to bedrock	 1.00 1.00 0.11	Somewhat limited Thin layer	 0.86
Rock outcrop-----	30	Not rated		Not rated	
Earcree-----	25	Very limited Seepage Slope	 1.00 1.00	Very limited Seepage	 1.00
166: Chokecherry-----	80	Very limited Slope Depth to bedrock	 1.00 0.69	Very limited Seepage Thin layer Large stones	 1.00 1.00 0.36
167: Povey-----	40	Very limited Slope Seepage Depth to bedrock	 1.00 0.72 0.10	Very limited Large stones Seepage Thin layer	 1.00 0.39 0.11
Nurkey-----	30	Very limited Seepage Slope	 1.00 1.00	Somewhat limited Seepage	 0.50

Soil Survey of City of Rocks National Reserve, Idaho

Table 23.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees	
		Rating class and limiting features	Value	Rating class and limiting features	Value
168: Kanlee-----	80	Very limited Slope Seepage Depth to bedrock	1.00 0.03 0.69	Somewhat limited Thin layer	0.88
169: Povey-----	60	Very limited Slope Seepage Depth to bedrock	1.00 0.72 0.10	Very limited Large stones Seepage Thin layer	1.00 0.39 0.11
Ola, cool-----	20	Very limited Seepage Slope Depth to bedrock	1.00 1.00 0.11	Somewhat limited Thin layer	0.86
170: Howcan-----	35	Very limited Slope Seepage	1.00 0.72	Not limited	
Searla-----	30	Very limited Slope Seepage	1.00 1.00	Not limited	
171: Howcan-----	40	Very limited Slope Seepage	1.00 0.72	Not limited	
Searla-----	25	Very limited Slope Seepage	1.00 1.00	Not limited	

Table 24.--Engineering Properties

(Absence of an entry indicates that the data were not estimated. An asterisk (*) denotes the representative texture and classification; other possible textures and classifications follow.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
6: Arbone-----	0-10	*Loam	*CL	*A-4, A-6	0	0	91-100	91-100	78-90	55-66	25-35	8-12
	10-35	*Loam	*CL	*A-4, A-6	0	0	91-100	91-100	78-90	55-66	25-35	8-12
	35-60	*Loam, silt loam	*CL	*A-4, A-6	0	0	84-100	83-100	71-90	50-66	24-31	8-12
19: Birchcreek, thin surface---	0-8	*Extremely stony loam	*GC, CL, GP-GC	*A-6, A-7, A-2	12-36	12-30	22-80	19-79	16-74	11-55	27-41	9-17
	8-15	*Very gravelly clay loam, very cobbly clay loam, very stony clay loam	*GC, CH	*A-7, A-2	6-38	13-44	40-71	37-70	32-68	25-54	39-53	19-29
	15-22	*Extremely gravelly clay, very cobbly clay, very stony clay	*GP-GC, GC	*A-2	0	13-32	13-36	9-33	8-33	7-29	50-66	29-40
	22-32	*Unweathered bedrock			---	---	---	---	---	---	---	---
21: Birchcreek, moist-----	0-5	*Very stony loam	*GC, CL	*A-6, A-7, A-2	22-52	15-45	49-77	47-76	39-71	28-53	27-41	9-17
	5-9	*Very gravelly clay loam, very cobbly clay loam, very stony clay loam	*GC, CH	*A-7, A-2	6-38	7-38	40-71	37-70	32-68	25-54	39-53	19-29
	9-31	*Very stony clay, very cobbly clay, extremely gravelly clay	*CH, GC	*A-7, A-2	14-37	7-32	21-77	18-77	15-76	13-67	50-66	29-40
	31-41	*Unweathered bedrock			---	---	---	---	---	---	---	---
Itca-----	0-3	*Very stony loam	*SC, GC-GM, CL	*A-4, A-2, A-6	15-46	7-32	48-94	46-94	38-86	27-63	26-37	7-13
	3-17	*Extremely stony clay, extremely stony clay loam, extremely cobbly clay loam, very cobbly clay	*GC, GP-GC, CH	*A-2, A-7	26-32	26-32	21-73	18-72	16-70	12-57	45-58	25-32
	17-27	*Unweathered bedrock			---	---	---	---	---	---	---	---

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
26: Chayson-----	0-3	*Gravelly silt loam	*GM, GC, ML	*A-6, A-7, A-4	0	0	56-75	54-74	48-73	40-62	29-45	9-17
	3-18	*Gravelly clay loam, silty clay loam, silt loam	*GC, ML	*A-6, A-7, A-2	0	0-15	57-91	55-91	46-85	32-62	36-45	16-18
	18-28	*Gravelly loam, very gravelly loam	*SC, GC, CL	*A-4, A-6, A-2	0	0-13	50-83	48-82	41-77	29-57	25-34	8-11
	28-32	*Cemented material			---	---	---	---	---	---	---	---
32: Conneridge, extremely stony surface--	0-3	*Very gravelly loam	*GC	*A-2, A-7	14-38	7-19	38-69	36-68	30-64	21-48	28-43	9-17
	3-7	*Very gravelly loam, gravelly loam	*GC	*A-2, A-6	0	0-19	36-68	34-67	28-63	20-47	26-39	9-17
	7-13	*Very stony loam, very gravelly loam, gravelly loam	*GC, CL	*A-2, A-6	24-51	0-19	39-74	36-73	30-69	21-51	26-39	9-17
	13-17	*Very gravelly loam, extremely gravelly loam, very cobbly loam	*GC, GP-GC	*A-2	0	12-39	19-47	15-44	13-41	9-30	23-33	7-13
	17-23	*Extremely gravelly loam, very cobbly loam, very gravelly loam	*GP-GC, GC	*A-2	0	12-37	13-36	10-34	8-31	6-23	23-33	7-13
	23-33	*Unweathered bedrock			---	---	---	---	---	---	---	---
36: Cumulic Endoaquolls----	0-28	*Clay loam	*MH, ML, OH	*A-7	0	0	94-100	94-100	82-94	63-74	48-66	19-24
	28-40	*Sandy clay loam	*SC, CL	*A-6, A-7	0	0	95-100	95-100	78-93	41-55	29-45	12-21
	40-60	*Sandy loam	*SC-SM, SM, SC	*A-4, A-2	0	0	94-100	94-100	69-84	35-48	17-31	2-10
78: Hymas-----	0-11	*Very stony loam	*CL, CL-ML	*A-4, A-6	20-47	13-35	76-93	75-93	67-91	54-75	22-35	6-12
	11-15	*Very stony loam, extremely stony loam, very cobbly loam, extremely cobbly loam	*CL, SC-SM	*A-4, A-6	20-46	13-34	77-94	76-94	64-86	44-62	21-31	6-12
	15-25	*Unweathered bedrock			---	---	---	---	---	---	---	---

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
78: Bezzant-----	0-15	*Cobbly loam	*CL, ML, GC	*A-6, A-7	0	19-31	66-88	65-88	55-83	41-63	31-47	11-18
	15-23	*Very cobbly loam, very gravelly loam	*GC	*A-2, A-7	0	15-46	36-68	34-66	29-62	21-47	29-43	12-18
	23-31	*Very cobbly clay loam, extremely cobbly clay loam, extremely cobbly sandy clay loam	*GC, CL	*A-6, A-7, A-2	0	29-51	27-70	24-69	20-67	15-54	29-45	13-25
	31-60	*Very cobbly loam, very cobbly sandy clay loam, cobbly sandy clay loam	*GC, CL	*A-2, A-7	0	24-46	34-69	31-68	27-68	19-54	27-45	12-25
84: Itca-----	0-3	*Very stony loam	*GC, GC-GM, CL	*A-4, A-2, A-6	15-46	7-32	48-94	46-94	38-86	27-63	26-37	7-13
	3-17	*Extremely stony clay, extremely stony clay loam, extremely cobbly clay loam, very cobbly clay	*GC, CH, GP-GC	*A-2, A-7	26-32	26-32	21-73	18-72	16-70	12-57	45-58	25-32
	17-27	*Unweathered bedrock			---	---	---	---	---	---	---	---
Birchcreek, moist-----	0-5	*Very stony loam	*GC, CL	*A-6, A-7, A-2	22-52	15-45	49-77	47-76	39-71	28-53	27-41	9-17
	5-9	*Very gravelly clay loam, very cobbly clay loam, very stony clay loam	*GC, CH	*A-7, A-2	6-38	7-38	40-71	37-70	32-68	25-54	39-53	19-29
	9-31	*Very stony clay, very cobbly clay, extremely gravelly clay	*CH, GC	*A-7, A-2	14-37	7-32	21-77	18-77	15-76	13-67	50-66	29-40
	31-41	*Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	*Unweathered bedrock			---	---	---	---	---	---	---	---

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
86: Jimsage-----	0-6	*Gravelly loam	*GC, GC-GM, GM	*A-4, A-2	0	0	56-75	54-74	46-66	32-47	25-35	6-10
	6-14	*Very gravelly loam, extremely gravelly loam	*GC, GC-GM	*A-2, A-6	0	7-29	29-64	26-63	22-57	15-41	24-35	7-12
	14-23	*Extremely gravelly loam, very gravelly loam	*GC, GP-GC	*A-2	0	13-34	20-42	17-39	14-36	10-26	23-32	7-12
	23-60	*Extremely gravelly sandy loam, very cobbly sandy loam, extremely cobbly sandy loam, very gravelly sandy loam	*GP-GC, GC	*A-2, A-1	0	23-49	25-52	22-50	16-40	8-20	21-28	6-10
Doodlelink-----	0-10	*Gravelly loam	*GC, CL	*A-6, A-2	0-7	0	57-82	55-82	46-75	33-55	25-38	8-14
	10-60	*Very cobbly loam, very cobbly clay loam	*GC, CL	*A-6, A-7, A-2	0	27-56	44-72	41-70	34-69	26-54	27-44	11-21
89: Kanlee-----	0-10	*Sandy loam	*SC, SC-SM, SM	*A-4, A-6, A-2	0	0	100	100	73-81	35-43	25-37	6-12
	10-14	*Sandy loam, sandy clay loam	*SC, CL	*A-6, A-7	0	0	100	100	76-88	46-58	29-47	12-21
	14-29	*Gravelly sandy clay loam, coarse sandy loam, sandy loam	*GC, SC	*A-2, A-7	0	0	61-92	59-92	47-87	23-49	26-45	9-21
	29-35	*Weathered bedrock			---	---	---	---	---	---	---	---
	35-45	*Unweathered bedrock			---	---	---	---	---	---	---	---
101: Ola-----	0-16	*Sandy loam	*SC-SM, SM	*A-4, A-2	0	0	85-100	85-100	64-82	32-45	23-35	4-10
	16-22	*Sandy loam	*SC-SM, SM	*A-2, A-1, A-4	0	0	67-100	65-100	49-82	25-45	23-35	4-10
	22-30	*Gravelly sandy loam, loam, sandy loam	*SC, SC-SM, CL	*A-4, A-6, A-2	0	0	66-92	64-92	47-77	30-51	22-37	6-13
	30-40	*Weathered bedrock			---	---	---	---	---	---	---	---

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
102: Pachic Haplocryolls---	0-3	*Stony loam	*ML, GC	*A-7, A-6	17-30	3-15	63-94	62-93	53-87	39-66	37-49	13-18
	3-13	*Gravelly loam	*CL, GC, ML	*A-6, A-7	0	8-15	58-81	56-81	49-75	36-57	33-45	13-18
	13-24	*Very gravelly clay loam, very gravelly loam	*GC, GC-GM	*A-6, A-1, A-7	0	7-12	33-56	31-54	22-53	16-41	22-47	6-24
	24-31	*Extremely stony loam, very stony loam, extremely cobbly loam	*GC, CL, GP-GC	*A-2, A-7, A-1	19-32	19-37	22-68	19-67	14-67	10-53	21-47	6-24
	31-45	*Extremely cobbly loam, extremely stony clay loam, very stony loam	*GC, CL, GP-GC	*A-2, A-7, A-1	19-32	19-40	22-68	19-67	14-67	10-53	21-46	6-24
	45-60	*Extremely stony clay loam, very stony loam, extremely cobbly loam	*GC, CL, GP-GC	*A-2, A-7, A-1	19-32	17-37	22-68	19-67	14-65	10-51	21-45	6-25
107: Poisonhol, extremely stony surface--	0-5	*Loam	*CL, SC	*A-6, A-7, A-4	0	0	77-100	76-100	64-94	46-70	29-41	9-17
	5-11	*Very cobbly clay loam, very gravelly loam, very cobbly loam	*GC, CL	*A-7, A-2	0-12	13-44	43-75	40-74	35-70	28-56	38-48	17-23
	11-15	*Very cobbly loam, very gravelly loam, very stony loam	*SC, GC, GC-GM	*A-4, A-6, A-1	12-44	27-63	43-75	40-74	34-68	24-49	21-31	6-12
	15-39	*Extremely cobbly loam, very cobbly loam, very gravelly loam, extremely gravelly loam	*GC, GC-GM	*A-2, A-6, A-1	17-46	31-58	31-63	28-61	24-56	17-41	21-31	6-12
	39-43	*Cemented material			---	---	---	---	---	---	---	---

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
108: Povey-----	0-3	*Very stony loam	*GM	*A-4, A-7, A-2	22-51	13-19	55-77	53-77	45-69	31-50	31-42	7-12
	3-25	*Extremely stony loam, very stony loam	*GM, ML, GC-GM	*A-2, A-6	36-51	7-22	36-87	33-87	28-79	20-57	28-40	7-12
	25-36	*Extremely stony loam, very cobbly sandy loam, extremely gravelly loam	*GC, GP-GC	*A-2	18-42	18-42	18-52	14-50	12-45	8-33	23-31	7-12
	36-50	*Very cobbly sandy loam, extremely stony loam, extremely gravelly loam	*GC-GM, GP-GC, GC	*A-2, A-1	12-39	26-50	29-68	26-67	19-55	11-34	18-27	4-10
	50-60	*Unweathered bedrock			---	---	---	---	---	---	---	---
109: Povey-----	0-3	*Very stony loam	*GM	*A-4, A-7, A-2	22-51	13-19	55-77	53-77	45-69	31-50	31-42	7-12
	3-25	*Extremely stony loam, very stony loam	*GM, GC-GM, ML	*A-2, A-6	36-51	7-22	36-87	33-87	28-79	20-57	28-40	7-12
	25-36	*Extremely stony loam, very cobbly sandy loam, extremely gravelly loam	*GC, GP-GC	*A-2	18-42	18-42	18-52	14-50	12-45	8-33	23-31	7-12
	36-50	*Very cobbly sandy loam, extremely stony loam, extremely gravelly loam	*GC-GM, GP-GC, GC	*A-2, A-1	12-39	26-50	29-68	26-67	19-55	11-34	18-27	4-10
	50-60	*Unweathered bedrock			---	---	---	---	---	---	---	---
Middlehill-----	0-3	*Extremely stony sandy loam	*GP-GC, GC	*A-2, A-1	24-48	12-21	20-57	16-55	12-44	6-24	22-33	6-12
	3-9	*Extremely stony loam, very stony loam, extremely gravelly sandy loam	*GC, GP-GC	*A-2, A-6, A-1	38-59	6-16	18-56	15-54	12-49	9-36	21-31	6-12
	9-16	*Extremely cobbly sandy loam, very stony loam, extremely gravelly sandy loam	*GC-GM, GC, GP-GM	*A-2, A-1	12-37	25-48	22-72	19-71	14-60	7-34	17-31	2-12
	16-24	*Extremely stony loamy coarse sand	*GP-GC, SC, GP	*A-1, A-2	49-69	12-37	25-84	22-83	10-46	3-19	16-27	2-10
	24-34	*Unweathered bedrock			---	---	---	---	---	---	---	---

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
111: Raftriver-----	0-4	*Loam	*CL, SC-SM	*A-4, A-6	0	0-8	76-91	75-90	62-84	43-61	22-37	6-13
	4-8	*Silt loam, loam	*CL, CL-ML	*A-4, A-6	0	0	80-92	79-92	70-89	56-73	21-32	6-12
	8-13	*Silt loam, loam	*CL, CL-ML	*A-4, A-6	0	0	80-100	79-100	70-97	56-79	21-31	6-12
	13-23	*Loam, Silt loam	*CL, CL-ML	*A-4, A-6	0	0	100	100	83-93	57-67	21-32	6-13
	23-29	*Very gravelly sandy loam, very gravelly loam	*GC-GM, GC, GM	*A-1, A-2	0	0	40-55	38-53	27-43	15-27	16-27	2-10
	29-39	*Cemented material			---	---	---	---	---	---	---	---
116: Riceton-----	0-7	*Loamy coarse sand	*SM	*A-2	0	0	100	100	51-59	17-25	0-29	NP-6
	7-23	*Coarse sandy loam	*SC-SM, SC, SM	*A-4, A-2	0	0	100	100	59-69	33-43	18-31	2-10
	23-33	*Gravelly coarse sandy loam	*SC-SM, SC, SM	*A-1, A-2	0	0	62-79	60-78	35-54	20-34	18-31	2-10
	33-44	*Gravelly coarse sandy loam, gravelly loamy coarse sand	*SC-SM, SM, SC	*A-1, A-2	0	0	62-80	61-79	35-54	15-27	16-27	2-10
	44-60	*Gravelly loamy coarse sand	*SC-SM, SW-SM, SC	*A-1, A-2	0	0	62-80	61-79	26-42	7-17	16-27	2-10
123: Kanlee-----	0-2	*Sandy loam	*SC, SC-SM, SM	*A-4, A-6, A-2	0	0	100	100	73-81	35-43	25-37	6-12
	2-19	*Sandy clay loam, sandy loam	*SC, CL	*A-6, A-7	0	0	100	100	81-93	43-55	29-45	12-21
	19-24	*Coarse sandy loam, sandy loam	*SC, CL	*A-6, A-7, A-4	0	0	100	100	59-74	36-51	26-43	9-21
	24-35	*Weathered bedrock			---	---	---	---	---	---	---	---
	35-45	*Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	*Unweathered bedrock			---	---	---	---	---	---	---	---
Earcree-----	0-37	*Gravelly coarse sandy loam	*GM, GC-GM, SM	*A-2, A-1	0	0	58-77	56-76	33-50	18-31	27-42	6-12
	37-52	*Gravelly coarse sandy loam, gravelly sandy loam, gravelly loamy coarse sand	*GC-GM, GM, SC	*A-1, A-2	0	0	52-76	50-75	29-52	16-32	17-28	2-10
	52-60	*Very gravelly loamy coarse sand	*GP-GC, GP-GM	*A-1	0	0	29-52	26-50	14-29	5-12	16-23	2-6

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
124:												
Ola, cool-----	0-16	*Coarse sandy loam	*SC-SM, SM	*A-4, A-2	0	0	85-100	85-100	52-68	30-43	23-35	4-10
	16-22	*Coarse sandy loam	*SC-SM, SM	*A-2, A-4	0	0	85-100	85-100	52-68	30-43	23-35	4-10
	22-30	*Gravelly coarse sandy loam, coarse sandy loam	*SC-SM, SC, SM	*A-2, A-4, A-1	0	0	61-100	59-100	35-69	20-43	17-31	2-10
	30-40	*Weathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	*Unweathered bedrock			---	---	---	---	---	---	---	---
Earcree-----	0-37	*Gravelly coarse sandy loam	*GM, GC-GM, SM	*A-2, A-1	0	0	58-77	56-76	33-50	18-31	27-42	6-12
	37-52	*Gravelly coarse sandy loam, gravelly sandy loam, gravelly loamy coarse sand	*GC-GM, GM, SC	*A-1, A-2	0	0	52-76	50-75	29-52	16-32	17-28	2-10
	52-60	*Very gravelly loamy coarse sand	*GP-GC, GP-GM	*A-1	0	0	29-52	26-50	14-29	5-12	16-23	2-6
166:												
Chokecherry-----	0-5	*Very channery sandy loam	*GC-GM, GM	*A-2, A-1	0	15-31	36-67	35-66	25-51	15-32	20-31	2-6
	5-14	*Extremely channery sandy loam	*GP-GC, GP-GM, GC	*A-1, A-2	0	38-47	12-38	11-36	8-31	5-21	18-32	2-11
	14-24	*Weathered bedrock			---	---	---	---	---	---	---	---

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
167: Povey-----	0-3	*Very stony loam	*GM	*A-4, A-7, A-2	22-51	13-19	55-77	53-77	45-69	31-50	31-42	7-12
	3-25	*Extremely stony loam, very stony loam	*GM, ML, GC-GM	*A-2, A-6	36-51	7-22	36-87	33-87	28-79	20-57	28-40	7-12
	25-36	*Extremely stony loam, very cobbly sandy loam, extremely gravelly loam	*GC, GP-GC	*A-2	18-42	18-42	18-52	14-50	12-45	8-33	23-31	7-12
	36-50	*Very cobbly sandy loam, extremely stony loam, extremely gravelly loam	*GC-GM, GP-GC, GC	*A-2, A-1	12-39	26-50	29-68	26-67	19-55	11-34	18-27	4-10
	50-60	*Unweathered bedrock			---	---	---	---	---	---	---	---
Nurkey-----	0-2	*Sandy loam	*SC-SM, SM	*A-4, A-2	0	0-9	82-100	81-100	59-80	35-50	18-30	2-7
	2-6	*Cobbly loam, gravelly sandy loam, sandy loam	*CL, GM	*A-6, A-7, A-1	0	9-47	55-90	53-90	38-82	24-59	20-43	2-17
	6-12	*Cobbly loam, sandy loam, gravelly sandy loam	*GC, GM, CL	*A-6, A-7, A-1	0	9-44	54-90	52-90	38-83	24-60	19-41	2-17
	12-18	*Very cobbly loam, very gravelly sandy clay loam	*GC	*A-6, A-2	0	14-45	38-70	36-68	30-64	22-49	28-39	12-19
	18-28	*Very gravelly loam, Very gravelly sandy clay loam	*GC	*A-2	0	7-20	34-54	31-52	26-48	18-35	27-38	12-19
	28-35	*Very gravelly loam	*GC, GC-GM	*A-2, A-1	0	7-20	34-54	31-52	25-48	17-34	20-34	6-16
	35-39	*Very cobbly sandy loam	*GC-GM, GC, GM	*A-1, A-2	0	21-43	37-64	35-63	25-53	13-31	0-26	NP-10
	39-60	*Very cobbly sandy loam	*GC-GM, GM	*A-1, A-2	0	21-43	37-64	35-63	25-53	13-31	0-25	NP-7
168: Kanlee-----	0-10	*Sandy loam	*SC, SC-SM, SM	*A-4, A-6, A-2	0	0	100	100	73-81	35-43	25-37	6-12
	10-14	*Sandy loam, sandy clay loam	*SC, CL	*A-6, A-7	0	0	100	100	76-88	46-58	29-47	12-21
	14-29	*Gravelly sandy clay loam, coarse sandy loam, sandy loam	*GC, SC	*A-2, A-7	0	0	61-92	59-92	47-87	23-49	26-45	9-21
	29-35	*Weathered bedrock			---	---	---	---	---	---	---	---
	35-45	*Unweathered bedrock			---	---	---	---	---	---	---	---

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
169: Povey-----	0-3	*Very stony loam	*GM	*A-4, A-7, A-2	22-51	13-19	55-77	53-77	45-69	31-50	31-42	7-12
	3-25	*Extremely stony loam, very stony loam	*GM, GC-GM, ML	*A-2, A-6	36-51	7-22	36-87	33-87	28-79	20-57	28-40	7-12
	25-36	*Extremely stony loam, very cobbly sandy loam, extremely gravelly loam	*GC, GP-GC	*A-2	18-42	18-42	18-52	14-50	12-45	8-33	23-31	7-12
	36-50	*Very cobbly sandy loam, extremely stony loam, extremely gravelly loam	*GC-GM, GP-GC, GC	*A-2, A-1	12-39	26-50	29-68	26-67	19-55	11-34	18-27	4-10
	50-60	*Unweathered bedrock			---	---	---	---	---	---	---	---
Ola, cool-----	0-16	*Coarse sandy loam	*SC-SM, SM	*A-4, A-2	0	0	85-100	85-100	52-68	30-43	23-35	4-10
	16-22	*Coarse sandy loam	*SC-SM, SM	*A-2, A-4	0	0	85-100	85-100	52-68	30-43	23-35	4-10
	22-30	*Gravelly coarse sandy loam, coarse sandy loam	*SC-SM, SC, SM	*A-2, A-4, A-1	0	0	61-100	59-100	35-69	20-43	17-31	2-10
	30-40	*Weathered bedrock			---	---	---	---	---	---	---	---
170: Howcan-----	0-10	*Very gravelly loam	*GC-GM, GM	*A-2, A-1	0-10	0	44-54	42-52	35-48	24-34	23-35	4-10
	10-25	*Very gravelly loam	*GC, GM	*A-6, A-7, A-2	0-7	0-40	50-61	48-60	43-58	31-43	33-46	12-18
	25-36	*Very cobbly loam	*GC, GM	*A-6, A-2, A-7	0-8	0-40	46-65	43-64	38-61	28-46	33-46	12-18
	36-60	*Very stony loam, very cobbly loam	*GC, GC-GM	*A-2, A-6	21-34	16-28	52-74	50-73	41-68	29-50	20-35	6-15
Searla-----	0-5	*Cobbly loam	*CL, ML, GC-GM	*A-4, A-7	0	8-21	62-83	61-82	51-76	36-55	26-41	7-14
	5-12	*Cobbly clay loam, gravelly clay loam	*CL, GC	*A-7, A-6	0	8-21	61-83	59-82	53-81	38-59	38-47	19-25
	12-19	*Gravelly sandy clay loam	*GC	*A-7, A-2	0	0-14	53-70	52-69	43-63	28-43	38-47	19-25
	19-32	*Very cobbly sandy clay loam, very gravelly sandy clay loam	*GC	*A-2, A-7	0	14-43	44-65	41-64	35-59	23-40	38-47	19-25
	32-39	*Very cobbly sandy clay loam, very gravelly sandy clay loam, very cobbly sandy loam	*GC, GM	*A-2, A-1	0	20-43	45-67	43-66	29-57	14-35	16-37	2-17
	39-60	*Very cobbly sandy loam, very gravelly sandy loam, very cobbly sandy clay loam	*GC, GM	*A-2, A-6, A-1	0	26-54	40-71	37-70	26-60	16-41	16-35	2-14

Table 24.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
171: Howcan-----	0-10	*Very gravelly loam	*GC-GM, GM	*A-2, A-1	0-10	0	44-54	42-52	35-48	24-34	23-35	4-10
	10-25	*Very gravelly loam	*GC, GM	*A-6, A-7, A-2	0-7	0-40	50-61	48-60	43-58	31-43	33-46	12-18
	25-36	*Very cobbly loam	*GC, GM	*A-6, A-2, A-7	0-8	0-40	46-65	43-64	38-61	28-46	33-46	12-18
	36-60	*Very stony loam, very cobbly loam	*GC, GC-GM	*A-2, A-6	21-34	16-28	52-74	50-73	41-68	29-50	20-35	6-15
Searla-----	0-5	*Cobbly loam	*CL, ML, GC-GM	*A-4, A-7	0	8-21	62-83	61-82	51-76	36-55	26-41	7-14
	5-12	*Cobbly clay loam, gravelly clay loam	*CL, GC	*A-7, A-6	0	8-21	61-83	59-82	53-81	38-59	38-47	19-25
	12-19	*Gravelly sandy clay loam	*GC	*A-7, A-2	0	0-14	53-70	52-69	43-63	28-43	38-47	19-25
	19-32	*Very cobbly sandy clay loam, very gravelly sandy clay loam	*GC	*A-2, A-7	0	14-43	44-65	41-64	35-59	23-40	38-47	19-25
	32-39	*Very cobbly sandy clay loam, very gravelly sandy clay loam, very cobbly sandy loam	*GC, GM	*A-2, A-1	0	20-43	45-67	43-66	29-57	14-35	16-37	2-17
	39-60	*Very cobbly sandy loam, very gravelly sandy loam, very cobbly sandy clay loam	*GC, GM	*A-2, A-6, A-1	0	26-54	40-71	37-70	26-60	16-41	16-35	2-14

Table 25.--Physical Soil Properties

(Sand, silt, and clay values are shown either as a range or a representative value. Absence of an entry indicates that data were not estimated. Soil properties are measured or inferred from direct observations in the field or laboratory.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
6: Arbone-----	0-10	30-50	40	13-18	1.30-1.50	0.6-2.0	0.14-0.16	0.0-2.9	1.0-3.0
	10-35	30-50	40	13-18	1.30-1.50	0.6-2.0	0.14-0.16	0.0-2.9	1.0-3.0
	35-60	5-45	40	13-18	1.35-1.55	0.6-2.0	0.14-0.16	0.0-2.9	0.5-1.0
19: Birchcreek, thin surface-----	0-8	30-50	38	15-25	1.20-1.30	0.6-2.0	0.03-0.07	3.0-5.9	1.0-3.0
	8-15	20-45	32	28-40	1.35-1.45	0.2-0.6	0.05-0.08	3.0-5.9	1.0-2.0
	15-22	5-45	29	40-55	1.25-1.40	0.1-0.2	0.02-0.07	3.0-5.9	0.5-1.0
	22-32				---	---	---	---	---
21: Birchcreek, moist-----	0-5	30-50	38	15-25	1.20-1.35	0.6-2.0	0.08-0.11	3.0-5.9	1.0-3.0
	5-9	20-45	32	28-40	1.35-1.45	0.2-0.6	0.05-0.08	3.0-5.9	1.0-2.0
	9-31	5-45	29	40-55	1.25-1.40	0.1-0.2	0.02-0.09	3.0-5.9	0.5-1.0
	31-41				---	---	---	---	---
Itca-----	0-3	30-50	40	12-20	1.15-1.30	0.6-2.0	0.08-0.11	0.0-2.9	2.0-3.0
	3-17	20-45	29	35-45	1.25-1.45	0.1-0.6	0.02-0.07	3.0-5.9	1.0-2.0
	17-27				---	---	---	---	---
26: Chayson-----	0-3	25-50	54	15-25	1.30-1.40	0.6-2.0	0.13-0.15	3.0-5.9	2.0-4.0
	3-18	2-45	26	25-34	1.30-1.45	0.2-0.6	0.08-0.11	3.0-5.9	1.0-2.0
	18-28	25-50	38	15-25	1.40-1.50	0.6-2.0	0.09-0.13	3.0-5.9	0.5-1.0
	28-32				---	---	---	---	---
32: Conneridge, extremely stony surface--	0-3	23-52	38	14-25	1.25-1.35	0.6-2.0	0.08-0.11	3.0-5.9	2.0-4.0
	3-7	23-52	38	14-25	1.30-1.40	0.6-2.0	0.08-0.14	3.0-5.9	1.0-2.0
	7-13	23-52	38	14-25	1.30-1.40	0.6-2.0	0.08-0.14	3.0-5.9	1.0-2.0
	13-17	23-52	40	12-20	1.30-1.40	0.6-2.0	0.04-0.09	0.0-2.9	0.5-1.0
	17-23	23-52	40	12-20	1.30-1.40	0.6-2.0	0.03-0.08	0.0-2.9	0.5-1.0
	23-33				---	---	---	---	---

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
36: Cumulic Endoaquolls----	0-28	35	33	28-35	1.20-1.30	0.2-0.6	0.14-0.16	3.0-5.9	5.0-10
	28-40	40-80	18	18-30	1.55-1.70	0.2-0.6	0.07-0.09	3.0-5.9	1.0-3.0
	40-60	64	26	5-15	1.15-1.30	2.0-5.8	0.11-0.13	0.0-2.9	0.5-2.0
78: Hymas-----	0-11	35-50	41	10-18	1.25-1.35	0.6-2.0	0.07-0.08	0.0-2.9	1.0-3.0
	11-15	35-50	41	10-18	1.35-1.45	0.6-2.0	0.05-0.08	0.0-2.9	0.5-1.0
	15-25				---	---	---	---	---
Bezzant-----	0-15	25-50	38	18-27	1.10-1.15	0.6-2.0	0.12-0.14	3.0-5.9	2.0-5.0
	15-23	30-50	38	18-27	1.15-1.25	0.6-2.0	0.08-0.11	3.0-5.9	1.0-3.0
	23-31	20-75	37	20-35	1.25-1.40	0.2-0.6	0.04-0.10	3.0-5.9	0.0-1.0
	31-60	30-50	38	18-35	1.15-1.25	0.2-2.0	0.08-0.12	3.0-5.9	0.0-1.0
84: Itca-----	0-3	30-50	40	12-20	1.15-1.30	0.6-2.0	0.08-0.11	0.0-2.9	2.0-3.0
	3-17	20-45	29	35-45	1.25-1.45	0.1-0.6	0.02-0.07	3.0-5.9	1.0-2.0
	17-27				---	---	---	---	---
Birchcreek, moist-----	0-5	30-50	38	15-25	1.20-1.35	0.6-2.0	0.08-0.11	3.0-5.9	1.0-3.0
	5-9	20-45	32	28-40	1.35-1.45	0.2-0.6	0.05-0.08	3.0-5.9	1.0-2.0
	9-31	5-45	29	40-55	1.25-1.40	0.1-0.2	0.02-0.09	3.0-5.9	0.5-1.0
	31-41				---	---	---	---	---
Rock outcrop----	0-60				---	---	---	---	---
86: Jimsage-----	0-6	35-50	42	10-15	1.25-1.40	0.6-2.0	0.12-0.14	0.0-2.9	2.0-4.0
	6-14	30-50	41	12-18	1.30-1.45	0.6-2.0	0.05-0.11	0.0-2.9	1.0-3.0
	14-23	30-50	41	12-18	1.30-1.45	0.6-2.0	0.04-0.09	0.0-2.9	0.5-1.5
	23-60	55-85	20	10-15	1.55-1.65	2.0-5.9	0.03-0.05	0.0-2.9	0.5-1.0
Doodlelink-----	0-10	30-50	40	13-21	1.30-1.45	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0
	10-60	20-50	40	17-31	1.35-1.55	0.2-2.0	0.07-0.10	3.0-5.9	0.5-2.0
89: Kanlee-----	0-10	55-80	19	10-18	1.50-1.65	2.0-5.9	0.09-0.11	0.0-2.9	2.0-4.0
	10-14	45-80	23	18-30	1.55-1.70	0.2-5.9	0.09-0.11	3.0-5.9	1.0-3.0
	14-29	45-80	15	15-30	1.55-1.70	0.2-5.9	0.08-0.10	3.0-5.9	0.5-2.0
	29-35				---	---	---	---	---
	35-45				---	---	---	---	---

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>In/hr</i>	<i>In/in</i>	<i>Pct</i>	<i>Pct</i>
101: Ola-----	0-16	55-80	23	8-15	1.60-1.70	2.0-5.9	0.07-0.09	0.0-2.9	2.0-4.0
	16-22	55-80	23	8-15	1.60-1.70	2.0-5.9	0.07-0.08	0.0-2.9	2.0-4.0
	22-30	30-80	31	10-20	1.50-1.70	0.6-5.9	0.06-0.08	0.0-2.9	1.0-3.0
	30-40				---	---	---	---	---
102: Pachic Haplocryolls---	0-3	25-50	37	20-27	1.25-1.35	0.6-2.0	0.11-0.14	3.0-5.9	4.0-6.0
	3-13	25-50	37	20-27	1.25-1.35	0.6-2.0	0.11-0.14	3.0-5.9	2.0-4.0
	13-24	20-50	35	10-35	1.35-1.50	0.2-2.0	0.05-0.08	3.0-5.9	1.0-2.0
	24-31	20-50	37	10-27	1.40-1.50	0.6-2.0	0.02-0.08	3.0-5.9	0.5-2.0
	31-45	20-50	37	10-35	1.40-1.50	0.2-2.0	0.02-0.08	3.0-5.9	0.5-1.5
	45-60	20-50	35	10-35	1.40-1.50	0.2-2.0	0.02-0.07	3.0-5.9	0.5-1.0
107: Poisonhol, extremely stony surface--	0-5	25-50	38	15-25	1.30-1.45	0.6-2.0	0.13-0.15	3.0-5.9	2.0-3.0
	5-11	20-45	37	25-32	1.35-1.45	0.2-2.0	0.05-0.07	3.0-5.9	1.5-2.5
	11-15	30-50	41	10-18	1.35-1.45	0.6-2.0	0.07-0.08	0.0-2.9	0.5-1.0
	15-39	30-50	41	10-18	1.35-1.45	0.6-2.0	0.05-0.07	0.0-2.9	0.5-1.0
	39-43				---	---	---	---	---
108: Povey-----	0-3	30-50	40	12-18	1.25-1.40	0.6-2.0	0.08-0.11	0.0-2.9	4.0-6.0
	3-25	30-50	40	12-18	1.25-1.40	0.6-2.0	0.04-0.11	0.0-2.9	3.0-5.0
	25-36	30-80	40	12-18	1.40-1.55	0.6-5.9	0.02-0.07	0.0-2.9	0.5-1.0
	36-50	30-80	30	8-15	1.40-1.55	0.6-5.9	0.03-0.06	0.0-2.9	0.0-0.5
	50-60				---	---	---	---	---
109: Povey-----	0-3	30-50	40	12-18	1.25-1.40	0.6-2.0	0.08-0.11	0.0-2.9	4.0-6.0
	3-25	30-50	40	12-18	1.25-1.40	0.6-2.0	0.04-0.11	0.0-2.9	3.0-5.0
	25-36	30-80	40	12-18	1.40-1.55	0.6-5.9	0.02-0.07	0.0-2.9	0.5-1.0
	36-50	30-80	30	8-15	1.40-1.55	0.6-5.9	0.03-0.06	0.0-2.9	0.0-0.5
	50-60				---	---	---	---	---
Middlehill-----	0-3	55-85	19	10-18	1.30-1.45	2.0-5.9	0.02-0.04	0.0-2.9	1.0-2.0
	3-9	30-80	41	10-18	1.30-1.45	0.6-5.9	0.02-0.07	0.0-2.9	0.5-1.0
	9-16	35-80	23	5-18	1.35-1.50	0.6-5.9	0.02-0.05	0.0-2.9	0.5-1.0
	16-24	50-90	6	5-15	1.40-1.55	5.9-20.0	0.01-0.02	0.0-2.9	0.0-0.5
	24-34				---	---	---	---	---

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
111: Raftriver-----	0-4	30-50	40	10-20	1.20-1.40	0.6-2.0	0.15-0.16	0.0-2.9	1.0-3.0
	4-8	30-80	56	10-18	1.50-1.70	0.6-2.0	0.15-0.17	0.0-2.9	0.5-1.5
	8-13	30-80	56	10-18	1.50-1.70	0.6-2.0	0.15-0.18	0.0-2.9	0.5-1.0
	13-23	30-80	40	10-20	1.50-1.70	0.6-2.0	0.16-0.18	0.0-2.9	0.3-0.8
	23-29	30-80	30	5-15	1.50-1.70	0.6-5.9	0.05-0.07	0.0-2.9	0.0-0.5
	29-39				---	---	---	---	---
116: Riceton-----	0-7	75-85	11	2-10	1.60-1.70	5.9-20.0	0.02-0.04	0.0-2.9	2.0-3.0
	7-23	55-85	24	5-15	1.60-1.80	2.0-5.9	0.04-0.06	0.0-2.9	1.0-2.0
	23-33	55-85	24	5-15	1.60-1.80	2.0-5.9	0.04-0.04	0.0-2.9	1.0-2.0
	33-44	55-90	14	5-15	1.65-1.85	2.0-20.0	0.04-0.04	0.0-2.9	0.0-0.5
	44-60	55-90	4	5-15	1.65-1.85	5.9-20.0	0.02-0.03	0.0-2.9	0.0-0.5
123: Kanlee-----	0-2	55-85	19	10-18	1.50-1.65	2.0-5.9	0.09-0.11	0.0-2.9	2.0-4.0
	2-19	40-80	18	18-30	1.55-1.70	0.2-5.9	0.10-0.12	3.0-5.9	1.0-3.0
	19-24	40-80	17	15-30	1.55-1.70	2.0-5.9	0.06-0.08	3.0-5.9	0.5-2.0
	24-35				---	---	---	---	---
	35-45				---	---	---	---	---
Rock outcrop----	0-60				---	---	---	---	---
Earcree-----	0-37	52-80	18	10-18	1.40-1.50	2.0-5.9	0.05-0.06	0.0-2.9	3.0-6.0
	37-52	52-90	24	5-15	1.30-1.50	2.0-20.0	0.05-0.06	0.0-2.9	0.5-1.0
	52-60	75-90	11	5-10	1.30-1.50	5.9-20.0	0.02-0.03	0.0-2.9	0.0-0.5
124: Ola, cool-----	0-16	55-80	23	8-15	1.60-1.70	2.0-5.9	0.04-0.06	0.0-2.9	2.0-4.0
	16-22	55-80	23	8-15	1.60-1.70	2.0-5.9	0.04-0.05	0.0-2.9	2.0-4.0
	22-30	55-80	24	5-15	1.60-1.70	2.0-5.9	0.04-0.05	0.0-2.9	0.5-2.0
	30-40				---	---	---	---	---
Rock outcrop----	0-60				---	---	---	---	---
Earcree-----	0-37	52-80	18	10-18	1.40-1.50	2.0-5.9	0.05-0.06	0.0-2.9	3.0-6.0
	37-52	52-90	24	5-15	1.30-1.50	2.0-20.0	0.05-0.06	0.0-2.9	0.5-1.0
	52-60	75-90	11	5-10	1.30-1.50	5.9-20.0	0.02-0.03	0.0-2.9	0.0-0.5
166: Chokecherry-----	0-5	55-80	32	5-10	1.11-1.29	2.0-5.9	0.06-0.08	0.0-2.9	2.0-4.0
	5-14	35-80	35	5-17	1.34-1.45	2.0-5.9	0.01-0.04	0.0-2.9	1.0-2.0
	14-24				---	---	---	---	---

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
167: Povey-----	0-3	30-50	40	12-18	1.25-1.40	0.6-2.0	0.08-0.11	0.0-2.9	4.0-6.0
	3-25	30-50	40	12-18	1.25-1.40	0.6-2.0	0.04-0.11	0.0-2.9	3.0-5.0
	25-36	30-80	40	12-18	1.40-1.55	0.6-5.9	0.02-0.07	0.0-2.9	0.5-1.0
	36-50	30-80	30	8-15	1.40-1.55	0.6-5.9	0.03-0.06	0.0-2.9	0.0-0.5
	50-60				---	---	---	---	---
Nurkey-----	0-2	55-80	32	5-12	1.16-1.34	2.0-5.9	0.11-0.12	0.0-2.9	1.0-3.0
	2-6	30-80	34	5-25	1.16-1.34	0.6-5.9	0.12-0.15	3.0-5.9	1.0-3.0
	6-12	30-80	34	5-25	1.29-1.40	0.6-5.9	0.11-0.15	3.0-5.9	0.5-2.0
	12-18	30-70	38	18-27	1.29-1.40	0.2-2.0	0.08-0.11	3.0-5.9	0.3-1.0
	18-28	30-70	34	18-27	1.29-1.40	0.2-2.0	0.08-0.11	3.0-5.9	0.1-0.5
	28-35	30-80	36	10-23	1.29-1.40	0.6-2.0	0.08-0.11	0.0-2.9	0.1-0.3
	35-39	30-80	28	2-15	1.29-1.45	2.0-5.9	0.05-0.08	0.0-2.9	0.0-0.1
	39-60	30-80	28	2-15	1.29-1.45	2.0-5.9	0.05-0.08	0.0-2.9	0.0-0.1
168: Kanlee-----	0-10	55-80	19	10-18	1.50-1.65	2.0-5.9	0.09-0.11	0.0-2.9	2.0-4.0
	10-14	45-80	23	18-30	1.55-1.70	0.2-5.9	0.09-0.11	3.0-5.9	1.0-3.0
	14-29	45-80	15	15-30	1.55-1.70	0.2-5.9	0.08-0.10	3.0-5.9	0.5-2.0
	29-35				---	---	---	---	---
	35-45				---	---	---	---	---
169: Povey-----	0-3	30-50	40	12-18	1.25-1.40	0.6-2.0	0.08-0.11	0.0-2.9	4.0-6.0
	3-25	30-50	40	12-18	1.25-1.40	0.6-2.0	0.04-0.11	0.0-2.9	3.0-5.0
	25-36	30-80	40	12-18	1.40-1.55	0.6-5.9	0.02-0.07	0.0-2.9	0.5-1.0
	36-50	30-80	30	8-15	1.40-1.55	0.6-5.9	0.03-0.06	0.0-2.9	0.0-0.5
	50-60				---	---	---	---	---
Ola, cool-----	0-16	55-80	23	8-15	1.60-1.70	2.0-5.9	0.04-0.06	0.0-2.9	2.0-4.0
	16-22	55-80	23	8-15	1.60-1.70	2.0-5.9	0.04-0.06	0.0-2.9	2.0-4.0
	22-30	55-80	24	5-15	1.60-1.70	2.0-5.9	0.04-0.05	0.0-2.9	0.5-2.0
	30-40				---	---	---	---	---
170: Howcan-----	0-10	35-52	43	8-15	1.30-1.40	0.6-2.0	0.08-0.10	0.0-2.9	2.0-4.0
	10-25	25-52	39	18-26	1.35-1.45	0.6-2.0	0.08-0.10	3.0-5.9	2.0-4.0
	25-36	25-52	39	18-26	1.35-1.45	0.6-2.0	0.07-0.10	3.0-5.9	2.0-4.0
	36-60	30-52	40	10-21	1.35-1.45	0.6-2.0	0.06-0.10	0.0-5.9	0.0-1.0

Table 25.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
170: Searla-----	0-5	30-52	40	12-20	1.40-1.50	0.6-2.0	0.11-0.13	0.0-2.9	2.0-4.0
	5-12	20-75	29	27-35	1.40-1.50	0.2-0.6	0.08-0.10	3.0-5.9	0.5-1.0
	12-19	20-75	23	27-35	1.40-1.50	0.2-0.6	0.07-0.09	3.0-5.9	0.5-1.0
	19-32	20-75	23	27-35	1.40-1.50	0.2-0.6	0.05-0.07	3.0-5.9	0.5-1.0
	32-39	52-85	22	5-25	1.50-1.60	0.2-0.6	0.05-0.07	3.0-5.9	0.0-0.5
	39-60	52-85	32	5-22	1.50-1.60	0.2-5.9	0.04-0.06	0.0-2.9	0.0-0.5
171: Howcan-----	0-10	35-52	43	8-15	1.30-1.40	0.6-2.0	0.08-0.10	0.0-2.9	2.0-4.0
	10-25	25-52	39	18-26	1.35-1.45	0.6-2.0	0.08-0.10	3.0-5.9	2.0-4.0
	25-36	25-52	39	18-26	1.35-1.45	0.6-2.0	0.07-0.10	3.0-5.9	2.0-4.0
	36-60	30-52	40	10-21	1.35-1.45	0.6-2.0	0.06-0.10	0.0-5.9	0.0-1.0
Searla-----	0-5	30-52	40	12-20	1.40-1.50	0.6-2.0	0.11-0.13	0.0-2.9	2.0-4.0
	5-12	20-75	29	27-35	1.40-1.50	0.2-0.6	0.08-0.10	3.0-5.9	0.5-1.0
	12-19	20-75	23	27-35	1.40-1.50	0.2-0.6	0.07-0.09	3.0-5.9	0.5-1.0
	19-32	20-75	23	27-35	1.40-1.50	0.2-0.6	0.05-0.07	3.0-5.9	0.5-1.0
	32-39	52-85	22	5-25	1.50-1.60	0.2-0.6	0.05-0.07	3.0-5.9	0.0-0.5
	39-60	52-85	32	5-22	1.50-1.60	0.2-5.9	0.04-0.06	0.0-2.9	0.0-0.5

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Table 26.--Erosion Properties

(Entries under "Erosion factors" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer.)

Map symbol and soil name	Depth	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
	<i>In</i>					
6:						
Arbone-----	0-10	.32	.32	5	5	56
	10-35	.37	.37			
	35-60	.43	.43			
19:						
Birchcreek, thin surface-----	0-8	.05	.32	2	8	0
	8-15	.10	.32			
	15-22	.02	.28			
	22-32	---	---			
21:						
Birchcreek, moist-----	0-5	.10	.32	2	8	0
	5-9	.10	.32			
	9-31	.10	.24			
	31-41	---	---			
Itca-----	0-3	.15	.43	1	7	38
	3-17	.05	.28			
	17-27	---	---			
26:						
Chayson-----	0-3	.20	.43	2	7	38
	3-18	.15	.28			
	18-28	.28	.43			
	28-32	---	---			
32:						
Conneridge, extremely stony surface-----	0-3	.05	.20	2	7	38
	3-7	.15	.37			
	7-13	.10	.43			
	13-17	.10	.49			
	17-23	.05	.49			
	23-33	---	---			
36:						
Cumulic Endoaquolls-----	0-28	.24	.24	4	6	48
	28-40	.20	.20			
	40-60	.28	.28			
78:						
Hymas-----	0-11	.15	.43	1	6	48
	11-15	.15	.43			
	15-25	---	---			
Bezzant-----	0-15	.15	.28	5	5	56
	15-23	.10	.32			
	23-31	.10	.32			
	31-60	.10	.37			
84:						
Itca-----	0-3	.15	.43	1	7	38
	3-17	.05	.28			
	17-27	---	---			

Soil Survey of City of Rocks National Reserve, Idaho

Table 26.--Erosion Properties--Continued

Map symbol and soil name	Depth	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
	<i>In</i>					
84:						
Birchcreek, moist-----	0-5	.10	.32	2	8	0
	5-9	.10	.32			
	9-31	.10	.24			
	31-41	---	---			
Rock outcrop-----	0-60	---	---	---	---	---
86:						
Jimsage-----	0-6	.20	.37	2	6	48
	6-14	.15	.37			
	14-23	.10	.43			
	23-60	.05	.24			
Doodlelink-----	0-10	.17	.32	5	6	48
	10-60	.15	.37			
89:						
Kanlee-----	0-10	.15	.15	2	3	86
	10-14	.32	.32			
	14-29	.15	.28			
	29-35	---	---			
	35-45	---	---			
101:						
Ola-----	0-16	.15	.15	3	3	86
	16-22	.32	.32			
	22-30	.37	.37			
	30-40	---	---			
102:						
Pachic Haplocryolls-----	0-3	.10	.24	3	7	38
	3-13	.20	.32			
	13-24	.15	.28			
	24-31	.02	.32			
	31-45	.05	.32			
	45-60	.05	.32			
107:						
Poisonhol, extremely stony surface-----	0-5	.24	.24	2	6	48
	5-11	.10	.28			
	11-15	.10	.43			
	15-39	.10	.43			
	39-43	---	---			
108:						
Povey-----	0-3	.05	.20	3	7	38
	3-25	.05	.20			
	25-36	.05	.43			
	36-50	.10	.43			
	50-60	---	---			
109:						
Povey-----	0-3	.05	.20	3	7	38
	3-25	.05	.20			
	25-36	.05	.43			
	36-50	.10	.43			
	50-60	---	---			

Soil Survey of City of Rocks National Reserve, Idaho

Table 26.--Erosion Properties--Continued

Map symbol and soil name	Depth	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
	<i>In</i>					
109:						
Middlehill-----	0-3	.02	.17	2	8	0
	3-9	.05	.43			
	9-16	.05	.37			
	16-24	.02	.20			
	24-34	---	---			
111:						
Raftriver-----	0-4	.32	.32	2	5	56
	4-8	.37	.37			
	8-13	.37	.37			
	13-23	.49	.49			
	23-29	.15	.49			
	29-39	---	---			
116:						
Riceton-----	0-7	.05	.05	5	2	134
	7-23	.24	.24			
	23-33	.10	.24			
	33-44	.05	.10			
	44-60	.05	.05			
123:						
Kanlee-----	0-2	.10	.10	2	3	86
	2-19	.20	.20			
	19-24	.28	.28			
	24-35	---	---			
	35-45	---	---			
Rock outcrop-----	0-60	---	---	---	---	---
Earcree-----	0-37	.05	.10	5	5	56
	37-52	.10	.24			
	52-60	.05	.15			
124:						
Ola, cool-----	0-16	.10	.10	3	3	86
	16-22	.28	.28			
	22-30	.20	.32			
	30-40	---	---			
Rock outcrop-----	0-60	---	---	---	---	---
Earcree-----	0-37	.05	.10	5	5	56
	37-52	.10	.24			
	52-60	.05	.15			
166:						
Chokecherry-----	0-5	.10	.28	2	6	48
	5-14	.02	.43			
	14-24	---	---			
167:						
Povey-----	0-3	.05	.20	3	7	38
	3-25	.05	.20			
	25-36	.05	.43			
	36-50	.10	.43			
	50-60	---	---			

Soil Survey of City of Rocks National Reserve, Idaho

Table 26.--Erosion Properties--Continued

Map symbol and soil name	Depth	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
	<i>In</i>					
167: Nurkey-----	0-2	.28	.28	5	3	86
	2-6	.24	.32			
	6-12	.17	.37			
	12-18	.15	.37			
	18-28	.10	.37			
	28-35	.10	.43			
	35-39	.10	.28			
	39-60	.10	.28			
168: Kanlee-----	0-10	.15	.15	2	3	86
	10-14	.32	.32			
	14-29	.15	.28			
	29-35	---	---			
	35-45	---	---			
169: Povey-----	0-3	.05	.20	3	7	38
	3-25	.05	.20			
	25-36	.05	.43			
	36-50	.10	.43			
	50-60	---	---			
Ola, cool-----	0-16	.10	.10	3	3	86
	16-22	.28	.28			
	22-30	.20	.32			
	30-40	---	---			
170: Howcan-----	0-10	.15	.32	5	7	38
	10-25	.15	.32			
	25-36	.10	.32			
	36-60	.10	.43			
Searla-----	0-5	.17	.28	4	6	48
	5-12	.10	.24			
	12-19	.10	.24			
	19-32	.10	.24			
	32-39	.10	.32			
	39-60	.10	.32			
171: Howcan-----	0-10	.15	.32	5	7	38
	10-25	.15	.32			
	25-36	.10	.32			
	36-60	.10	.43			
Searla-----	0-5	.17	.28	4	6	48
	5-12	.10	.24			
	12-19	.10	.24			
	19-32	.10	.24			
	32-39	.10	.32			
	39-60	.10	.32			

Soil Survey of City of Rocks National Reserve, Idaho

Table 27.---Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100 g</i>	<i>pH</i>	<i>Pct</i>	<i>mmhos/cm</i>	
6: Arbone-----	0-10	11-16	7.2-7.8	0	0	0
	10-35	11-16	7.4-7.8	0	0	0
	35-60	11-15	7.8-8.4	5-30	0.0-2.0	0
19: Birchcreek, thin surface-----	0-8	13-21	6.6-7.8	0	0	0
	8-15	22-31	6.6-7.8	0	0	0
	15-22	29-40	6.6-7.8	0	0	0
	22-32	---	---	---	---	---
21: Birchcreek, moist----	0-5	13-21	6.6-7.8	0	0	0
	5-9	22-31	6.6-7.8	0	0	0
	9-31	29-40	6.6-7.8	0	0	0
	31-41	---	---	---	---	---
Itca-----	0-3	11-17	6.6-7.3	0	0	0
	3-17	27-34	6.6-7.8	0	0	0
	17-27	---	---	---	---	---
26: Chayson-----	0-3	13-21	6.6-7.6	0	0	0
	3-18	19-19	7.8-8.4	5-20	0.0-2.0	0-5
	18-28	11-12	7.9-9.0	15-20	2.0-4.0	5-15
	28-32	---	---	---	---	---
32: Conneridge, extremely stony surface-----	0-3	12-21	6.6-7.4	0	0	0
	3-7	12-21	6.6-7.4	0	0	0
	7-13	12-21	6.6-7.4	0	0	0
	13-17	10-17	7.6-8.4	15-40	0.0-2.0	0
	17-23	10-17	7.6-8.4	15-40	0.0-2.0	0
	23-33	---	---	---	---	---
36: Cumulic Endoaquolls--	0-28	25-32	6.6-7.8	0-5	0	0
	28-40	15-25	6.6-7.8	0	0	0
	40-60	5.0-14	6.6-7.8	0	0	0
78: Hymas-----	0-11	8.1-17	7.8-8.4	5-15	0.0-2.0	0
	11-15	6.8-13	8.0-8.6	40-50	0.0-2.0	2-5
	15-25	---	---	---	---	---
Bezzant-----	0-15	16-23	7.6-8.4	15-40	0.0-2.0	0
	15-23	15-23	7.8-8.4	15-40	0.0-2.0	0
	23-31	14-28	7.8-8.4	15-40	0.0-2.0	0
	31-60	13-28	7.8-8.4	1-5	0.0-2.0	0
84: Itca-----	0-3	11-17	6.6-7.3	0	0	0
	3-17	27-34	6.6-7.8	0	0	0
	17-27	---	---	---	---	---

Soil Survey of City of Rocks National Reserve, Idaho

Table 27.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Salinity	Sodium adsorption ratio
	In	meq/100 g	pH	Pct	mmhos/cm	
84: Birchcreek, moist----	0-5	13-21	6.6-7.8	0	0	0
	5-9	22-31	6.6-7.8	0	0	0
	9-31	29-40	6.6-7.8	0	0	0
	31-41	---	---	---	---	---
Rock outcrop-----	0-60	---	---	---	---	---
86: Jimsage-----	0-6	9.1-14	6.6-7.8	0	0	0
	6-14	11-16	7.4-7.8	0	0.0-2.0	0
	14-23	10-15	7.4-7.8	0	0.0-2.0	0
	23-60	8.6-13	8.2-8.6	5-15	2.0-4.0	0
Doodlelink-----	0-10	11-18	6.1-6.5	0	0	0
	10-60	14-25	6.1-7.2	0	0	0
89: Kanlee-----	0-10	9.1-16	6.1-7.3	0	0	0
	10-14	15-25	6.6-7.8	0	0	0
	14-29	13-25	6.6-7.8	0	0	0
	29-35	---	---	---	---	---
	35-45	---	---	---	---	---
101: Ola-----	0-16	10-20	6.1-7.3	0	0	0
	16-22	10-20	6.1-7.3	0	0	0
	22-30	10-20	6.1-7.3	0	0	0
	30-40	---	---	---	---	---
102: Pachic Haplocryolls--	0-3	19-25	6.6-7.3	0	0	0
	3-13	17-24	6.6-7.3	0	0	0
	13-24	9.2-27	6.6-7.3	0	0	0
	24-31	8.5-27	6.6-7.3	0	0	0
	31-45	8.5-26	6.6-7.3	0	0	0
	45-60	8.5-25	6.6-7.3	0	0	0
107: Poisonhol, extremely stony surface-----	0-5	13-21	7.4-8.4	0-5	0.0-2.0	0-5
	5-11	21-26	7.4-8.4	0-5	0.0-2.0	0-5
	11-15	8.6-15	7.9-9.0	10-30	2.0-4.0	2-10
	15-39	8.6-15	7.9-9.0	10-30	2.0-4.0	2-10
	39-43	---	---	---	---	---
108: Povey-----	0-3	11-16	6.1-7.3	0	0	0
	3-25	11-16	6.1-7.3	0	0	0
	25-36	10-15	6.6-7.6	0	0	0
	36-50	6.2-13	6.6-7.6	0	0	0
	50-60	---	---	---	---	---
109: Povey-----	0-3	11-16	6.1-7.3	0	0	0
	3-25	11-16	6.1-7.3	0	0	0
	25-36	10-15	6.6-7.6	0	0	0
	36-50	6.2-13	6.6-7.6	0	0	0
	50-60	---	---	---	---	---

Soil Survey of City of Rocks National Reserve, Idaho

Table 27.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100 g</i>	<i>pH</i>	<i>Pct</i>	<i>mmhos/cm</i>	
109: Middlehill-----	0-3	8.9-16	6.6-7.8	0	0	0
	3-9	8.6-15	6.6-7.8	0	0	0
	9-16	4.6-15	6.6-7.8	0	0	0
	16-24	4.1-13	7.9-8.4	5-15	0.0-2.0	0-5
	24-34	---	---	---	---	---
111: Raftriver-----	0-4	8.9-17	7.2-7.6	0	0	0
	4-8	8.6-15	7.4-7.8	0	0	0
	8-13	8.6-15	7.9-8.5	15-30	2.0-4.0	2-10
	13-23	8.4-16	7.9-8.5	15-30	2.0-4.0	2-10
	23-29	4.1-13	7.9-8.5	15-30	2.0-4.0	2-10
	29-39	---	---	---	---	---
116: Riceton-----	0-7	5.0-14	6.1-7.3	0	0	0
	7-23	4.8-13	7.4-7.6	0	0	0
	23-33	4.8-13	7.4-7.6	0	0	0
	33-44	4.1-13	7.4-7.6	0	0	0
	44-60	4.1-13	7.4-7.6	0	0	0
123: Kanlee-----	0-2	9.1-16	6.1-7.3	0	0	0
	2-19	15-25	6.6-7.8	0	0	0
	19-24	13-25	6.6-7.8	0	0	0
	24-35	---	---	---	---	---
	35-45	---	---	---	---	---
Rock outcrop-----	0-60	---	---	---	---	---
Earcree-----	0-37	15-25	6.1-7.3	0	0	0
	37-52	5.0-15	6.1-7.3	0	0	0
	52-60	5.0-10	6.1-7.3	0	0	0
124: Ola, cool-----	0-16	10-20	6.1-7.3	0	0	0
	16-22	10-20	6.1-7.3	0	0	0
	22-30	5.0-15	6.1-7.3	0	0	0
	30-40	---	---	---	---	---
Rock outcrop-----	0-60	---	---	---	---	---
Earcree-----	0-37	15-25	6.1-7.3	0	0	0
	37-52	5.0-15	6.1-7.3	0	0	0
	52-60	5.0-10	6.1-7.3	0	0	0
166: Chokecherry-----	0-5	4.9-9.4	6.6-7.3	0	0	0
	5-14	4.8-15	6.6-7.3	0	0	0
	14-24	---	---	---	---	---
167: Povey-----	0-3	11-16	6.1-7.3	0	0	0
	3-25	11-16	6.1-7.3	0	0	0
	25-36	10-15	6.6-7.6	0	0	0
	36-50	6.2-13	6.6-7.6	0	0	0
	50-60	---	---	---	---	---

Soil Survey of City of Rocks National Reserve, Idaho

Table 27.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Salinity	Sodium adsorption ratio
	In	meq/100 g	pH	Pct	mmhos/cm	
167: Nurkey-----	0-2	4.8-11	6.6-7.3	0	0	0
	2-6	4.8-21	6.6-7.3	0	0	0
	6-12	4.6-21	6.6-7.3	0	0	0
	12-18	14-22	6.6-7.4	0	0	0
	18-28	14-21	6.6-7.4	0	0	0
	28-35	7.9-18	7.4-7.8	0	0	0
	35-39	1.7-12	7.4-7.8	0	0	0
	39-60	1.7-8.1	7.8-8.2	15-30	0.0-2.0	0
168: Kanlee-----	0-10	9.1-16	6.1-7.3	0	0	0
	10-14	15-25	6.6-7.8	0	0	0
	14-29	13-25	6.6-7.8	0	0	0
	29-35	---	---	---	---	---
	35-45	---	---	---	---	---
169: Povey-----	0-3	11-16	6.1-7.3	0	0	0
	3-25	11-16	6.1-7.3	0	0	0
	25-36	10-15	6.6-7.6	0	0	0
	36-50	6.2-13	6.6-7.6	0	0	0
	50-60	---	---	---	---	---
Ola, cool-----	0-16	10-20	6.1-7.3	0	0	0
	16-22	10-20	6.1-7.3	0	0	0
	22-30	5.0-15	6.1-7.3	0	0	0
	30-40	---	---	---	---	---
170: Howcan-----	0-10	7.0-15	6.6-7.3	0	0	0
	10-25	8.0-25	6.6-7.3	0	0	0
	25-36	8.0-25	6.6-7.3	0	0	0
	36-60	6.0-15	6.6-7.3	0	0	0
Searla-----	0-5	11-18	6.6-7.6	0	0	0
	5-12	21-28	6.6-7.6	0	0	0
	12-19	21-28	6.6-7.6	0	0	0
	19-32	21-28	7.8-8.4	1-15	0	0
	32-39	4.1-18	7.8-8.4	1-15	0.0-2.0	0-5
	39-60	4.1-16	7.8-8.4	1-15	0.0-2.0	0-5
171: Howcan-----	0-10	7.0-15	6.6-7.3	0	0	0
	10-25	8.0-25	6.6-7.3	0	0	0
	25-36	8.0-25	6.6-7.3	0	0	0
	36-60	6.0-15	6.6-7.3	0	0	0
Searla-----	0-5	11-18	6.6-7.6	0	0	0
	5-12	21-28	6.6-7.6	0	0	0
	12-19	21-28	6.6-7.6	0	0	0
	19-32	21-28	7.8-8.4	1-15	0	0
	32-39	4.1-18	7.8-8.4	1-15	0.0-2.0	0-5
	39-60	4.1-16	7.8-8.4	1-15	0.0-2.0	0-5

Table 28.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			<i>Feet</i>	<i>Feet</i>	<i>Feet</i>				
6: Arbone-----	B	Jan-Dec	---	---	---	---	None	---	None
19: Birchcreek, thin surface-----	D	Jan-Dec	---	---	---	---	None	---	None
21: Birchcreek, moist-----	D	Jan-Dec	---	---	---	---	None	---	None
Itca-----	D	Jan-Dec	---	---	---	---	None	---	None
26: Chayson-----	C	Jan-Dec	---	---	---	---	None	---	None
32: Conneridge, extremely stony surface-----	C	Jan-Dec	---	---	---	---	None	---	None
36: Cumulic Endoaquolls-----	C	January	1.5-2.5	>6.0	---	---	None	Brief	Occasional
		February	1.5-2.5	>6.0	---	---	None	Brief	Occasional
		March	1.5-2.5	>6.0	---	---	None	Brief	Occasional
		April	1.5-2.5	>6.0	---	---	None	Brief	Occasional
		May	1.5-2.5	>6.0	---	---	None	Brief	Occasional
		June	1.5-2.5	>6.0	---	---	None	---	None
		July	1.5-2.5	>6.0	---	---	None	---	None
		December	1.5-2.5	>6.0	---	---	None	Brief	Occasional
78: Hymas-----	D	Jan-Dec	---	---	---	---	None	---	None

Table 28.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			<i>Feet</i>	<i>Feet</i>	<i>Feet</i>				
78: Bezzant-----	C	Jan-Dec	---	---	---	---	None	---	None
84: Itca-----	D	Jan-Dec	---	---	---	---	None	---	None
Birchcreek, moist-----	D	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop-----	---	Jan-Dec	---	---	---	---	None	---	None
86: Jimsage-----	B	Jan-Dec	---	---	---	---	None	---	None
Doodlelink-----	B	Jan-Dec	---	---	---	---	None	---	None
89: Kanlee-----	C	Jan-Dec	---	---	---	---	None	---	None
101: Ola-----	B	Jan-Dec	---	---	---	---	None	---	None
102: Pachic Haplocryolls-----	C	Jan-Dec	---	---	---	---	None	---	None
107: Poisonhol, extremely stony surface-----	C	Jan-Dec	---	---	---	---	None	---	None
108: Povey-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 28.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			<i>Feet</i>	<i>Feet</i>	<i>Feet</i>				
109: Povey-----	B	Jan-Dec	---	---	---	---	None	---	None
Middlehill-----	C	Jan-Dec	---	---	---	---	None	---	None
111: Raftriver-----	C	Jan-Dec	---	---	---	---	None	---	None
116: Riceton-----	A	Jan-Dec	---	---	---	---	None	---	None
123: Kanlee-----	C	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop-----	---	Jan-Dec	---	---	---	---	None	---	None
Earcree-----	A	Jan-Dec	---	---	---	---	None	---	None
124: Ola, cool-----	B	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop-----	---	Jan-Dec	---	---	---	---	None	---	None
Earcree-----	A	Jan-Dec	---	---	---	---	None	---	None
166: Chokecherry-----	D	Jan-Dec	---	---	---	---	None	---	None
167: Povey-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 28.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			<i>Feet</i>	<i>Feet</i>	<i>Feet</i>				
167: Nurkey-----	C	Jan-Dec	---	---	---	---	None	---	None
168: Kanlee-----	C	Jan-Dec	---	---	---	---	None	---	None
169: Povey-----	B	Jan-Dec	---	---	---	---	None	---	None
Ola, cool-----	C	Jan-Dec	---	---	---	---	None	---	None
170: Howcan-----	B	Jan-Dec	---	---	---	---	None	---	None
Searla-----	C	Jan-Dec	---	---	---	---	None	---	None
171: Howcan-----	B	Jan-Dec	---	---	---	---	None	---	None
Searla-----	C	Jan-Dec	---	---	---	---	None	---	None

Table 29.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that data were not estimated. Only components with some data estimated are shown in the table.)

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		<i>In</i>	<i>In</i>				
6: Arbone-----	No restriction	---	---	---	Moderate	Moderate	Low
19: Birchcreek, thin surface-----	Lithic bedrock	20-40	---	Indurated	Moderate	Moderate	Low
21: Birchcreek, moist-----	Lithic bedrock	20-40	---	Indurated	Moderate	High	Low
Itca-----	Lithic bedrock	10-20	---	Indurated	Low	High	Low
26: Chayson-----	Duripan	20-40	---	Indurated	Moderate	Moderate	Moderate
32: Conneridge, extremely stony surface---	Lithic bedrock	20-40	---	Indurated	Moderate	Moderate	Low
36: Cumulic Endoaquolls-----	Strongly contrasting textural stratification	40-60	---	Noncemented	High	High	Low
78: Hymas-----	Lithic bedrock	10-20	---	Indurated	Moderate	Moderate	Low
Bezzant-----	No restriction	---	---	---	Moderate	Moderate	Low
84: Itca-----	Lithic bedrock	10-20	---	Indurated	Low	High	Low
Birchcreek, moist-----	Lithic bedrock	20-40	---	Indurated	Moderate	Moderate	Low
86: Jimsage-----	No restriction	---	---	---	Moderate	Moderate	Moderate
Doodlelink-----	No restriction	---	---	---	Moderate	Low	Low
89: Kanlee-----	Paralithic bedrock	20-40	---	Moderately cemented	Moderate	Low	Low
	Lithic bedrock	35-40		Indurated			

Table 29.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		<i>In</i>	<i>In</i>				
101: Ola-----	Paralithic bedrock	20-40	---	Moderately cemented	Moderate	Low	Moderate
102: Pachic Haplocryolls-----	No restriction	---	---	---	High	Low	Low
107: Poisonhol, extremely stony surface----	Duripan	20-40	---	Indurated	Moderate	Moderate	Moderate
108: Povey-----	Lithic bedrock	40-50	---	Indurated	Moderate	Low	Low
109: Povey-----	Lithic bedrock	40-50	---	Indurated	Moderate	Low	Low
Middlehill-----	Strongly contrasting textural stratification Lithic bedrock	15-20	---	Noncemented	Moderate	Moderate	Low
		20-40		Indurated			
111: Raftriver-----	Duripan	20-40	---	Indurated	Moderate	Moderate	Moderate
116: Riceton-----	No restriction	---	---	---	Moderate	Low	Moderate
123: Kanlee-----	Paralithic bedrock	20-40	---	Moderately cemented	Moderate	Moderate	Low
	Lithic bedrock	35-60		Indurated			
Earcree-----	No restriction	---	---	---	Moderate	Low	Low
124: Ola, cool-----	Paralithic bedrock	20-40	---	Moderately cemented	Moderate	Low	Moderate
Earcree-----	No restriction	---	---	---	Moderate	Low	Low
166: Chokecherry-----	Paralithic bedrock	10-20	---	Moderately cemented	Moderate	Low	Low

Table 29.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		<i>In</i>	<i>In</i>				
167: Povey-----	Lithic bedrock	40-50	---	Indurated	Moderate	Low	Low
Nurkey-----	No restriction	---	---	---	Moderate	Moderate	Low
168: Kanlee-----	Paralithic bedrock	20-40	---	Moderately cemented	Moderate	Low	Low
	Lithic bedrock	35-40		Indurated			
169: Povey-----	Lithic bedrock	40-50	---	Indurated	Moderate	Low	Low
Ola, cool-----	Paralithic bedrock	20-40	---	Moderately cemented	Moderate	Low	Moderate
170: Howcan-----	No restriction	---	---	---	Moderate	Low	Low
Searla-----	Strongly contrasting textural stratification	20-40	---	Noncemented	Moderate	Moderate	Low
171: Howcan-----	No restriction	---	---	---	Moderate	Low	Low
Searla-----	Strongly contrasting textural stratification	20-40	---	Noncemented	Moderate	Moderate	Low

Soil Survey of City of Rocks National Reserve, Idaho

Table 30.---Taxonomic Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Arbone-----	Coarse-loamy, mixed, superactive, frigid Calcic Haploxerolls
Bezzant-----	Loamy-skeletal, mixed, superactive, frigid Typic Calcixerolls
Birchcreek-----	Clayey-skeletal, smectitic, frigid Typic Argixerolls
Chayson-----	Fine-loamy, mixed, superactive, frigid Typic Durixerolls
*Chokecherry-----	Loamy-skeletal, mixed, superactive, shallow Typic Haplocryolls
Conneridge-----	Loamy-skeletal, mixed, superactive, frigid Calcic Haploxerolls
Cumulic Endoaquolls-----	Cumulic Endoaquolls
*Doodlelink-----	Loamy-skeletal, mixed, superactive, frigid Pachic Haploxerolls
Earcree-----	Coarse-loamy, mixed, superactive Pachic Haplocryolls
Howcan-----	Loamy-skeletal, mixed, superactive, frigid Typic Argixerolls
Hymas-----	Loamy-skeletal, carbonatic, frigid Lithic Haploxerolls
Itca-----	Clayey-skeletal, smectitic, frigid Lithic Argixerolls
Jimsage-----	Loamy-skeletal, mixed, superactive, frigid Calcic Pachic Haploxerolls
Kanlee-----	Fine-loamy, mixed, superactive, frigid Typic Argixerolls
Middlehill-----	Loamy-skeletal, mixed, superactive Xeric Haplocryolls
Nurkey-----	Loamy-skeletal, mixed, superactive Calcic Argicryolls
Ola-----	Coarse-loamy, mixed, superactive, frigid Pachic Haploxerolls
Pachic Haplocryolls-----	Pachic Haplocryolls
Poisonhol-----	Loamy-skeletal, mixed, superactive, frigid Haploxerollic Durixerolls
Povey-----	Loamy-skeletal, mixed, superactive Pachic Haplocryolls
*Raftriver-----	Coarse-loamy, mixed, superactive, frigid Xeric Haplodurids
*Riceton-----	Coarse-loamy, mixed, superactive, frigid Typic Haploxerolls
Searla-----	Loamy-skeletal, mixed, superactive, frigid Calcic Argixerolls

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