United States Department of Agriculture

NRCS

Natural Resources Conservation Service

United States Department of the Interior, National Park Service

In cooperation with San Juan County Conservation District

Soil Survey of San Juan Island National Historical Park, Washington

National Park Service TIC # D-87

How To Use This Soil Survey

General Soil Map

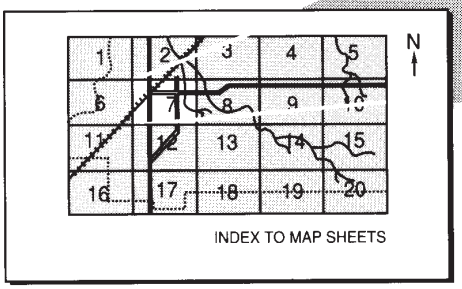
The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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.

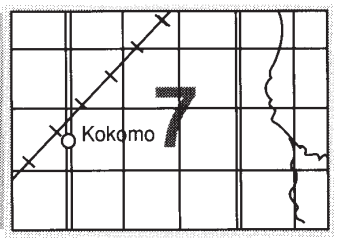
Detailed Soil Maps

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

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

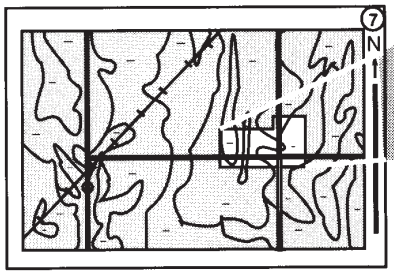


INDEX TO MAP SHEETS

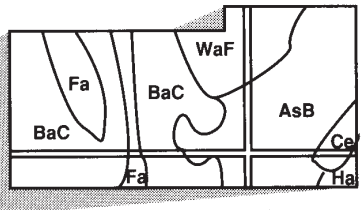


MAP SHEET

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



MAP SHEET



AREA OF INTEREST

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

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.

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

Major fieldwork for this soil survey was completed in 2003. Soil names and descriptions were approved in 2004. Unless otherwise indicated, statements in this publication refer to conditions in the park in 2005. This survey was made cooperatively by the Natural Resources Conservation Service, the National Park Service, and San Juan County Conservation District.

The proper citation for this soil survey report is as follows:

United States Department of Agriculture, Natural Resources Conservation Service, and United States Department of the Interior, National Park Service. 2005. Soil survey of San Juan Island National Historical Park, Washington.

Cover: Top photograph is at American Camp, looking east from Redoubt to Mount Finlayson, and bottom photograph is at English Camp, looking west over Garrison Bay from Young Hill.

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

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Issued 2005

Foreword

This soil survey contains information that affects land use planning in the park. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Planners and engineers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in ecology, recreation, and wildlife management can use the survey to help them understand, protect, and enhance the environment.

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.

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

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

Gus Hughbanks
State Conservationist
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Soil Survey of
San Juan Island National Historical Park, Washington

By Mike Regan, Toby Rodgers, and Erik Dahlke, Natural Resources Conservation Service

Fieldwork by Mike Regan, Tim Riebe, and Toby Rodgers, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
United States Department of the Interior, National Park Service, and San Juan County Conservation District

San Juan Island National Historical Park is in San Juan County, which lies off the coast of Washington (fig. 1). The 1,752-acre park consists of two units, English Camp and American Camp (fig. 2), approximately 9 miles apart on San Juan Island, the largest island in San Juan County. The county consists of a least 176 named islands and reefs, but depending on tidal conditions, more than 400 islands or reefs can be above water at any one time. San Juan County is bounded by the Strait of Georgia to the north, the Rosario Strait to the east, the Strait of Juan de Fuca to the south, and the Haro Strait to the west.

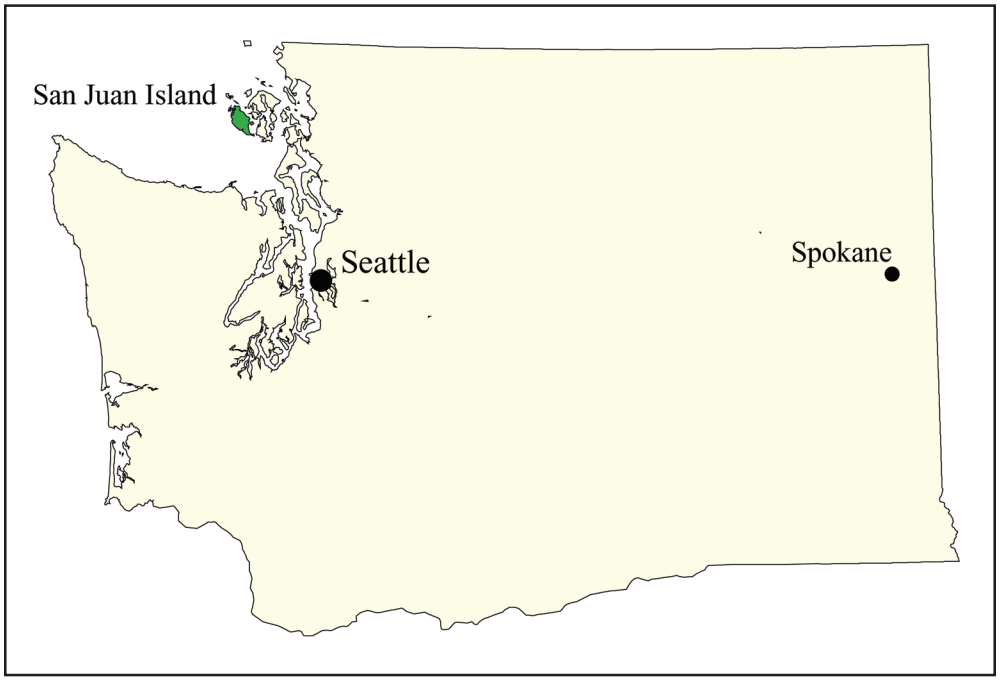

Figure 1.—Location of San Juan Island, part of San Juan County in Washington.

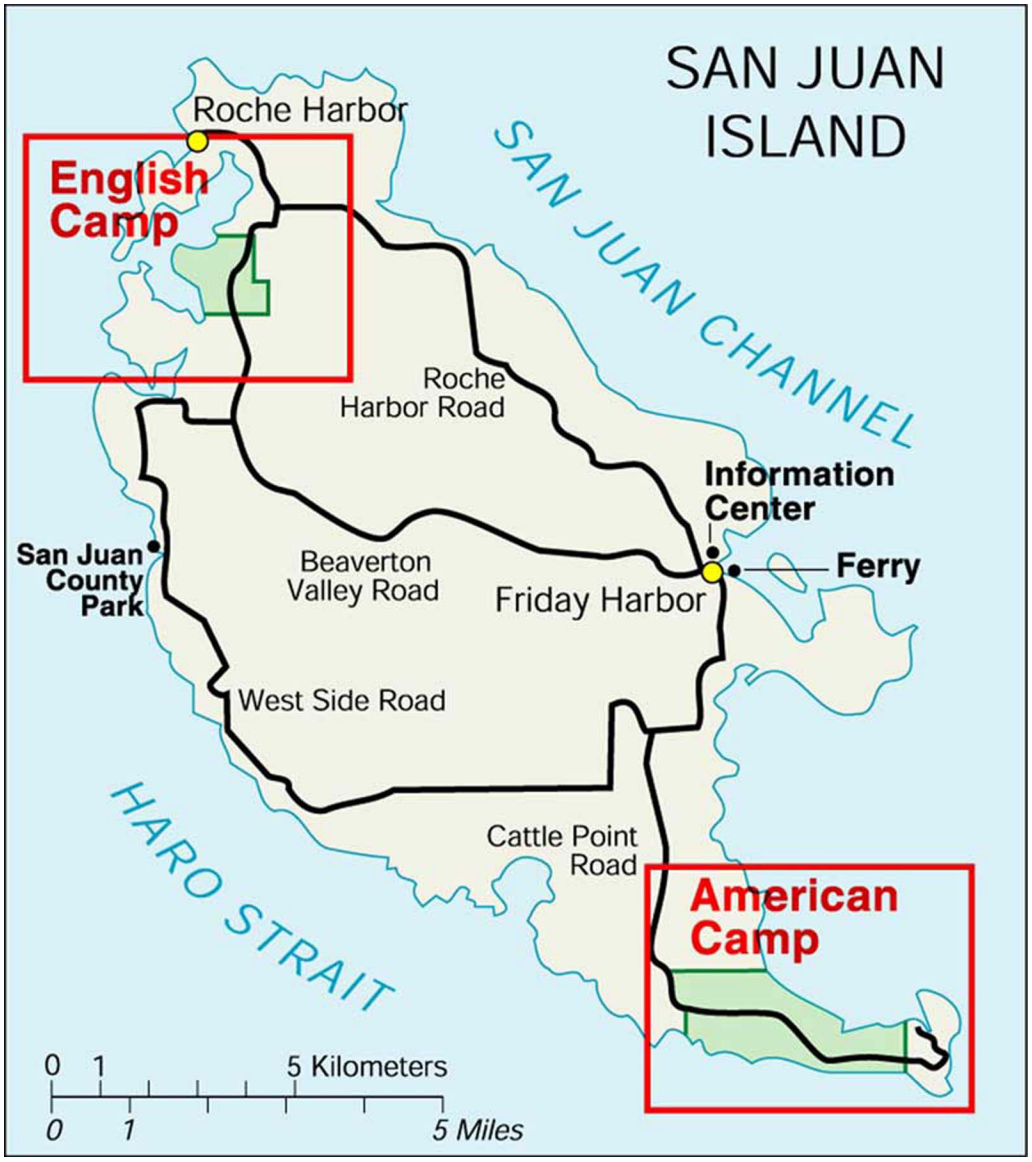

Figure 2.—Location of English and American Camps of San Juan Island National Historical Park in Washington (map by National Park Service).

Besides San Juan Island, the other principal named islands are Barnes, Blakely, Clark, Decatur, James, Johns, Lopez, Matia, Orcas, Patos, Shaw, Spieden, Stuart, Sucia, and Waldron. Friday Harbor, on San Juan Island, is the county seat and the largest town in the county. The total land area of the county is approximately 114,880 acres, or about 180 square miles.

With a view of the majestic Vancouver Island, Olympic Peninsula, Puget Sound, and North Cascade Range, San Juan Island National Historical Park offers a wealth of scenic, recreational, and educational opportunities for visitors. About 250,000 people visit the park each year to enjoy and explore the natural and historical setting preserved in the park. As a result of the geologic history of this glaciated landscape, a variety of landforms are at both American Camp and English Camp. The historic land uses and natural conditions have helped to shape the vegetative mosaic and underlying soils of both of the park units.

This soil survey updates a portion of the soil survey of San Juan County,

Washington, published in 1962 (USDA, 1962). It provides additional information and has larger scale maps that show the soils in greater detail. This report is an interim publication. A complete update of the soil survey of San Juan County currently is in progress.

General Nature of the Park

This section provides general information about the park. It discusses the history and development, geology, and climate of the park.

History and Development

San Juan Island National Historical Park was established in 1966 to interpret and preserve the sites of American Camp and English Camp and the historic events that occurred there from 1853 to 1874. These events culminated in the peaceful arbitration of the Oregon Territory boundary dispute (fig. 3), including the so-called Pig War of 1859 (Cannon, 1997).

Situated at the southern end of San Juan Island, American Camp overlooks the Strait of Juan de Fuca and is subject to the full brunt of storm tracks from the west and south. A dunefield in the center of the camp trends to the northwest, providing evidence of the prevailing winds from the Strait of Juan de Fuca. A large expanse of prairie surrounds this dunefield and makes up a significant part of the total acreage of American Camp. Prairie vegetation extends from sea level at South Beach and Fourth of July Beach to the top of the Redoubt and the southern slopes of the 295-foot-high Mount Finlayson. In contrast, the northern slopes of Mount Finlayson support a forest canopy of Douglas-fir, western red cedar, and western hemlock. Other forested areas occupy the low-lying areas north of the American Camp Visitor Center.

English Camp lies further to the north, out of the immediate reach of storm activity, in a relatively sheltered area along the shores of Garrison Bay and Westcott Bay. Traveling to both units of the park during a day with wind-driven rain illustrates the marked difference in shelter between the two camps. English Camp largely is

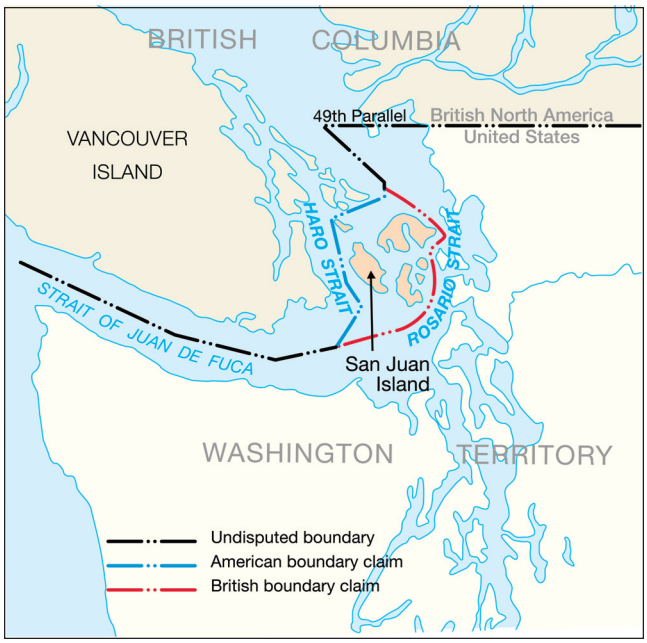

Figure 3.—Map of Oregon Territory boundaries.

forested, although the south slopes of the 650-foot-high Young Hill are rocky and support rangeland with scattered Oregon white oak trees. Pasture grasses are on the parade ground of the camp while young stands of red alder are in areas once cultivated by former residents.

From a historical perspective, the soil and vegetative communities of both American Camp and English Camp indirectly had some influence in the settlement of both sites by Europeans. At American Camp, the early explorers and settlers found dominantly prairie, as indicated by the presence of the San Juan soils and the persistent grassland vegetation. Settling in and cultivating an area naturally devoid of trees would have been highly appealing. In their native condition, the prairie soils would have been fertile and well suited to use as cropland and grazing land.

At English Camp, the soil profiles reveal the native soils and vegetative communities present prior to European settlement. Profiles of the Haro and Hiddenridge soils on the southern flank of Young Hill indicate the presence of native grassland while the soils throughout the rest of English Camp indicate the presence of forestland. Forest stands throughout much of English Camp do not exhibit the wind-sculpted shape common in trees at American Camp. English Camp and Garrison Bay are largely protected from severe weather conditions. The soils at English Camp demonstrate the capacity of the site to be used as a reliable source of timber and cultivated land, such as cropland and pastureland.

Prior to European settlement, American and English Camps served as central gathering places for Native Americans. The prairies provided important planting areas for vegetation used by the Native Americans. In addition, the soil profiles along the edge of Garrison Bay exhibit an extensive shell midden, further evidence of use of the site over a long period of time. Examination of the soil profiles in both park units reveals a great deal about the natural evolution of the units. Exploration and interpretation of the profiles can help to complete the story of the San Juan Islands, including the geologic history and formation.

Geology

By Jon Riedel, geologist, National Park Service, San Juan Island National Historical Park.

San Juan Island National Historical Park is on the continent side of the subduction margin between the Juan de Fuca and North American plates. This area is part of the “ring of fire,” a Pacific Basin region that is tectonically active and contains hundreds of volcanoes. Major earthquakes punctuate the Holocene geologic history of the region. The most recent of these earthquakes occurred in 1701, although six other major quakes have occurred in the last 4,000 years. The full impact of large subduction quakes on San Juan Island is unknown, but crustal subsidence and tsunamis may be included.

The park has been impacted to a lesser extent by large eruptions of the Cascade Range volcanoes. Approximately 8,000 years ago, the eruption of Mt. Mazama (now the site of Crater Lake, Oregon) resulted in the deposition of volcanic ash on the island. Hillslope erosion and deposition have reworked and mixed the tephra material into some of the soil profiles.

Rocks exposed at San Juan Island National Historical Park are part of the Late Cretaceous San Juan Thrust System. This system is a series of nappes that lie in a northwest-trending belt about 90 miles wide. Nappes are massive sheets of rock that have moved to the west along dominantly horizontal thrust faults. These terranes consist primarily of metamorphosed sedimentary and volcanic deposits from early Paleozoic (250 million years ago [Ma]) to middle Cretaceous (100 Ma). They are placed along a series of westerly-vergent thrust faults that date to a period between 100 to 84 Ma. The orogenic event that caused the thrust faulting is believed to be the

collision of the Wrangellia terrane with the North American continent. Some elements of the nappe sequence are metamorphosed by rapid burial from the North American continent (as much as 12 miles) and subsequent tectonic uplift during this event (Brandon, 1989).

Rock exposures at English Camp are part of the Deadman Bay terrane, which is the western leading edge of the thrust system. They date from Late Permian to Lower Jurassic. This terrane includes red and green pillow basalt, tuff, limestone, and ribbon chert. Early Permian crinoid and Tethyian fusilinid fossils can be found in some massive gray limestone pods. The Tethyian fossils are exotic to North America, evidence that the rocks containing them have been transported long distances.

Rocks exposed along the bluffs near American Camp are thrust over the Deadman Bay terrane, along the Rosario Thrust Zone. The Constitution Formation consists of massive volcaniclastic sandstone thrust over greenstone, mudstone, and Orcas ribbon chert. Imbricated slices of Garrison Schist and Orcas Chert in the fault zone are evidence of thrust displacement (Brandon and others, 1988).

Some of the bedrock outcroppings in the park are polished and striated by glacial abrasion. The most recent ice sheet, the Cordilleran Ice Sheet, covered San Juan Island between 18,200 and 13,300 years ago. The ice sheet flowed south-southwest across the northern Puget Lowland from Canada. It reached its maximum thickness, 4,000 feet, over San Juan County about 17,000 years ago (Porter and Swanson, 1998; Booth, 1986).

Glacial deposits are at both American and English Camps. At English Camp, Guss Island and other areas are covered with glaciomarine and glacial outwash deposits. Glaciomarine deposits are significant hydrologic and pedologic features. Locally known as a hardpan, or densic material, these deposits restrict water and plant roots. Glacial outwash contains a diverse mixture of rocks from Canada, including granite from the Coast Range and North Cascade Range. At American Camp, a glacial moraine forms the backbone of the island northwest of Mount Finlayson. On part of the moraine, soldiers moved large erratic glacial boulders during the construction of fortifications known as the Redoubt. These boulders dot the landscape on both sides of Cattle Point. The moraine is approximately 13,000 years old. It represents the point where retreat of the glacier paused for a period of time or where the glacier became grounded on existing glacial sediment. To the south of the moraine is an extensive outwash plain that slopes gently to the south and probably formed as the glacier stabilized along the moraine.

The immense weight of the glacial ice depressed the crust 300 to 400 feet. As the ice sheet melted some 13,000 years ago, the crust rebounded and left a series of stranded marine terraces along the south side of Cattle Point and along Bell Point and Young Bluff. Shells and other marine fossils can be found in the glacial sediment on the shoreline well above the modern sea level. Four prominent perched marine terraces are clearly visible above the road in the Cattle Point area of American Camp. These features are evidence of isostatic uplifting of the crust following deglaciation. Eroding bluffs along both sides of Cattle Point consist of marine outwash, diamict, and subtidal deposits that date to the emergence of the shoreline some time between 13,300 and 12,600 years ago (Dethier and others, 1996).

Rocks more resistant to erosion form headlands along the coastline at Cattle Point. Prevailing winds from the south and the Strait of Juan de Fuca pummel the unprotected shoreline at American Camp (Johannesen, 1993). Longshore drift generally is to the west, along the south side of Cattle Point. Large beach deposits are between the rock headlands. They consist of wide beaches and back beach berms dotted with large pieces of driftwood. Bluffs on the south face of Cattle Point, below the main road, are eroding, as indicated by a broken fenceline.

Gravel and sand spits formed by a northwesterly longshore drift enclose Johnny

and Old Town Lagoons on the north side of Cattle Point. Redistribution of beach sand by wind to areas inland has resulted in rapid deposition of fine sand at the end of Pickett's Lane, and a small dunefield is active east of the lane. Blowout areas contain evidence of buried soils and former surface stability.

Garrison Bay at English Camp is protected on all sides from wind-driven wave action. This quiet water provides important habitat for shellfish. Native American habitation of this area was heavily influenced by the abundant shellfish food source, as evidenced by the shell midden under the parade grounds at English Camp. The beach below the parade grounds is composed largely of shell midden deposits and is undergoing slow erosion as a result of wave action, pedestrian traffic, and a lack of vegetative cover.

Climate

By the National Water and Climate Center, National Resources Conservation Service, Portland, Oregon.

The climate tables for this survey were created from data collected at the Olga 2 SE climate station in Washington. Thunderstorm days, relative humidity, percent sunshine, and wind information were estimated from data collected at the First Order station at Seattle, Washington.

Table 1 gives data on temperature and precipitation for the park as recorded at the Olga 2 SE station in 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 length of the growing season.

In winter, the average temperature is 41.0 degrees F and the average daily minimum temperature is 35.8 degrees. The lowest temperature on record, which occurred at the Olga 2 SE station on January 13, 1950, is -8 degrees. In summer, the average temperature is 59.4 degrees and the average daily maximum temperature is 68.9 degrees. The highest recorded temperature, which occurred at the Olga 2 SE station on July 17, 1941, is 92 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.

The total annual precipitation averages 28.07 inches. Of this, 17.36 inches, or 62 percent, usually falls in March through November. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 3.40 inches at the Olga 2 SE station on January 21, 1935, and the second heaviest was 2.89 inches at the Olga 2 SE station on January 24, 1935. Thunderstorms occur on about 11 days each year, about 7 of which occur in October.

The average seasonal snowfall is about 5.6 inches. The greatest snow depth at any one time during the period of record was 27 inches on December 29, 1996. On the average, 3 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 15 inches in February 1916.

The average relative humidity in midafternoon is about 62 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 62 percent of the time possible in summer and 28 percent in winter. The speed and direction of the wind on the San Juan Islands are highly variable. The prevailing wind in Seattle is from the southwest, and the average windspeed is 9 miles per hour. Average windspeed is highest, 10 miles per hour, in January. The windspeed on the islands could easily exceed that of Seattle.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the park. 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 plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the park are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the park. 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 park 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 park and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the park, 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.

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 park, 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.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, vegetation, 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.

Because of its small scale, the map is not suitable for detailed planning and management. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils that Formed Under Grassland Vegetation

Number of map units: 2
Percentage of park: 51 percent

1. Soils on Glacial Outwash Plains (San Juan)

Percentage of park: 41 percent (figs. 4 and 5, pp. 14 and 15)
Location in park: American Camp, primarily on south-facing slopes
Depth class: Very deep
Position on landscape: Hillslopes
Parent material: Eolian sand over glacial outwash
Elevation: 0 to 310 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days
Minor components: Endoaquents, Pilepoint soils, Xerorthents
Present vegetation: Roemer's fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Characteristics of San Juan soils
Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid
Surface layer texture: Sandy loam
Subsoil texture: Gravelly loamy coarse sand
Substratum texture: Extremely gravelly coarse sand
Slope range: 0 to 60 percent

2. Soils on Hills and Mountains (Haro-Hiddenridge-Rock outcrop)

Percentage of park: 10 percent (fig. 6, p. 16)
Location in park: English and American Camps, although primarily on the south-facing flank of Young Hill at English Camp
Depth class: Shallow to deep to bedrock
Position on landscape: Hillsides and mountainsides
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Elevation: 0 to 650 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days
Minor components: None
Present vegetation: Oregon white oak, Roemer's fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Characteristics of Haro soils
Depth class: Shallow to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to rapid
Surface layer texture: Loam
Subsoil texture: Gravelly sandy loam
Slope range: 8 to 100 percent

Characteristics of Hiddenridge soils
Depth class: Deep to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderately rapid or rapid
Surface layer texture: Gravelly coarse sandy loam
Subsoil texture: Very gravelly coarse sandy loam
Substratum texture: Extremely gravelly coarse sandy loam
Slope range: 8 to 100 percent

Characteristics of Rock outcrop
Kind of rock: Metasedimentary

Soils that Formed Under Forest Vegetation

Number of map units: 3
Percentage of park: 48 percent

3. Soils in Valleys of Glacial Outwash Plains (Spieden-Mitchellbay-Sholander)

Percentage of park: 20 percent (figs. 5 and 6, pp. 15 and 16)
Location in park: English and American Camps, primarily in the lowest landscape positions
Depth class: Very deep, and moderately deep or deep to dense material
Position on landscape: Valleys (bottom land)
Parent material: Glacial outwash and glaciomarine deposits
Elevation: 0 to 300 feet

Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days
Minor components: Bazal, Coveland, Limepoint, Shalcar, and Sucia soils
Present vegetation: Overstory of Sitka spruce, Douglas-fir, lodgepole pine, western red cedar, grand fir, and red alder

Characteristics of Spieden soils
Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow to very rapid
Surface layer texture: Silt loam
Subsoil texture: Gravelly loamy sand
Substratum texture: Coarse sand
Slope range: 0 to 2 percent

Characteristics of Mitchellbay soils
Depth class: Moderately deep to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to moderately rapid
Surface layer texture: Gravelly sandy loam
Subsoil texture: Sandy loam
Substratum texture: Loam
Slope range: 0 to 25 percent

Characteristics of Sholander soils
Depth class: Deep to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to very rapid
Surface layer texture: Gravelly loam
Subsoil texture: Gravelly loamy sand
Substratum texture: Loam
Slope range: 0 to 8 percent

4. Soils on Hills of Glacial Outwash Plains (Hoypus-Everett)

Percentage of park: 14 percent (fig. 4, p. 14)
Location in park: American Camp, primarily on north-facing slopes
Depth class: Very deep
Position on landscape: Hillslopes
Parent material: Glacial outwash
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days
Minor components: None
Present vegetation: Overstory of Douglas-fir, lodgepole pine, Pacific madrone, western red cedar, grand fir, red alder, and western hemlock

Characteristics of Hoypus soils
Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid

Surface layer texture: Sandy loam
Subsoil texture: Gravelly loamy sand
Substratum texture: Extremely gravelly sand
Slope range: 3 to 50 percent

Characteristics of Everett soils
Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid
Surface layer texture: Sandy loam
Subsoil texture: Very gravelly coarse sand
Substratum texture: Extremely gravelly coarse sand
Slope range: 3 to 50 percent

5. Soils on Hills and Mountains (Cady-Rock outcrop-Doebay)

Percentage of park: 14 percent (fig. 6, p. 16)
Location in park: English Camp, extending from the shoreline of Garrison and Westcott Bays to the summit of Young Hill
Depth class: Shallow or moderately deep to bedrock
Position on landscape: Hillsides and mountainsides
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Elevation: 0 to 650 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days
Minor components: Roche soils
Present vegetation: Overstory of Douglas-fir, lodgepole pine, Pacific madrone, and grand fir

Characteristics of Cady soils
Depth class: Shallow to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to moderately rapid
Surface layer texture: Loam
Subsoil texture: Loam
Slope range: 5 to 100 percent

Characteristics of Rock outcrop
Kind of rock: Metasedimentary

Characteristics of Doebay soils
Depth class: Moderately deep to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate or moderately rapid
Surface layer texture: Loam
Subsoil texture: Gravelly sandy loam
Substratum texture: Very gravelly loam
Slope range: 5 to 100 percent

Miscellaneous Areas

Number of map units: 1
Percentage of park: About 1 percent

6. Fresh water

Percentage of park: About 1 percent
Location in park: American Camp, along the northern shore

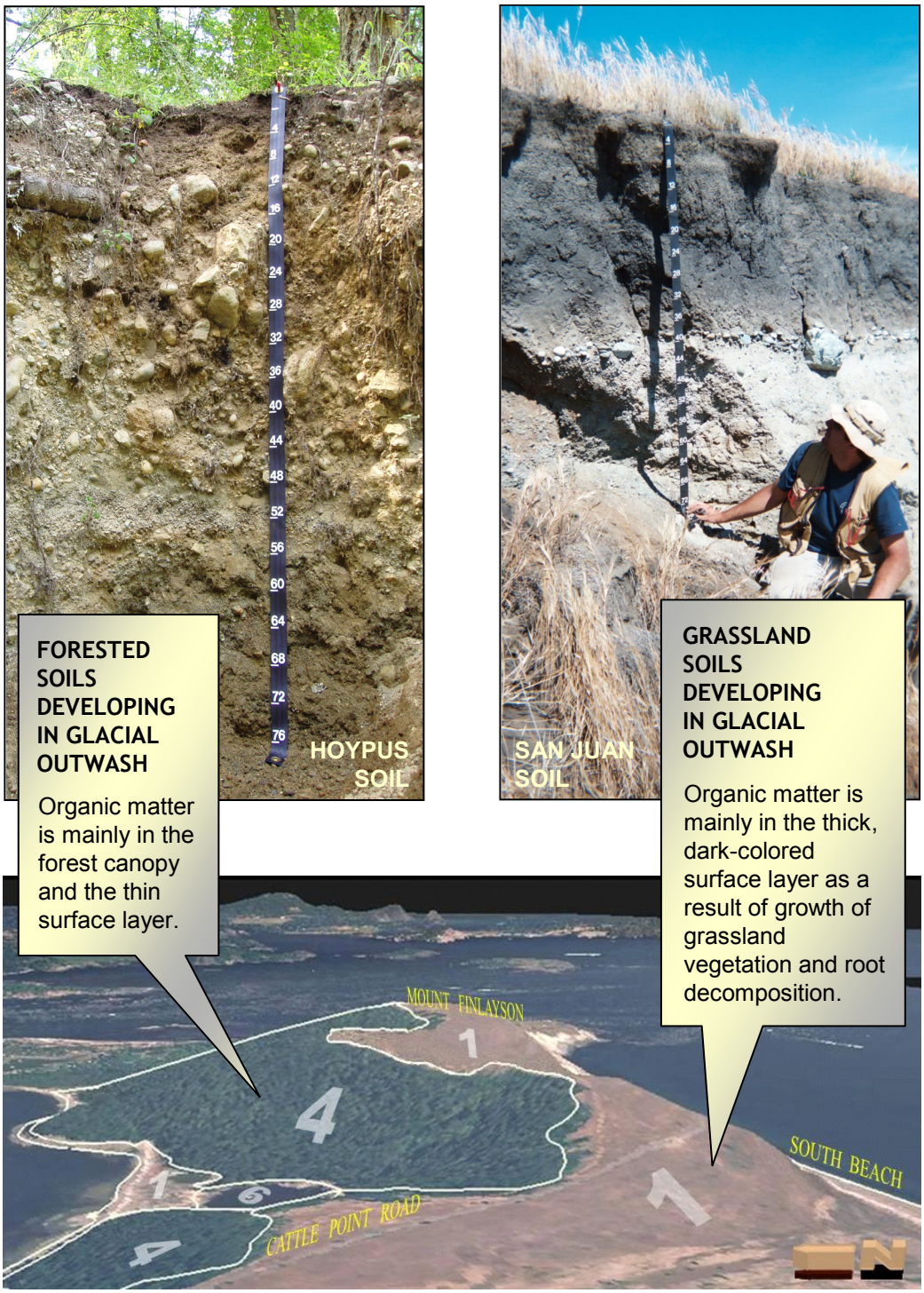

Figure 4.—Oblique perspective view of American Camp, looking east toward Mount Finlayson. On this page and the following two pages, the numbers in the polygons correspond with general soil map units. Soil profiles and descriptions illustrate general features and differences of various soils.

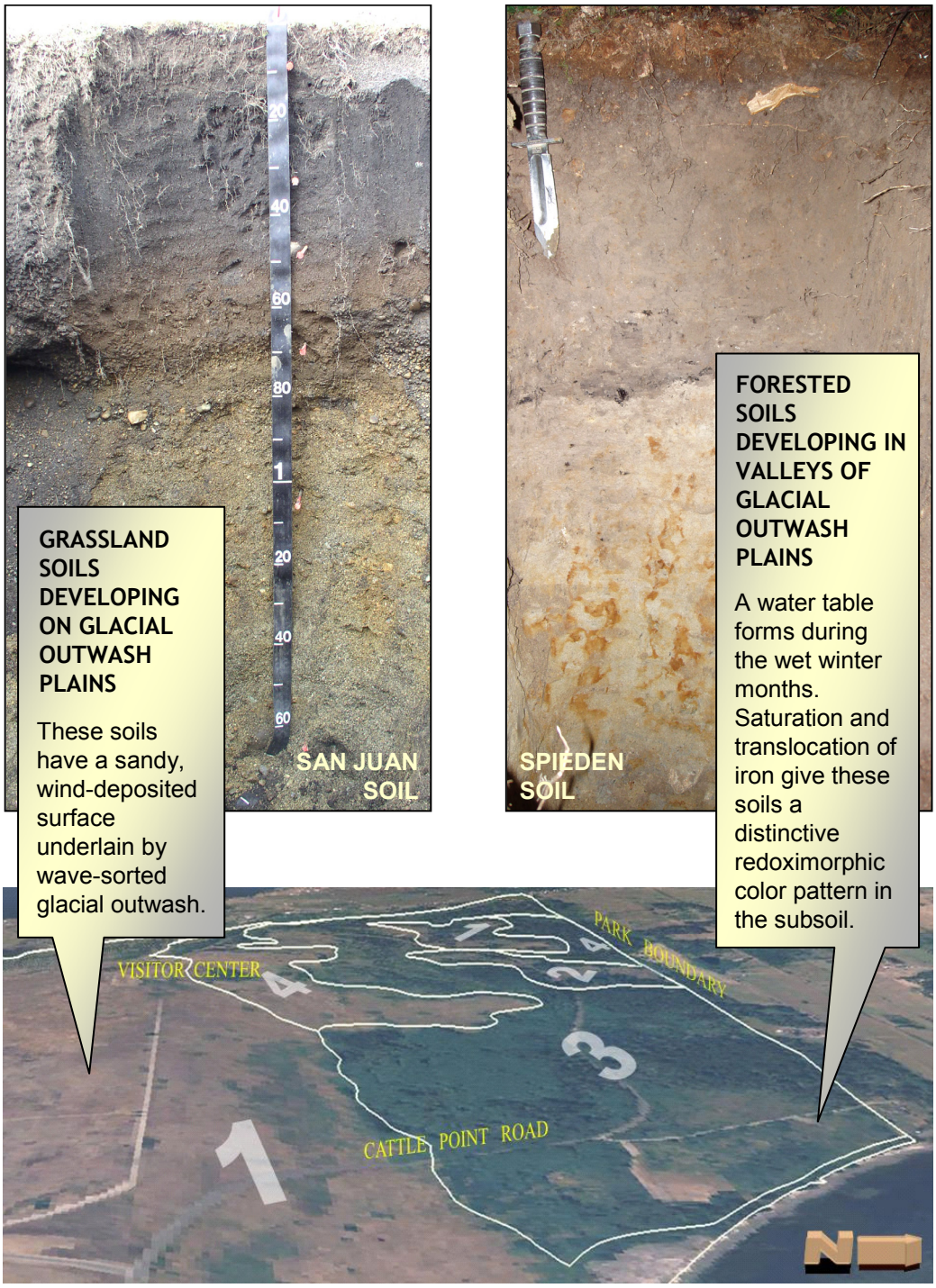

Figure 5.—Oblique perspective view of American Camp, looking west toward the visitor center. Images on this page and the preceding and following pages were created with a geographic information system by draping a digital orthographic photograph over a 10-meter digital elevation model.

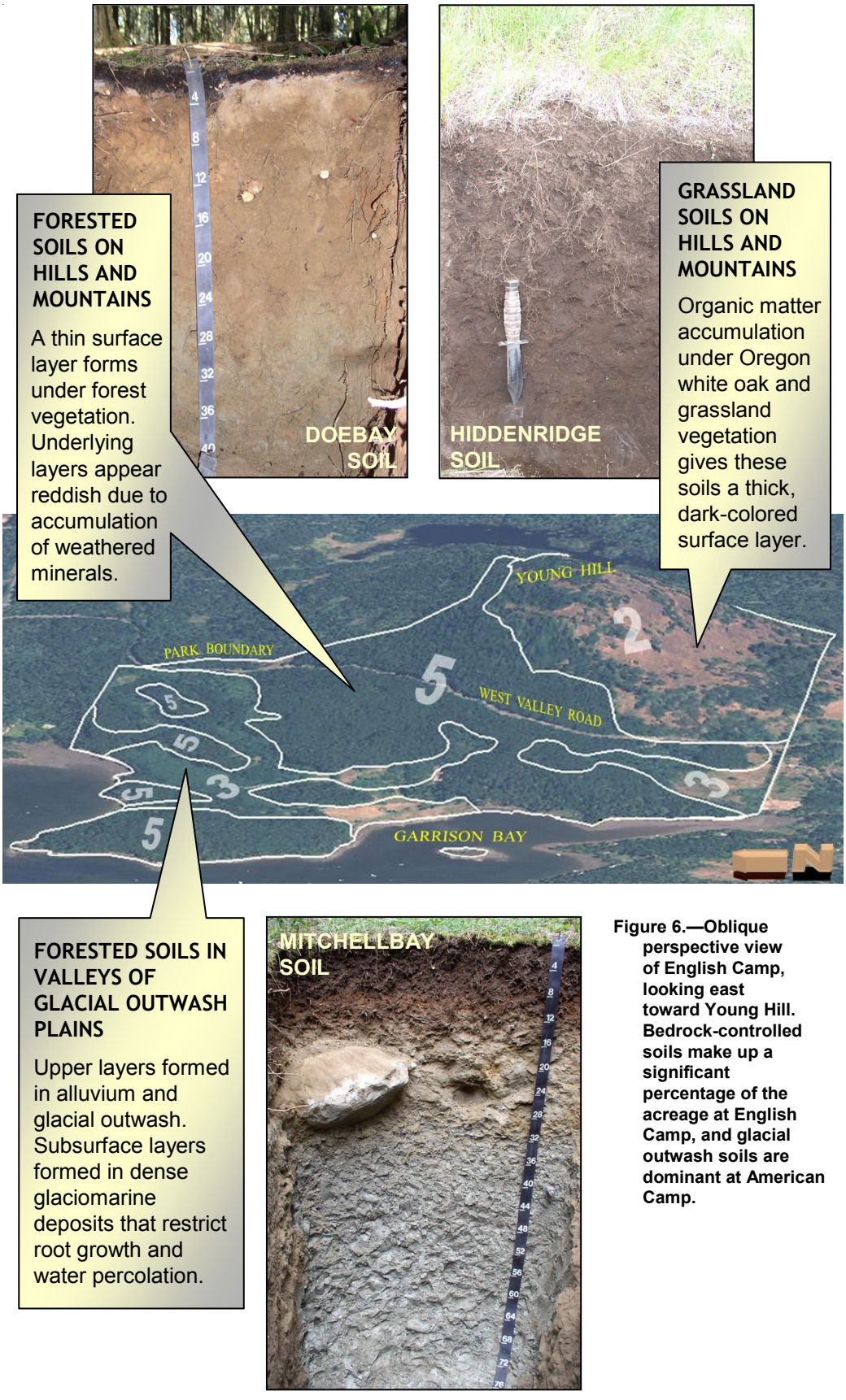

Figure 6.—Oblique perspective view of English Camp, looking east toward Young Hill. Bedrock-controlled soils make up a significant percentage of the acreage at English Camp, and glacial outwash soils are dominant at American Camp.

Detailed Soil Map Units

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. 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.

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown

on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, San Juan sandy loam, 2 to 8 percent slopes, is a phase of the San Juan series.

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Haro-Hiddenridge-Rock outcrop complex, 8 to 35 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 maps. Because of present or anticipated uses of the map units in the survey area, 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. Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Spieden and Sholander soils, 0 to 2 percent slopes, is an undifferentiated group in this survey area.

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

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.

999—Fresh water

General landscape: Shore complexes
Elevation: 0 to 5 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Composition: Fresh water—100 percent
Landform: Depressions

1000—Spieden and Sholander soils, 0 to 2 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Spieden, undrained, and similar soils—25 percent
Spieden, drained, and similar soils—25 percent
Sholander, undrained, and similar soils—20 percent

Sholander, drained, and similar soils—20 percent
Dissimilar minor component—10 percent

Major Components

Characteristics of Spieden, Undrained

Setting
Landform: Drainageways

Properties and qualities
Parent material: Glacial outwash
Slope range: 0 to 2 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Poorly drained
Permeability: Moderately slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: Frequent (see “Water Features” table)
Minimum depth to seasonal high water table: At the surface (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 4.9 inches
Land capability subclass (nonirrigated): 5w

Vegetation
Ecological site: Picea sitchensis-Alnus rubra/Rubus spectabilis PISI-ALRU/RUSP (F002XY904WA)
Common trees: Sitka spruce, red alder
Forest understory vegetation: Salmonberry, common snowberry, trailing blackberry, scouringrush horsetail, field horsetail, cluster rose, red elderberry, western swordfern, softstem bulrush

Typical profile
A1—0 to 4 inches; mucky silt loam
A2—4 to 11 inches; silt loam
E—11 to 24 inches; gravelly loamy sand
Bg—24 to 36 inches; gravelly loamy coarse sand
C1—36 to 48 inches; coarse sand
C2—48 to 60 inches; coarse sand

Characteristics of Spieden, Drained

Setting
Landform: Drainageways

Properties and qualities
Parent material: Glacial outwash
Slope range: 0 to 2 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Poorly drained
Permeability: Moderately slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 11 inches (see “Water Features” table)

Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 4.9 inches
Land capability subclass (nonirrigated): 4w

Vegetation
Ecological site: Picea sitchensis-Alnus rubra/Rubus spectabilis PISI-ALRU/RUSP (F002XY904WA)
Common trees: Sitka spruce, red alder
Forest understory vegetation: Salmonberry, common snowberry, trailing blackberry, scouringrush horsetail, field horsetail, cluster rose, red elderberry, western swordfern, softstem bulrush

Typical profile
A1—0 to 4 inches; mucky silt loam
A2—4 to 11 inches; silt loam
E—11 to 24 inches; gravelly loamy sand
Bg—24 to 36 inches; gravelly loamy coarse sand
C1—36 to 48 inches; coarse sand
C2—48 to 60 inches; coarse sand

Characteristics of Sholander, Undrained

Setting
Landform: Valleys

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 0 to 2 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: Frequent (see “Water Features” table)
Minimum depth to seasonal high water table: At the surface to a depth of about 16 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.3 inches
Land capability subclass (nonirrigated): 5w

Vegetation
Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile
A—0 to 8 inches; gravelly loam
E—8 to 16 inches; gravelly sandy loam
Bg1—16 to 28 inches; gravelly loamy sand
Bg2—28 to 51 inches; gravelly sand
2Cd—51 to 60 inches; loam

Characteristics of Sholander, Drained

Setting
Landform: Valleys

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 0 to 2 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 16 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.3 inches
Land capability subclass (nonirrigated): 4s

Vegetation
Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile
A—0 to 8 inches; gravelly loam
E—8 to 16 inches; gravelly sandy loam
Bg1—16 to 28 inches; gravelly loamy sand
Bg2—28 to 51 inches; gravelly sand
2Cd—51 to 60 inches; loam

Dissimilar Minor Component

Sucia soils
Percentage of map unit: 10 percent
Landform: Valleys

1004—Limepoint and Sholander soils, 0 to 8 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Limepoint, undrained, and similar soils—35 percent
Limepoint, drained, and similar soils—35 percent

Sholander, undrained, and similar soils—10 percent
Sholander, drained, and similar soils—10 percent
Dissimilar minor component—10 percent

Major Components

Characteristics of Limepoint, Undrained

Setting
Landform: Valleys, drainageways

Properties and qualities
Parent material: Alluvium over dense glaciomarine deposits
Slope range: 0 to 8 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to dense material
Drainage class: Poorly drained
Permeability: Very slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: Occasional (see “Water Features” table)
Minimum depth to seasonal high water table: At the surface (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 7.7 inches
Land capability subclass (nonirrigated): 5w

Vegetation
Ecological site: Picea sitchensis-Alnus rubra/Rubus spectabilis PISI-ALRU/RUSP (F002XY904WA)
Common trees: Sitka spruce, red alder
Forest understory vegetation: Salmonberry, common snowberry, trailing blackberry, scouringrush horsetail, field horsetail, cluster rose, red elderberry, western swordfern, softstem bulrush

Typical profile
A1—0 to 6 inches; mucky silt loam
A2—6 to 14 inches; loam
Bg—14 to 31 inches; loamy coarse sand
Cg1—31 to 49 inches; loam
Cg2—49 to 58 inches; sandy loam
2Cd—58 to 60 inches; silty clay loam

Characteristics of Limepoint, Drained

Setting
Landform: Drainageways, valleys

Properties and qualities
Parent material: Alluvium over dense glaciomarine deposits
Slope range: 0 to 8 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to dense material
Drainage class: Poorly drained
Permeability: Very slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 14 inches (see “Water Features” table)

Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 7.7 inches
Land capability subclass (nonirrigated): 4w

Vegetation
Ecological site: Picea sitchensis-Alnus rubra/Rubus spectabilis PISI-ALRU/RUSP (F002XY904WA)
Common trees: Sitka spruce, red alder
Forest understory vegetation: Salmonberry, common snowberry, trailing blackberry, scouringrush horsetail, field horsetail, cluster rose, red elderberry, western swordfern, softstem bulrush

Typical profile
A1—0 to 6 inches; mucky silt loam
A2—6 to 14 inches; loam
Bg—14 to 31 inches; loamy coarse sand
Cg1—31 to 49 inches; loam
Cg2—49 to 58 inches; sandy loam
2Cd—58 to 60 inches; silty clay loam

Characteristics of Sholander, Undrained

Setting
Landform: Valleys

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 2 to 8 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: Occasional (see “Water Features” table)
Minimum depth to seasonal high water table: At the surface to a depth of about 16 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.3 inches
Land capability subclass (nonirrigated): 6w

Vegetation
Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile
A—0 to 8 inches; gravelly loam
E—8 to 16 inches; gravelly sandy loam
Bg1—16 to 28 inches; gravelly loamy sand
Bg2—28 to 51 inches; gravelly sand
2Cd—51 to 60 inches; loam

Characteristics of Sholander, Drained

Setting
Landform: Valleys

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 2 to 8 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 16 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.3 inches
Land capability subclass (nonirrigated): 4w

Vegetation
Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile
A—0 to 8 inches; gravelly loam
E—8 to 16 inches; gravelly sandy loam
Bg1—16 to 28 inches; gravelly loamy sand
Bg2—28 to 51 inches; gravelly sand
2Cd—51 to 60 inches; loam

Dissimilar Minor Component

Shalcar, Undrained

Percentage of map unit: 10 percent

Setting
Landform: Depressions

Properties and qualities
Parent material: Organic material over glacial outwash or dense glaciomarine deposits
Slope range: 0 to 2 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Very poorly drained
Permeability: Moderately slow to rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: Frequent (see “Water Features” table)
Minimum depth to seasonal high water table: At the surface (see “Water Features” table)

Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 17.1 inches
Land capability subclass (nonirrigated): 5w

Vegetation
Ecological site: Salix lucida/Spiraea douglasii (F002XX905WA)
Common trees: None
Characteristic plants: Pacific willow, Douglas spirea

Typical profile
Oa1—0 to 3 inches; muck
Oa2—3 to 11 inches; muck
Oa3—11 to 22 inches; muck
2Bg1—22 to 27 inches; fine sandy loam
2Bg2—27 to 44 inches; silt loam
2Cg—44 to 60 inches; sandy loam

1009—Coveland-Mitchellbay complex, 8 to 25 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Coveland and similar soils—70 percent
Mitchellbay and similar soils—25 percent
Dissimilar minor component—5 percent

Major Components

Characteristics of Coveland

Setting
Landform: Hillslopes, valleys

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 8 to 15 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: At the surface to a depth of 9 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 7.3 inches
Land capability subclass (nonirrigated): 6w

Vegetation

Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile

A1—0 to 4 inches; loam
A2—4 to 9 inches; loam
E—9 to 20 inches; sandy loam
Btg1—20 to 36 inches; silty clay loam
Btg2—36 to 44 inches; silt loam
Cd—44 to 60 inches; silt loam

Characteristics of Mitchellbay

Setting

Landform: Valleys, hillslopes

Properties and qualities

Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 8 to 25 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: 1 to 5 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 5 inches
Land capability subclass (nonirrigated): 4w

Vegetation

Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly sandy loam
Bw—5 to 13 inches; gravelly sandy loam
E—13 to 19 inches; sandy loam
Btg—19 to 34 inches; loam
Cd—34 to 60 inches; loam

Dissimilar Minor Component

Rock outcrop
Percentage of map unit: 5 percent
Landform: Hillslopes

1013—Bazal and Mitchellbay soils, 0 to 3 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Bazal, undrained, and similar soils—30 percent
Bazal, drained, and similar soils—30 percent
Mitchellbay and similar soils—40 percent

Major Components

Characteristics of Bazal, Undrained

Setting
Landform: Drainageways, valleys

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 0 to 3 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to dense material
Drainage class: Poorly drained
Permeability: Very slow to rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: Frequent (see “Water Features” table)
Minimum depth to seasonal high water table: At the surface (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 6.6 inches
Land capability subclass (nonirrigated): 5w

Vegetation
Ecological site: Picea sitchensis-Alnus rubra/Rubus spectabilis PISI-ALRU/RUSP (F002XY904WA)
Common trees: Sitka spruce, red alder
Forest understory vegetation: Salmonberry, common snowberry, trailing blackberry, scouringrush horsetail, field horsetail, cluster rose, red elderberry, western swordfern, softstem bulrush

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 4 inches; mucky loam
A2—4 to 10 inches; loam

Bw—10 to 17 inches; loam
E—17 to 24 inches; loamy coarse sand
2Btg—24 to 39 inches; loam
2Cd—39 to 60 inches; loam

Characteristics of Bazal, Drained

Setting
Landform: Drainageways, valleys

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 0 to 3 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to dense material
Drainage class: Poorly drained
Permeability: Very slow to rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 10 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 6.6 inches
Land capability subclass (nonirrigated): 5w

Vegetation
Ecological site: Picea sitchensis-Alnus rubra/Rubus spectabilis PISI-ALRU/RUSP (F002XY904WA)
Common trees: Sitka spruce, red alder
Forest understory vegetation: Salmonberry, common snowberry, trailing blackberry, scouringrush horsetail, field horsetail, cluster rose, red elderberry, western swordfern, softstem bulrush

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 4 inches; mucky loam
A2—4 to 10 inches; loam
Bw—10 to 17 inches; loam
E—17 to 24 inches; loamy coarse sand
2Btg—24 to 39 inches; loam
2Cd—39 to 60 inches; loam

Characteristics of Mitchellbay

Setting
Landform: Valleys, hillslopes

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 0 to 3 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None

Frequency of ponding: Frequent (see “Water Features” table)
Minimum depth to seasonal high water table: About 1 to 5 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 5 inches
Land capability subclass (nonirrigated): 5w

Vegetation
Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly sandy loam
Bw—5 to 13 inches; gravelly sandy loam
E—13 to 19 inches; sandy loam
Btg—19 to 34 inches; loam
Cd—34 to 60 inches; loam

1014—Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes

Map Unit Setting

General landscape: Shore complexes
Elevation: 0 to 10 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 365 days

Map Unit Composition

Endoaquents, tidal, and similar soils—45 percent
Xerorthents and similar soils—45 percent
Dissimilar minor component—10 percent

Major Components

Characteristics of Endoaquents, Tidal

Setting
Landform: Beaches

Properties and qualities
Parent material: Beach sand
Slope range: 0 to 5 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Very poorly drained
Permeability: Very rapid (see “Physical Properties” table)

Frequency of flooding: Very frequent (see “Water Features” table)
Frequency of ponding: None
Minimum depth to seasonal high water table: At the surface (see “Water Features” table)
Salinity maximum: Strongly saline
Sodicity maximum: Sodic
Available water capacity (entire profile): About 1.8 inches
Land capability subclass (nonirrigated): 8w

Vegetation
Ecological site: None assigned
Common trees: None
Characteristic plant: Virginia glasswort

Typical profile
C1—0 to 29 inches; sand
C2—29 to 48 inches; very gravelly coarse sand
C3—48 to 60 inches; extremely gravelly coarse sand

Characteristics of Xerorthents

Setting
Landform: Hillslopes, beaches

Properties and qualities
Parent material: Beach sand and colluvium derived from glacial outwash
Slope range: 0 to 5 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Excessively drained
Permeability: Very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 0.6 inch
Land capability subclass (nonirrigated): 7s

Vegetation
Ecological site: Salt Water Shoreline - FERU/CALE (R002XY302WA)
Common trees: None
Characteristic plants: Oregon gumweed, Roemer’s fescue, common yarrow, field chickweed, great camas, red fescue

Typical profile
A—0 to 1 inch; very gravelly sand
C1—1 to 20 inches; very gravelly sand
C2—20 to 60 inches; very gravelly sand

Dissimilar Minor Component

Rock outcrop
Percentage of map unit: 10 percent
Landform: Hillslopes

2001—Mitchellbay gravelly sandy loam, 5 to 15 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Mitchellbay and similar soils—90 percent
Dissimilar minor component—10 percent

Characteristics of Mitchellbay

Setting

Landform: Valleys, hillslopes

Properties and qualities

Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 5 to 15 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: Occasional (see “Water Features” table)
Minimum depth to seasonal high water table: About 1 to 5 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 5 inches
Land capability subclass (nonirrigated): 4w

Vegetation

Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly sandy loam
Bw—5 to 13 inches; gravelly sandy loam
E—13 to 19 inches; sandy loam
Btg—19 to 34 inches; loam
Cd—34 to 60 inches; loam

Dissimilar Minor Component

Rock outcrop
Percentage of map unit: 10 percent
Landform: Hillslopes

2002—Sucia sandy loam, 3 to 8 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Sucia and similar soils—90 percent
Dissimilar minor component—10 percent

Characteristics of Sucia

Setting
Landform: Valleys

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 3 to 8 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to dense material
Drainage class: Moderately well drained
Permeability: Very slow to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 9 to 27 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 4 inches
Land capability subclass (nonirrigated): 4w

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, lodgepole pine
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
A—0 to 9 inches; sandy loam
Bw—9 to 19 inches; loamy sand
Bg1—19 to 27 inches; loamy sand
Bg2—27 to 33 inches; gravelly sand
2Bg3—33 to 47 inches; gravelly sandy loam
2Cd—47 to 60 inches; loam

Dissimilar Minor Component

Sholander soils
Percentage of map unit: 10 percent
Landform: Valleys

2004—Mitchellbay gravelly sandy loam, 2 to 5 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Mitchellbay and similar soils—100 percent

Characteristics of Mitchellbay

Setting
Landform: Valleys, hillslopes

Properties and qualities
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 2 to 5 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 1 to 5 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 5 inches
Land capability subclass (nonirrigated): 4w

Vegetation
Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly sandy loam
Bw—5 to 13 inches; gravelly sandy loam
2E—13 to 19 inches; sandy loam

2Btg—19 to 34 inches; loam
2Cd—34 to 60 inches; loam

3000—Pilepoint loam, 3 to 12 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Pilepoint and similar soils—90 percent
Dissimilar minor component—10 percent

Characteristics of Pilepoint

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Eolian sand over glacial outwash and dense glaciomarine deposits
Slope range: 3 to 12 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to dense material
Drainage class: Moderately well drained
Permeability: Very slow to rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 13 to 22 inches (see “Water Features” table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 4.5 inches
Land capability subclass (nonirrigated): 3s

Vegetation
Ecological site: Puget Prairie QUGA4/FERO (R002XY102WA)
Common tree: Oregon white oak
Characteristic plants: Roemer’s fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Typical profile
A1—0 to 4 inches; loam
A2—4 to 13 inches; loam
Bw—13 to 22 inches; very gravelly sandy loam
E—22 to 29 inches; sandy loam
2Btg—29 to 36 inches; silt loam
2Cd1—36 to 46 inches; silt loam
2Cd2—46 to 60 inches; silt loam

Dissimilar Minor Component

Rock outcrop
Percentage of map unit: 10 percent
Landform: Hillslopes

3001—Hoypus sandy loam, 3 to 25 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Hoypus and similar soils—100 percent

Characteristics of Hoypus

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Glacial outwash
Slope range: 3 to 25 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.1 inches
Land capability subclass (nonirrigated): 4e

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, lodgepole pine
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; sandy loam
Bw1—5 to 20 inches; loamy sand
Bw2—20 to 36 inches; very gravelly loamy sand
C—36 to 60 inches; extremely gravelly sand

3005—San Juan sandy loam, 2 to 8 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

San Juan and similar soils—100 percent

Characteristics of San Juan

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Eolian sand over glacial outwash
Slope range: 2 to 8 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3 inches
Land capability subclass (nonirrigated): 4s

Vegetation
Ecological site: Puget Prairie QUGA4/FERO (R002XY102WA)
Common trees: Oregon white oak
Characteristics plants: Roemer’s fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Typical profile
A1—0 to 4 inches; sandy loam
A2—4 to 13 inches; sandy loam
A3—13 to 19 inches; sandy loam
Bw—19 to 27 inches; gravelly loamy coarse sand
C1—27 to 41 inches; extremely gravelly coarse sand
C2—41 to 62 inches; extremely gravelly coarse sand
C3—62 to 70 inches; extremely gravelly coarse sand

3006—San Juan sandy loam, 30 to 60 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

San Juan and similar soils—100 percent

Characteristics of San Juan

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Eolian sand over glacial outwash

Slope range: 30 to 60 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid (see "Physical Properties" table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3 inches
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site: Puget Prairie QUGA4/FERO (R002XY102WA)
Common trees: Oregon white oak
Characteristic plants: Roemer's fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Typical profile
A1—0 to 4 inches; sandy loam
A2—4 to 13 inches; sandy loam
A3—13 to 19 inches; sandy loam
Bw—19 to 27 inches; gravelly loamy coarse sand
C1—27 to 41 inches; extremely gravelly coarse sand
C2—41 to 62 inches; extremely gravelly coarse sand
C3—62 to 70 inches; extremely gravelly coarse sand

3007—San Juan sandy loam, 15 to 35 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

San Juan and similar soils—100 percent

Characteristics of San Juan

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Eolian sand over glacial outwash
Slope range: 15 to 35 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid (see "Physical Properties" table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline

Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3 inches
Land capability subclass (nonirrigated): 4e

Vegetation
Ecological site: Puget Prairie QUGA4/FERO (R002XY102WA)
Common trees: Oregon white oak
Characteristic plants: Roemer's fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Typical profile
A1—0 to 4 inches; sandy loam
A2—4 to 13 inches; sandy loam
A3—13 to 19 inches; sandy loam
Bw—19 to 27 inches; gravelly loamy coarse sand
C1—27 to 41 inches; extremely gravelly coarse sand
C2—41 to 62 inches; extremely gravelly coarse sand
C3—62 to 70 inches; extremely gravelly coarse sand

3008—Xerorthents-Endoaquents, tidal association, 0 to 100 percent slopes

Map Unit Setting

General landscape: Shore complexes
Elevation: 0 to 100 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 365 days

Map Unit Composition

Xerorthents and similar soils—75 percent
Endoaquents, tidal, and similar soils—25 percent

Major Components

Characteristics of Xerorthents

Setting
Landform: Hillslopes, sea cliffs, beaches

Properties and qualities
Parent material: Beach sand and colluvium derived from glacial outwash
Slope range: 5 to 100 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Excessively drained
Permeability: Very rapid (see "Physical Properties" table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Strongly saline
Sodicity maximum: Sodic
Available water capacity (entire profile): About 0.6 inch
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site: Salt Water Shoreline FERU/CALE (R002XY302WA)
Common trees: None
Characteristic plants: Oregon gumweed, Roemer's fescue, common yarrow, field chickweed, great camas, red fescue

Typical profile
A—0 to 1 inch; very gravelly sand
C1—1 to 20 inches; very gravelly sand
C2—20 to 60 inches; very gravelly sand

Characteristics of Endoaquents, Tidal

Setting
Landform: Beaches

Properties and qualities
Parent material: Beach sand
Slope range: 0 to 5 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Very poorly drained
Permeability: Very rapid (see "Physical Properties" table)
Frequency of flooding: Very frequent (see "Water Features" table)
Frequency of ponding: None
Minimum depth to seasonal high water table: At the surface (see "Water Features" table)
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 1.8 inches
Land capability subclass (nonirrigated): 8w

Vegetation
Ecological site: None assigned
Common trees: None
Characteristic plant: Virginia glasswort

Typical profile
C1—0 to 29 inches; sand
C2—29 to 48 inches; very gravelly coarse sand
C3—48 to 60 inches; extremely gravelly coarse sand

3010—San Juan-Dune land complex, 0 to 30 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

San Juan and similar soils—60 percent

Dune land and similar soils—30 percent
Dissimilar minor component—10 percent

Major Components

Characteristics of San Juan

Setting
Landform: Dunes, blowouts

Properties and qualities
Parent material: Eolian sand over glacial outwash
Slope range: 0 to 30 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid (see "Physical Properties" table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3 inches
Land capability subclass (nonirrigated): 4s

Vegetation
Ecological site: Puget Prairie QUGA4/FERO (R002XY102WA)
Common trees: None
Characteristic plants: Roemer's fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Typical profile
A1—0 to 4 inches; sandy loam
A2—4 to 13 inches; sandy loam
A3—13 to 19 inches; sandy loam
Bw—19 to 27 inches; gravelly loamy coarse sand
C1—27 to 41 inches; extremely gravelly coarse sand
C2—41 to 62 inches; extremely gravelly coarse sand
C3—62 to 70 inches; extremely gravelly coarse sand

Characteristics of Dune Land

Setting
Landform: Dunes on outwash plains

Properties and qualities
Parent material: Eolian sand over glacial outwash
Slope range: 0 to 30 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Rapid (see "Physical Properties" table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 2.4 inches
Land capability subclass (nonirrigated): 8s

Typical profile
C—0 to 60 inches; fine sand

Dissimilar Minor Component

Blownout land
Percentage of map unit: 10 percent
Landform: Blowouts on outwash plains

3012—Hoypus sandy loam, 25 to 50 percent slopes

Map Unit Setting

General landscape: Outwash plains
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Hoypus and similar soils—100 percent

Characteristics of Hoypus

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Glacial outwash
Slope range: 25 to 50 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.1 inches
Land capability subclass (nonirrigated): 6e

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, lodgepole pine
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; sandy loam
Bw1—5 to 20 inches; loamy sand
Bw2—20 to 36 inches; very gravelly loamy sand
C—36 to 60 inches; extremely gravelly sand

3013—Everett sandy loam, 3 to 25 percent slopes

Map Unit Setting

General landscape: Hills
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Everett and similar soils—100 percent

Characteristics of Everett

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Glacial outwash
Slope range: 3 to 25 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.1 inches
Land capability subclass (nonirrigated): 4s

Vegetation
Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western hemlock, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 9 inches; sandy loam
Bw1—9 to 13 inches; gravelly sandy loam
Bw2—13 to 30 inches; very gravelly coarse sand
C—30 to 60 inches; extremely gravelly coarse sand

3014—Everett sandy loam, 25 to 50 percent slopes

Map Unit Setting

General landscape: Hills
Elevation: 0 to 300 feet

Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Everett and similar soils—100 percent

Characteristics of Everett

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Glacial outwash
Slope range: 25 to 50 percent
Surface area covered by stones and boulders: None
Restrictive feature: None within a depth of 60 inches
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid or rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.1 inches
Land capability subclass (nonirrigated): 6e

Vegetation
Ecological site: Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA)
Common trees: Douglas-fir, grand fir, lodgepole pine, red alder, western hemlock, western redcedar
Forest understory vegetation: Trailing blackberry, western swordfern, western brackenfern, cascade Oregongrape, common snowberry, creambush oceanspray, salmonberry, baldhip rose, northern twinflower, stinging nettle, woodland strawberry

Typical profile
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 9 inches; sandy loam
Bw1—9 to 13 inches; very gravelly sandy loam
Bw2—13 to 30 inches; very gravelly coarse sand
C—30 to 60 inches; extremely gravelly coarse sand

5000—Cady-Rock outcrop complex, 8 to 40 percent slopes

Map Unit Setting

General landscape: Hills, mountains
Elevation: 0 to 650 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Cady and similar soils—45 percent
Rock outcrop—35 percent
Dissimilar minor components—20 percent

Major Components

Characteristics of Cady

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 8 to 40 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.4 inches
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, lodgepole pine
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 4 inches; loam
Bw—4 to 16 inches; fine sandy loam
R—16 to 26 inches; unweathered bedrock

Characteristics of Rock Outcrop

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Kind of rock: Metasedimentary
Slope range: 8 to 40 percent
Land capability subclass (nonirrigated): 8s

Typical profile
R—0 to 60 inches; unweathered bedrock

Dissimilar Minor Components

Characteristics of Roche

Percentage of map unit: 10 percent

Setting
Landform: Hillslopes

Properties and qualities
Parent material: Glacial drift over dense glaciomarine deposits
Slope range: 0 to 15 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to dense material
Drainage class: Moderately well drained
Permeability: Very slow to moderately rapid
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: About 10 to 15 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 5.5 inches
Land capability subclass (nonirrigated): 3s

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, grand fir, lodgepole pine, western hemlock
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; loam
Bw—5 to 15 inches; gravelly sandy loam
2Bw—15 to 23 inches; loam
2Bg—23 to 39 inches; loam
2Cd—39 to 60 inches; silt loam

Characteristics of Doebay

Percentage of map unit: 10 percent
Landform: Hillsides, mountainsides

5006—Cady-Rock outcrop-Doebay complex, 50 to 100 percent slopes

Map Unit Setting

General landscape: Hills, mountains
Elevation: 0 to 650 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Cady and similar soils—70 percent
Rock outcrop—15 percent
Doebay and similar soils—15 percent

Major Components

Characteristics of Cady

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 50 to 100 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.4 inches
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, lodgepole pine
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 4 inches; loam
Bw—4 to 16 inches; fine sandy loam
R—16 to 26 inches; unweathered bedrock

Characteristics of Rock Outcrop

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Kind of rock: Metasedimentary
Slope range: 50 to 100 percent
Land capability subclass (nonirrigated): 8s

Typical profile
R—0 to 60 inches; unweathered bedrock

Characteristics of Doebay

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary bedrock
Slope range: 50 to 100 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained

Permeability: Moderate to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 4.3 inches
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, lodgepole pine
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 6 inches; loam
Bw1—6 to 16 inches; fine sandy loam
Bw2—16 to 21 inches; gravelly loam
C—21 to 35 inches; extremely gravelly sandy loam
R—35 to 45 inches; unweathered bedrock

5007—Haro-Hiddenridge-Rock outcrop complex, 8 to 35 percent slopes

Map Unit Setting

General landscape: Hills, mountains
Elevation: 0 to 650 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Haro and similar soils—50 percent
Hiddenridge and similar soils—30 percent
Rock outcrop—20 percent

Major Components

Characteristics of Haro

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 8 to 35 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None

Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 1.3 inches
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site: Puget Bald QUGA4/FERO (R002XY202WA)
Common trees: Oregon white oak
Characteristic plants: California oatgrass, Roemer's fescue, camas, common yarrow, field chickweed, prairie Junegrass

Typical profile
A1—0 to 1 inch; loam
A2—1 to 5 inches; gravelly loam
Bw—5 to 11 inches; gravelly sandy loam
R—11 to 21 inches; unweathered bedrock

Characteristics of Hiddenridge

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 8 to 35 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderately rapid or rapid (see "Physical Properties" table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 2.7 inches
Land capability subclass (nonirrigated): 4e

Vegetation
Ecological site: Puget Prairie QUGA4/FERO (R002XY102WA)
Common trees: Oregon white oak
Characteristic plants: Roemer's fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 3 inches; gravelly coarse sandy loam
A2—3 to 24 inches; very gravelly coarse sandy loam
C—24 to 57 inches; extremely gravelly coarse sandy loam
R—57 to 60 inches; unweathered bedrock

Characteristics of Rock Outcrop

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Kind of rock: Metasedimentary

Slope range: 8 to 35 percent
Land capability subclass (nonirrigated): 8s

Typical profile
R—0 to 60 inches; unweathered bedrock

5008—Doebay-Cady-Rock outcrop complex, 5 to 50 percent slopes

Map Unit Setting

General landscape: Hills, mountains
Elevation: 0 to 650 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Doebay and similar soils—40 percent
Cady and similar soils—35 percent
Rock outcrop—15 percent
Dissimilar minor component—10 percent

Major Components

Characteristics of Doebay

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 5 to 50 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 4.3 inches
Land capability subclass (nonirrigated): 6e

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, lodgepole pine
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 6 inches; loam
Bw1—6 to 16 inches; fine sandy loam

Bw2—16 to 21 inches; gravelly loam
C—21 to 35 inches; extremely gravelly sandy loam
R—35 to 45 inches; unweathered bedrock

Characteristics of Cady

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 5 to 50 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to moderately rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 3.4 inches
Land capability subclass (nonirrigated): 6e

Vegetation
Ecological site: Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA)
Common trees: Douglas-fir, Pacific madrone, lodgepole pine
Forest understory vegetation: Creambush oceanspray, salal, cascade Oregongrape, baldhip rose, orange honeysuckle, broadleaf starflower, Nootka rose, western brackenfern

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 4 inches; loam
Bw—4 to 16 inches; fine sandy loam
R—16 to 26 inches; unweathered bedrock

Characteristics of Rock Outcrop

Setting
Landform: Hillsides, mountainsides
Kind of rock: Metasedimentary

Properties and qualities
Slope range: 5 to 50 percent
Land capability subclass (nonirrigated): 8s

Typical profile
R—0 to 60 inches; unweathered bedrock

Dissimilar Minor Component

Drainageway soils
Percentage of map unit: 10 percent
Landform: Drainageways

5009—Haro-Hiddenridge-Rock outcrop complex, 50 to 100 percent slopes

Map Unit Setting

General landscape: Hills, mountains
Elevation: 0 to 650 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Haro and similar soils—50 percent
Hiddenridge and similar soils—30 percent
Rock outcrop—20 percent

Major Components

Characteristics of Haro

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 50 to 100 percent
Surface area covered by stones and boulders: None
Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 1.3 inches
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site: Puget Bald QUGA4/FERO (R002XY202WA)
Common trees: Oregon white oak
Characteristic plants: California oatgrass, Roemer’s fescue, camas, common yarrow, field chickweed, prairie Junegrass

Typical profile
A1—0 to 1 inch; loam
A2—1 to 5 inches; gravelly loam
Bw—5 to 11 inches; gravelly sandy loam
R—11 to 21 inches; unweathered bedrock

Characteristics of Hiddenridge

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 50 to 100 percent

Surface area covered by stones and boulders: None
Depth to restrictive feature: 40 to 60 inches to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderately rapid or rapid (see “Physical Properties” table)
Frequency of flooding: None
Frequency of ponding: None
Minimum depth to seasonal high water table: More than 72 inches
Salinity maximum: Nonsaline
Sodicity maximum: Nonsodic
Available water capacity (entire profile): About 2.7 inches
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site: Puget Prairie QUGA4/FERO (R002XY102WA)
Common trees: Oregon white oak
Characteristic plants: Roemer’s fescue, blue wildrye, camas, common yarrow, field chickweed, slender wheatgrass

Typical profile
Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 3 inches; gravelly coarse sandy loam
A2—3 to 24 inches; very gravelly coarse sandy loam
C—24 to 57 inches; extremely gravelly coarse sandy loam
R—57 to 60 inches; unweathered bedrock

Characteristics of Rock Outcrop

Setting
Landform: Hillsides, mountainsides

Properties and qualities
Kind of rock: Metasedimentary
Slope range: 50 to 100 percent
Land capability subclass (nonirrigated): 8s

Typical profile
R—0 to 60 inches; unweathered bedrock

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the park. 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 hay and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational 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 park. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

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

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

Interpretive Ratings

The interpretive tables in this survey rate the soils in the park 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.

Vegetation

The characteristics of the forestland and grassland vegetation in the park are described in this section. Additional information is given for each soil in the park in the "Ecological Sites and Characteristic Plant Communities," "Forage Suitability Group, Land Capability, and Yields per Acre of Forage," "Forestland Productivity," and "Forestland Management" tables.

Forestland Vegetation

By Dennis Robinson, State forester, Natural Resources Conservation Service.

Forestland landscapes are divided into ecological sites for the purposes of inventory, evaluation, and management. An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

Succession is the process of plant community development. It occurs over time and is influenced by climate, soil properties, plant growth, and natural disturbances. It is the progressive replacement of plant communities on an ecological site that tends toward establishment of the historic climax plant community. When a severe natural climatic event occurs or specific management practices are used on a site, the vegetation can tend away from the historic climax plant community. This change in the vegetation is known as retrogression.

All ecological sites have a historic climax plant community that is the basis for classifying each ecological site. The historic climax plant community is defined as the plant community that existed at the initial time of European immigration and settlement. It is the plant community that developed as a result of the site-forming factors and was best adapted to the combination of environmental factors associated with the site. The historic climax plant community is in dynamic equilibrium with its environment. Natural disturbances, such as drought, fire, and insects, were inherent to the development and maintenance of the historic climax plant community.

Documentation of the history of the vegetation prior to European settlement includes discussion of stand-replacement fires initiated by members of the Salish tribal groups (Agee, 1987). It is believed that these fires were initiated to allow grass and camas to proliferate for harvest. Fires that were set to increase open areas commonly extended to neighboring forests. As the fire intervals decreased with European settlement, areas once considered open prairies or grassland became populated with an overstory of residual Oregon white oak (*Quercus garryana*) and newly regenerated Douglas-fir (*Pseudotsuga menziesii*) and an understory of grass, dominantly Roemer's fescue (*Festuca roemeri*), and shrubs such as common snowberry (*Symphoricarpos albus*). Areas such as the south-facing slopes of Young Hill at English Camp and the summit of Mount Finlayson at American Camp exhibit these shifting ecological boundaries.

In areas such as the prairie above South Beach at American Camp, European settlement maintained open areas through sheep grazing and agricultural production. With the suppression of fires and cessation of agricultural land use in later years, Douglas-fir and common snowberry began to encroach. This can now be seen on the western portion of the prairie. Toward the center of the prairie, the environmental conditions, including the long distance from a seed source, persistent winds, lack of soil moisture, and cooler soil temperatures (marine air influence), have helped to maintain the open prairie.

The native forest ecological sites are described in the following paragraphs.

Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor PSME-ARME/HODI (F002XY901WA).—This ecological site is on south-facing slopes and ridges in areas where rock outcroppings occur. The temperature on these slopes is somewhat high, and the soil moisture content is low. Of the areas that support Douglas-fir, this site generally is the hottest and driest. The deeper soils support Douglas-fir, and the shallower soils support Pacific madrone. Other conifer species in the stands on this site include lodgepole pine. Although this ecological site is part of the regional climax western hemlock zone, Douglas-fir continues to be the climax species and Pacific madrone the subclimax species. Natural disturbances, such as periods of high winds, and fires cause Pacific madrone, a thin-barked species, to die out. Douglas-fir, however, can withstand fires of low to moderate severity. When stressed by events such as fires, Douglas-fir can produce a copious amount of seed for natural regeneration; thus, this site commonly supports Douglas-fir stands of mixed ages. Pacific madrone regenerates in the more disturbed areas, such as roadcuts, and in areas of severely disturbed mineral soils. Understory vegetation can consist of oceanspray with baldhip rose, Nootka rose, cascade Oregongrape, salal, western brackenfern, snowberry, rattlesnake plantain, and bleeding heart. Oceanspray is the dominant tall shrub. It is tolerant of shade and will become established in a disturbed area that has some protection by an overstory. Oceanspray is undesirable as a forage species, and it will remain dominant in an area until it is overshadowed by conifer species.

Thuja plicata-Pseudotsuga menziesii/Polystichum munitum THPL-PSME/POMU (F002XY903WA).—This ecological site is similar to other sites that have diverse conifer species in the stand. Western redcedar is dominant or codominant with Douglas-fir. In areas where western redcedar is dominant, its density and basal area are higher than those of Douglas-fir. Even though other species such as grand fir and western hemlock are present and a slight change in the climax community might occur, western redcedar and Douglas-fir are always dominant. The understory might be more open than it is in other ecological sites, primarily because large western redcedar trees produce so much shade that many plants are excluded. The primary understory species on this site are western swordfern, which is most abundant, and cascade Oregongrape, stinging nettle, and northern twinflower.

Picea sitchensis-Alnus rubra/Rubus spectabilis PISI-ALRU/RUSP (F002XY904WA).—This ecological site is comprised primarily of Sitka spruce and red alder, which thrive in the very moist or wet areas. Sitka spruce is more tolerant of shade than is red alder. Sitka spruce generally grows in mixed stands; pure stands are rare. Generally, the natural disturbances are wind events that result in windthrow of Sitka spruce trees. After a disturbance, red alder, a pioneer species, will most likely inhabit the area and Sitka spruce will regenerate under a canopy of red alder. Spruce on this ecological site and in this environment generally is protected, and the trees can become quite large in diameter and height. Fires are infrequent because the areas are wet and tend not to burn. If a fire does occur, it is of low intensity. Other conifer species that typically are included in Sitka spruce stands are western hemlock, lodgepole pine, western redcedar, and grand fir. These trees grow on hummocks and nurse logs that provide a drier microclimate. The understory species are dominantly salmonberry, swordfern, red huckleberry, stinging nettle, rushes, sedges, and horsetail.

Salix lucida/Spiraea douglasii SALU/SPDO (F002XY905WA).—This ecological site is wet or very wet. Several hundred species of willow occur in temperate North America. Pacific willow is recognized as the dominant woody plant on this site. Documented evidence suggests that willows are not always a pioneer species in disturbed or unstable wet areas, but they might occur in relatively stable successional stages on this site as a result of the nature of the habitat, which includes

characteristics such as a high water table and flooding. Disturbances on this ecological site generally occur as flooding. Fires are infrequent because the site commonly is very wet. Willows and Douglas spiraea are resistant to fire. Pacific willow is dominant on this site, but the site also has an abundance of Douglas spiraea. This site is in closed depressions, which contributes to the wet nature of the soils. Graminoid species are dominant in the understory in some areas. Douglas spiraea, the primary shrub, inhabits an area soon after a disturbance and shades out competing vegetation. Additional understory plants include a variety of sedges and grasses.

Grassland Vegetation

By Marty Chaney, area agronomist, Natural Resources Conservation Service.

Grassland in the park is comprised of sites that support native grasses and forbs (rangeland) and those that have been converted from native prairies and forestland to tilled and seeded pastures that support introduced forage species.

Native prairies and introduced grassland communities are maintained by both biotic and abiotic pressures. Fires, both those caused by humans and those by lightning, have influenced the development of all of the prairie soils, regardless of location. Human-caused fires were periodic and were used to stimulate the growth of carbohydrate-rich forbs that were harvested by Native American tribes in the area. Wild game was also attracted into the area by the nutritious regrowth of grasses and forbs. Fires also controlled the invasion of woody plants, which compete with and can replace grasses and forbs as the dominant species on a site. Human influence continues to be a major factor affecting the grassland. Farming, livestock grazing, conversion to woodland, reduction of fires, removal of active management, and development of homesites all have had a significant effect on both native and introduced grassland communities.

The major abiotic factors influencing plant communities on the rangeland soils include prevailing winds, which can result in a cooler local microclimate and affect soil temperatures; proximity to marine waters, which also can cause cooling of the local microclimate; aspect, which can cause the local microclimate to be either warmer and drier (south- or west-facing slopes) or cooler and wetter (north- and east-facing slopes); elevation, as the average daily high and low temperatures decrease with increasing elevation; and soil properties such as texture and available water capacity. Precipitation also has a major effect on plant communities in the park, as it is located in the rainshadow of the Olympic Mountains and receives significantly less precipitation than does the nearby mainland. Not only does this influence survival of the species, but it also affects the local growing season. Soils warm up more quickly in spring with the reduced amounts of cold rain, but the growing season can also be shorter on the shallow or sandy soils because less moisture is available in summer.

The major grassland communities, both native and introduced, that occur on the soils in the park are discussed in this section. Plant communities are not static; the biotic and abiotic factors present at any one time can result in transitions from one plant community or state of a plant community to another. Sometimes these transitions are gradual and the effects can be reversed by merely ceasing the activity causing the transition. Commonly, though, the transitions are abrupt, such as those caused by fire or tillage, and only a major input of energy, such as thorough burning, mechanical treatment, or use of chemicals, can return the community to its previous state. If a desired plant community is reestablished, it can once again transition to a different and commonly less desirable plant community unless the factors that cause the transition are controlled.

The native rangeland ecological sites are described in the following paragraphs.

PUGET PRAIRIE - QUGA4/FERO (R002XY102WA).—The soils that support this native plant community typically occur on outwash plains. They generally are nearly level, deep or very deep, and droughty and have a very dark-colored surface layer. They commonly contain a significant amount of sand. Typical soils include those of the Hiddenridge, San Juan, and Pilepoint series. Typical native species include Roemer's fescue (*Festuca roemeri*), camas (*Camassia quamash*), blue wildrye (*Elymus glaucus*), slender wheatgrass (*Elymus trachycaulus*), field chickweed (*Cerastium arvense ssp strictum*), common yarrow (*Achillea millefolium*), and Oregon white oak (*Quercus garryana*). Some areas of these soils are influenced by various abiotic factors such as prevailing winds (especially across marine waters), proximity to unprotected marine waters, and elevation. These factors result in cooler temperatures than generally are associated with these soils. These cooler areas are referred to as the "cold phase" of this ecological site. The effect of this cooler regime on the plant community generally is the absence of Oregon white oak.

PUGET BALD - QUGA4/FERO (R002XY202WA).—The soils that support this native plant community typically are on steep south- or west-facing hill slopes and are associated with stringers of deeper soils and patches of rock outcroppings. The soils generally are shallow and have a very dark-colored surface layer. Typical soils are those of the Haro series. Typical native species include Roemer's fescue (*Festuca roemeri*), camas (*Camassia quamash*), prairie Junegrass (*Koeleria macrantha*), California oatgrass (*Danthonia californica*), field chickweed (*Cerastium arvense ssp strictum*), common yarrow (*Achillea millefolium*), and Oregon white oak (*Quercus garryana*). In areas where Oregon white oak occurs, it can establish itself in dense stands with a canopy cover of 25 percent or more. These stands can be thinned naturally by various means such as fire or browsing by animals. Some areas of these soils are influenced by various abiotic factors such as prevailing winds (especially across marine waters), proximity to unprotected marine waters, and elevation. These factors result in cooler temperatures than generally are associated with these soils. These cooler areas are referred to as the "cold phase" of this ecological site. The effect of this cooler regime on the plant community generally is the absence of Oregon white oak.

SALT WATER SHORELINE - FERU/CALE (R002XY302WA).—The soils that support this native plant community typically are on gently sloping shorelines and steep bluffs directly above unprotected marine waters. The soils generally are sandy and droughty. Typical soils are Xerorthents. These soils are influenced by various abiotic factors such as prevailing winds (especially across marine waters) and proximity to unprotected marine waters. These factors result in cooler temperatures than generally are associated with these soils. The effect of this cooler regime on the plant community generally is the absence of Oregon white oak. In comparison to other native prairie plant communities, these communities generally show an increase in the abundance of red fescue (*Festuca rubra*) and a relative decrease in the abundance of Roemer's fescue (*Festuca roemeri*). Other common plants are Oregon gumweed (*Grindelia stricta*), great Camas (*Camassia leichtlinii*), field chickweed (*Cerastium arvense ssp strictum*), and common yarrow (*Achillea millefolium*).

Ecological Sites and Characteristic Plant Communities

In areas that have similar climate and topography, differences in the kind and amount of range 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 5 shows, for each soil that supports vegetation suitable for grazing, the ecological site and the characteristic vegetation. For the range sites only, the total

annual production of vegetation in favorable, normal, and unfavorable years is given in the table. For the forest sites only, the average percentage of the canopy cover is given for each species making up the characteristic vegetation. An explanation of the column headings in table 5 follows.

An *ecological site* is the product of all the environmental factors responsible for its development. 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.

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. Production data is given only for those soils that are under a rangeland ecological site.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *forest composition*, the expected percentage of the canopy cover 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. The expected percentage of the total annual production for each species making up the characteristic vegetation on the range sites was not available.

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 chapter 4 of the "National Range and Pasture Handbook" (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html).

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.

Hay and Pasture

General management needed for hay and pasture is suggested in this section. The forage suitability groups are listed, the estimated yields of the main hay and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Forage Suitability Groups

Most of the soils in the park will support a vigorous plant community of introduced agricultural grass and forb species. The soils that originally supported a native plant community of trees and shrubs commonly will also support a vigorous community of these agricultural species after the soils have been cleared, tilled, drained if needed, and seeded. Soil amendments, such as lime and regular applications of fertilizer, commonly are needed until the plant community is established and periodically afterward. Soils that developed under a native prairie community can be tilled and seeded to introduced grassland species and few additional amendments are needed. Currently, most sites that support a native prairie plant community also have several nonnative species in the plant community. The kind of management used in these areas will influence the particular group of species, either native or introduced, that will become dominant.

Forage suitability groups are made up of one or more individual soil map unit components that have similar potential and limitations for forage production. Soils within a forage suitability group are sufficiently uniform to support the same adapted forage plants under the same management conditions, require similar conservation treatment and management to produce the selected forage in the quality and quantity desired, and have comparable potential productivity.

The suitability group can be used as a planning tool for selecting species, selecting management practices and options, determining forage production levels, and determining recommended initial stocking rates. Included in the group descriptions are management practices needed to maintain a vigorous, productive plant community of adapted introduced agricultural grasses and forbs. Some of the soils in the park support native prairie vegetation, and some have been converted to introduced grasses and forbs. The information in the group descriptions can be used to better understand the plant communities to encourage vigorous growth and maintenance or to discourage growth of certain plants so that native grasses and forbs can increase in dominance on a site. The forage suitability groups are given in table 6.

Further information about the forage suitability groups is available in the "National Range and Pasture Handbook" (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html).

Yields per Acre

The average yields per acre that can be expected of the principal hay and pasture plants under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers,

conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various hay and pasture plants depends on the kind of soil and the mixture of plants. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding plant varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; and favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements.

The estimated yields reflect the productive capacity of each soil for the hay and pasture plants. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

The local office of the Natural Resources Conservation Service, the Conservation District, or the Cooperative Extension Service can provide additional information about the management and productivity of the soils.

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.

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, 2e. 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.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in the park is given in the section "Detailed Soil Map Units" and in table 6.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It 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 qualities, 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. It 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 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 82 acres in the park, or 4.7 percent of the total acreage, meet the soil requirements for prime farmland. About 233 acres, or 13.3 percent of the total acreage, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available. About 145 acres, or 8.3 percent of the total acreage, would meet the requirements for prime farmland if the soils were adequately drained to minimize the impact of the seasonal high water table.

Farmland of statewide importance is land, in addition to prime farmland, that is significant to the State for the production of food, feed, fiber, forage, and oilseed crops. Criteria for defining and delineating this land is determined by the Washington State Conservation Commission. Generally, farmland of statewide importance includes land that is nearly qualified as prime farmland and that can economically produce high yields of crops if treated and managed according to acceptable farming methods. Some of this land might produce yields as high as those of prime farmland if conditions are favorable. In some states, additional farmland of statewide importance might include tracts of land that have been designated for agriculture by

State law. About 288 acres of the park, or 16.4 percent of the total acreage, meet the soil requirements for farmland of statewide importance. These areas generally are too steep to meet the requirements for prime farmland.

The map units in the park that are considered prime farmland or farmland of statewide importance are listed in table 7. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as wetness or droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Forestland Productivity and Management

The tables in this section can help forest managers plan the use of soils. They show the potential productivity of the soils and rate the soils according to the limitations that affect various aspects of forestland management.

Forestland Productivity

In table 8, the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. The site index base age is the age of the trees, in years, that corresponds to the site index value. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet (http://soils.usda.gov/technical/nfmanual/). The base age is given in the "National Register of Site Index Curves" in the manual. Absence of a site index in the table indicates that measurements were not taken for that tree species on that soil.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Forestland Management

In tables 9a through 9d, interpretive ratings are given for various aspects of forestland management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified forest management practice. *Well suited* indicates that the soil has features that are favorable for the specified 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 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 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 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 forestland 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).

The paragraphs that follow indicate the soil properties considered in rating the soils for forestland management practices. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet (http://soils.usda.gov/technical/nfmanual/).

Ratings in the column *hazard of off-road or off-trail erosion* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary 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 that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and offsite damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, severe, or very 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; *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed; and very *severe* indicates that very significant erosion is expected, that the roads or trails require very 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.

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.

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 *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.

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 hazard* 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 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.

Recreation

The soils of the park are rated in tables 10a and 10b according to limitations that affect their suitability for recreation. 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, and access to water. 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 tables 10a and 10b can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

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, 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.

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.

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, 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.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds 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, 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.

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the park are listed.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper

part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2003) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in the park are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 2003).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Table 11 lists the map units in the park and indicates whether each component is hydric or nonhydric. The components listed as hydric meet the definition of hydric soils and, in addition, have at least one of the hydric soil indicators. The information in the table can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2003).

Map units that are made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The components in the table that are listed as nonhydric do not meet the definition of hydric soils because they do not have one of the hydric soil indicators. A portion of the map unit, however, may include hydric soils. Onsite investigation is recommended to determine whether hydric soils occur and the location of the included hydric soils.

Engineering

This section provides information for planning land uses related to development and water management. Soils are rated for various uses, and the most limiting features 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, 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, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; 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 maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

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

Building Site Development

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 12a and 12b show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, and shallow excavations.

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).

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.

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.

Sanitary Facilities

Tables 13a and 13b show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. 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 60 inches 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, 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, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability 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 permeability rate of more than 2 inches per hour 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.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture,

stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Tables 14a and 14b 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.

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 table 14a, 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 gravel or sand 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 gravel or sand, the soil is considered a likely source regardless of thickness. The assumption is that the gravel or sand layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of gravel and sand. 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 gravel or sand. The numbers 0.00 to 0.07 indicate that the layer is a poor source. The numbers 0.75 to 1.00 indicate that the layer is a good source. The numbers 0.08 to 0.74 indicate the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil, reclamation material, and roadfill. 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, or roadfill. The lower the number, the greater the limitation.

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.

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 15 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; embankments, dikes, and levees; and aquifer-fed excavated ponds. 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).

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

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. 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 about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent

water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

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

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

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the park, 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 index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 16 gives the engineering classifications and the range of index properties for the layers of each soil in the park.

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, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

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 ovendry 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 park 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 park or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 17 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the park. 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 table 17, 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 table 17, 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 table 17, 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, 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 (ovendry) 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 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 (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). 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 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 table 17, 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 factors are shown in table 17 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 several 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. 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.

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 18 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the park. 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 is the total amount of extractable bases 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. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard 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. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

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 19 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. Table 19 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. Table 19 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 20 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.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

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, 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, 2003 and 1999). 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. Table 21 shows the classification of the soils in the park. 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 Alfisol.

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 Xeralf (*Xer*, meaning dry, plus *alf*, from Alfisol).

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 Haploxeralfs (*Haplo*, meaning minimal horizonation, plus *xeralf*, the suborder of the Alfisols that has a xeric moisture regime).

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 *Aquultic* identifies an extragrade that consists of soils that have a seasonal high water table. An example is Aquultic Haploxeralfs.

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 fine-loamy, mixed, superactive, mesic Aquultic Haploxeralfs.

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.

Taxonomic Units and Their Morphology

In this section, each taxonomic unit recognized in the park 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 taxonomic unit in the park is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). 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, 2003). Following the pedon description is the range of important characteristics of the soils in the unit.

Bazal Series

Depth class: Moderately deep to dense material
Drainage class: Poorly drained
Permeability: Very slow to rapid
Landscape: Outwash plains
Landform: Drainageways, valleys
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 0 to 3 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Fine-loamy, mixed, superactive, mesic Typic Argialbolls

Typical Pedon

Bazal mucky loam in an area of Bazal and Mitchellbay soils, 0 to 3 percent slopes (fig. 7); 2,600 feet north and 300 feet east of the southwest corner of sec. 19, T. 36 N., R. 3 W; Willamette Baseline Meridian; Roche Harbor, Washington, USGS quadrangle; latitude 48 degrees, 36 minutes, 4 seconds north and longitude 123 degrees, 7 minutes, 31 seconds west (Colors are for moist soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed plant material; moderately acid (pH 6.0); abrupt smooth boundary.

A1—1 to 4 inches; black (10YR 2/1) mucky loam, dark gray (10YR 4/1) dry; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine irregular pores; moderately acid (pH 5.8); abrupt smooth boundary.

A2—4 to 10 inches; black (10YR 2/1) mucky loam, dark gray (10YR 4/1) dry; moderate medium granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine and common medium and coarse roots; many very fine irregular pores; 2 percent gravel; neutral (pH 6.6); clear wavy boundary.

Bw—10 to 17 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate coarse subangular blocky structure; soft, very friable, moderately sticky and moderately plastic; common very fine and fine roots; many very fine irregular pores; 5 percent gravel; neutral (pH 6.7); clear wavy boundary.

E—17 to 24 inches; 90 percent dark grayish brown (10YR 4/2) and 10 percent strong brown (7.5YR 4/6) loamy coarse sand, 90 percent light brownish gray (10YR 6/2) and 10 percent strong brown (7.5YR 5/6) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine irregular pores; 10 percent faint very dark grayish brown (10YR 3/2) masses of iron-manganese on faces of peds, dark yellowish brown (10YR 4/6) dry; 5 percent gravel; neutral (pH 6.7); gradual wavy boundary.

2Btg—24 to 39 inches; 70 percent brown (10YR 4/3) and 30 percent dark yellowish brown (10YR 4/6) loam, 70 percent pale brown (10YR 6/3) and 30 percent yellowish brown (10YR 5/8) dry; moderate medium subangular blocky structure;

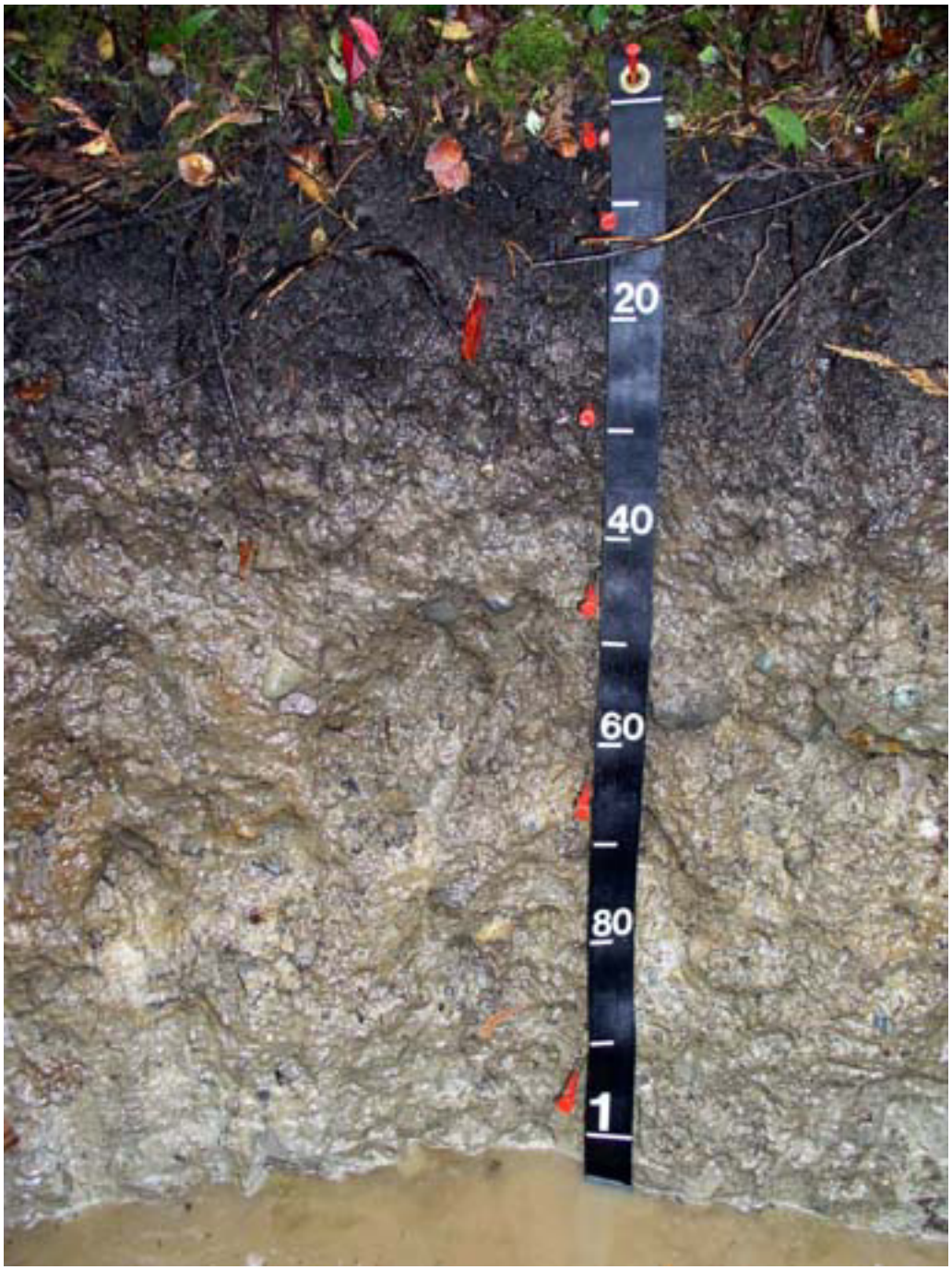

Figure 7.—Typical profile of Bazal mucky loam in an area of Bazal and Mitchellbay soils, 0 to 3 percent slopes. Numerals on tape are in centimeters.

moderately hard, friable, slightly sticky and slightly plastic; few very fine roots between peds; common very fine irregular pores; 30 percent prominent yellowish brown (10YR 5/8) masses of iron-manganese on faces of peds, brownish yellow (10YR 6/8) dry; 3 percent gravel; neutral (pH 7.0); clear wavy boundary.

2Cd—39 to 43 inches; olive brown (2.5Y 4/3) loam, light yellowish brown (2.5Y 6/3) dry; massive; hard, firm, moderately sticky and moderately plastic; few very fine irregular pores; 10 percent faint yellowish brown (10YR 5/8) masses of iron-

manganese in cracks, brownish yellow (10YR 6/6) dry; 3 percent gravel; slightly alkaline (pH 7.4).

Range in Characteristics

Average annual soil temperature: 49 to 51 degrees F
Mollic epipedon thickness: 10 to 17 inches
Depth to densic contact: 20 to 40 inches
Reaction: Moderately acid to mildly alkaline
Rock fragment content: 0 to 15 percent gravel

A horizon:
Hue—10YR or 7.5YR
Value—2 or 3 moist, 4 dry
Chroma—1 or 2 moist or dry
Texture—loam or silt loam
Clay content—10 to 20 percent

Bw horizon:
Hue—10YR or 7.5YR
Value—2 or 3 moist, 4 or 5 dry
Chroma—2 or 3 moist or dry
Texture—loam, fine sandy loam, or silt loam
Clay content—3 to 18 percent

E horizon:
Value—4 or 5 moist, 6 dry
Chroma—1 or 2 moist or dry
Texture—loamy coarse sand, loamy sand, sandy loam, or loam
Clay content—3 to 18 percent

Btg horizon:
Hue—10YR or 7.5YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Texture—loam, silt loam, or silty clay loam
Clay content—18 to 35 percent

Cd horizon:
Hue—7.5YR to 2.5Y
Value—5 or 6 moist, 4 to 7 dry
Chroma—2 or 3 moist or dry
Texture—loam, silt loam, or silty clay loam
Clay content—15 to 35 percent

Cady Series

Depth class: Shallow to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate or moderately rapid
Landscape: Hills, mountains
Landform: Hillsides, mountainsides
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 5 to 100 percent
Elevation: 0 to 650 feet
Mean annual precipitation: 18 to 35 inches

Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Loamy, isotic, mesic Lithic Dystroxerepts

Typical Pedon

Cady loam in an area of Cady-Rock outcrop-Roche complex, 8 to 40 percent slopes (fig. 8); 1,070 feet north and 1,503 feet east of the southwest corner of sec. 30, T. 36 N., R. 3 W.; Willamette Baseline Meridian; Friday Harbor, Washington, USGS quadrangle; latitude 48 degrees, 34 minutes, 57 seconds north and longitude 123 degrees, 7 minutes, 13 seconds west (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed plant material; abrupt wavy boundary.
A—1 to 4 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine and medium roots; many very fine and fine irregular pores; 5 percent gravel; moderately acid (pH 5.7); clear wavy boundary.
Bw—4 to 16 inches; brownish yellow (10YR 6/6) fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium, coarse, and very coarse roots; many very fine and fine irregular pores and common very fine and fine tubular pores; 10 percent gravel; moderately acid (pH 5.6); abrupt wavy boundary.
R—16 inches, sedimentary rock.

Range in Characteristics

Depth to restrictive feature: 10 to 20 inches to bedrock (lithic)
Average annual soil temperature: 49 to 54 degrees F
Soil moisture control section: Dry for 60 to 90 consecutive days following summer solstice
Depth to lithic contact: 10 to 20 inches
Reaction: Moderately acid or slightly acid
Volcanic glass content: Less than 5 percent throughout

Particle size control section:
Texture—coarse sandy loam, fine sandy loam, sandy loam, or loam
Clay content—5 to 15 percent
Rock fragment content—5 to 35 percent gravel

A horizon:
Value—2 to 4 moist, 2 to 5 dry
Chroma—1 or 2 moist, 1 to 3 dry

Bw horizon:
Value—3 or 4 moist, 5 or 6 dry
Chroma—3 or 4 moist, 3 to 6 dry

Coveland Series

Depth class: Deep to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to moderately rapid
Landscape: Outwash plains
Landform: Hillslopes, valleys
Parent material: Glacial outwash over dense glaciomarine deposits

Figure 8.—Typical profile of Cady loam in an area of Cady-Rock outcrop-Roche complex, 8 to 40 percent slopes. Numerals on tape are in centimeters.

Slope range: 8 to 15 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Fine-loamy, isotic, mesic Aquic Haploxeralfs

Typical Pedon

Coveland loam in an area of Coveland soils, 0 to 8 percent slopes (fig. 9); 1,400 feet south and 1,300 feet west of the northeast corner of sec. 3, T. 34 N, R. 3 W; Willamette Baseline Meridian; False Bay, Washington, USGS quadrangle; latitude 48 degrees, 28 minutes, 26 seconds north and longitude 123 degrees, 2 minutes, 41 seconds west (Colors are for dry soil unless otherwise noted.)

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; 5 percent gravel; slightly acid (pH 6.3); abrupt smooth boundary.

A2—4 to 9 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; 5 percent gravel; slightly acid (pH 6.3); abrupt smooth boundary.

E—9 to 20 inches; gray (10YR 6/1) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; few fine interstitial pores; 10 percent medium prominent irregular yellowish brown (10YR 5/6) masses of iron-manganese with clear boundaries throughout, dark yellowish brown (10YR 4/6) moist; 5 percent gravel; neutral (pH 6.8); clear wavy boundary.

2Btg1—20 to 36 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; strong medium and coarse prismatic structure; moderately hard, friable, moderately sticky and moderately plastic; many very fine roots in cracks and few very fine roots in matrix; common fine irregular pores and many fine tubular pores; 5 percent discontinuous faint clay films on surfaces along pores and 60 percent discontinuous prominent organic stains on vertical faces of peds; 40 percent medium prominent irregular yellowish brown (10YR 5/6) masses of iron-manganese with clear boundaries throughout, dark yellowish brown (10YR 4/6) moist; slightly acid (pH 6.4); gradual wavy boundary.

2Btg2—36 to 44 inches; light brownish gray (2.5Y 6/2) silt loam, olive brown (2.5Y 4/3) moist; strong coarse angular blocky structure; moderately hard, friable, moderately sticky and moderately plastic; many very fine roots in cracks and few very fine roots; common fine irregular and tubular pores; 5 percent discontinuous faint clay films on surfaces along pores and 15 percent discontinuous prominent organic stains on vertical faces of peds; 20 percent medium prominent irregular yellowish brown (10YR 5/6) masses of iron-manganese with clear boundaries throughout, dark yellowish brown (10YR 3/6) moist; slightly acid (pH 6.4); gradual wavy boundary.

2Cd—44 inches; light brownish gray (2.5Y 6/2) silt loam, olive brown (2.5Y 4/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine irregular pores; 10 percent medium prominent irregular yellowish brown (10YR 5/6) masses of iron-manganese with clear boundaries throughout, dark yellowish brown (10YR 4/6) moist; neutral (pH 6.6).

Range in Characteristics

Average annual soil temperature: 50 to 52 degrees F
Depth to redoximorphic features: 9 to 18 inches
Depth to densic contact: 40 to 60 inches
Reaction: Slightly acid or neutral

Particle size control section:
Clay content—18 to 35 percent
Rock fragment content—0 to 15 percent gravel

Figure 9.—Typical profile of Coveland loam in an area of Coveland soils, 0 to 8 percent slopes. Numerals on tape are in inches.

A horizon:
Hue—10YR or 7.5YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2 moist or dry
Clay content—5 to 18 percent

E horizon:
Value—4 or 5 moist, 6 or 7 dry

Chroma—1 or 2 moist or dry
Texture—sandy loam, loamy sand, or loam
Clay content—2 to 19 percent
Rock fragment content—0 to 15 percent gravel

2Btg horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 or 3 moist or dry
Texture—silt loam, silty clay loam, or loam
Clay content—18 to 35 percent
Rock fragment content—0 to 15 percent gravel

2Cd horizon:
Hue 2.5Y or 5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 or 3 moist or dry
Texture—sandy loam, loam, or silt loam
Clay content—17 to 32 percent
Rock fragment content—0 to 15 percent gravel

Doebay Series

Depth class: Moderately deep to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate or moderately rapid
Landscape: Hills, mountains
Landform: Hillsides, mountainsides
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 5 to 100 percent
Elevation: 0 to 650 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Loamy-skeletal, isotic, mesic Typic Dystroxerepts

Typical Pedon

Doebay loam in an area of Doebay-Cady-Rock outcrop complex, 5 to 50 percent slopes (fig. 10); in an area of forestland; 1,900 feet north and 2,100 feet west of the southeast corner of sec. 33, T. 37 N., R. 1 W.; Willamette Baseline Meridian; Mount Constitution, Washington, USGS quadrangle; latitude 48 degrees, 39 minutes, 1 second north and longitude 122 degrees, 50 minutes, 40 seconds west (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed plant material; very strongly acid (pH 4.5); abrupt wavy boundary.
A—1 to 6 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; moderately hard, friable; common fine and medium and few coarse roots; common very fine and fine irregular and tubular pores; 10 percent gravel; moderately acid (pH 5.7); abrupt smooth boundary.
Bw1—6 to 16 inches; dark yellowish brown (10YR 4/6) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable; many fine and medium and few coarse roots; common very fine and fine irregular and tubular pores; 10 percent gravel; moderately acid (pH 5.6); clear smooth boundary.

Figure 10.—Typical profile of Doebay loam in an area of Doebay-Cady-Rock outcrop complex, 5 to 50 percent slopes. Numerals on tape are in inches.

Bw2—16 to 21 inches; yellowish brown (10YR 5/6) gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; soft, very friable; common fine and medium and few coarse roots; common very fine and fine tubular and irregular pores; 35 percent gravel and 5 percent cobbles; moderately acid (pH 5.6); clear wavy boundary.

C—21 to 35 inches; light olive brown (2.5Y 5/4) extremely gravelly sandy loam, olive

brown (2.5Y 4/3) moist; weak medium subangular blocky structure; soft, very friable; common very fine and fine interstitial and irregular pores; 65 percent gravel; moderately acid (pH 5.6); abrupt wavy boundary.
R—35 to 45 inches; metasedimentary rock.

Range in Characteristics

Average annual soil temperature: 50 to 52 degrees F
Soil moisture control section: Dry for 60 to 90 consecutive days following summer solstice
Depth to lithic contact: 20 to 40 inches
Reaction: Strongly acid or moderately acid
Volcanic glass content: 0 to less than 5 percent in the A and Bw horizons

Particle size control section:
Clay content—5 to 18 percent
Rock fragment content: 35 to 75 percent total, including 35 to 75 percent gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones

A horizon:
Value—2 or 3 moist, 4 or 5 dry
Chroma—2 or 3 moist, 3 or 4 dry
Texture—loam, fine sandy loam, or sandy loam
Clay content—5 to 18 percent
Rock fragment content—10 to 35 percent gravel

Bw1 horizon:
Hue—7.5YR or 10YR
Value—3 or 4 moist, 4 or 5 dry
Chroma—2 to 4 moist, 3 to 6 dry
Texture—loam, sandy loam, or fine sandy loam
Clay content—5 to 18 percent
Rock fragment content—10 to 35 percent total, including 10 to 35 percent gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones

Bw2 horizon:
Hue—7.5YR to 2.5YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—3 or 4 moist, 3 to 6 dry
Texture—loam, sandy loam, or fine sandy loam
Clay content—5 to 18 percent
Rock fragment content—35 to 60 percent total, including 35 to 60 percent gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones

C horizon:
Hue—10YR to 2.5Y
Value—4 or 5 moist, 4 to 7 dry
Chroma—2 to 4 moist, 2 to 6 dry
Texture—loam, fine sandy loam, sandy loam, or coarse sandy loam
Clay content—2 to 12 percent
Rock fragments—50 to 75 percent total, including 50 to 75 percent gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones

Endoaquents

Depth class: Very deep
Drainage class: Very poorly drained

Permeability: Very rapid
Landscape: Shore complexes
Landform: Beaches
Parent material: Beach sand
Slope range: 0 to 5 percent
Elevation: 0 to 5 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 365 days

Taxonomic class: Endoaquents

Reference Pedon

Endoaquents sand in an area of Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes (fig. 11); 1,256 feet east and 3,215 feet south of the northwest corner of sec. 9, T. 36 N., R. 1 W.; Blakely Island NW Quarter, Washington, USGS quadrangle; latitude 48 degrees, 37 minutes, 18 seconds north and longitude 122 degrees, 49 minutes, 49 seconds west (Colors are for moist soil unless otherwise noted.)

C1—0 to 29 inches; 80 percent greenish black (5GY 2.5/0) sand; 20 percent black (N 2.5/0) mottles; single grain; loose, nonsticky and nonplastic; few tubular pores; 2 percent masses of iron-manganese that are dark yellowish brown (10YR 4/4) when moist; 5 percent gravel; strongly acid (pH 5.2); clear wavy boundary.
C2—29 to 48 inches; greenish black (5GY 2.5/) very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; common interstitial pores; 50 percent gravel; neutral (pH 7.1); gradual wavy boundary.
C3—48 to 60 inches; greenish black (5GY 2.5/) extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; common interstitial pores; 65 percent gravel; neutral (pH 7.2).

Range in Characteristics

Average annual soil temperature: 48 to 54 degrees F
Reaction: Moderately acid to neutral
Clay content: 0 to 2 percent
Depth to restrictive feature: More than 60 inches

C1 horizon:
Texture—sand, loamy coarse sand, or sand
Rock fragments—0 to 35 percent gravel

C2 horizon:
Texture—sand or coarse sand
Rock fragment content—35 to 90 percent gravel

C3 horizon:
Texture—sand or coarse sand
Rock fragment content—35 to 90 percent gravel

Everett Taxadjunct

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid
Landscape: Hills
Landform: Hillslopes

Figure 11.—Typical profile of Endoaquents sand in an area of Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes. Numerals on tape are in inches.

Parent material: Glacial outwash
Slope range: 3 to 50 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Sandy-skeletal, mixed, mesic Typic Dystroxerepts

Typical Pedon

Everett sandy loam, 3 to 25 percent slopes (fig. 12); 3,501 feet south and 10 feet west of the northeast corner of sec. 9, T. 36 N., R. 1 W.; Willamette Baseline Meridian; Blakely Island, Washington, USGS quadrangle; latitude 48 degrees, 37 minutes, 16 seconds north and longitude 122 degrees, 48 minutes, 50 seconds west (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; slightly decomposed plant material; abrupt wavy boundary.
A—2 to 9 inches; brown (10YR 4/3) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine tubular and irregular pores; 10 percent gravel; moderately acid (pH 5.6); abrupt wavy boundary.
Bw1—9 to 13 inches; yellowish brown (10YR 5/6) gravelly sandy loam, dark yellowish brown (10YR 3/6) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots and few medium roots; few very fine and fine irregular and tubular pores; 25 percent gravel; moderately acid (pH 5.8); clear wavy boundary.
Bw2—13 to 30 inches; yellowish brown (10YR 5/6) very gravelly coarse sand, dark yellowish brown (10YR 3/6) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine and few medium and coarse roots; few very fine and fine irregular pores and common very fine and fine interstitial pores; 50 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.
C—30 to 60 inches; variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 65 percent gravel; moderately acid (pH 5.8).

Range in Characteristics

Average annual soil temperature: 48 to 54 degrees F
Soil moisture control section: Dry for 60 to 75 consecutive days following summer solstice
Reaction: Slightly acid to very strongly acid

Particle size control section:
Rock fragment content—10 to 80 percent

A horizon:
Hue—5YR to 10YR
Value—2 to 5 moist, 4 to 6 dry
Chroma—1 to 3 moist or dry

Bw horizon:
Hue—10YR or 7.5YR
Value—3 to 6 moist or dry
Chroma—2 to 6 moist or dry
Texture—sandy loam, sand, or coarse sand

C horizon:
Texture—loamy sand or coarse sand

Haro Series

Depth class: Shallow to bedrock (lithic)
Drainage class: Well drained
Permeability: Moderate to rapid

Figure 12.—Typical profile of Everett sandy loam, 3 to 25 percent slopes. Numerals on tape are in inches.

Landscape: Hills, mountains
Landform: Hillsides, mountainsides
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 8 to 100 percent
Elevation: 0 to 650 feet
Mean annual precipitation: 18 to 35 inches

Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Loamy, isotic, mesic Lithic Ultic Haploxerolls

Typical Pedon

Haro loam in an area of Haro-Hiddenridge-Rock outcrop complex, 8 to 35 percent slopes (fig. 13); 915 feet north and 1,230 feet east of the southwest corner of sec. 25, T. 36 N., R. 4 W.; Roche Harbor, Washington, USGS quadrangle; latitude 48 degrees, 34 minutes, 55 seconds north and longitude 123 degrees, 8 minutes, 35 seconds west (Colors are for moist soil unless otherwise noted.)

A1—0 to 1 inch; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 2 percent gravel; strongly acid (pH 5.1); clear smooth boundary.
A2—1 to 5 inches; black (10YR 2/1) gravelly loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 10 percent gravel and 10 percent cobbles; strongly acid (pH 5.4); clear wavy boundary.
Bw—5 to 11 inches; very dark brown (10YR 2/2) gravelly sandy loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine and few coarse and very coarse roots; many very fine and fine interstitial pores and common very fine and fine tubular pores; 20 percent gravel and 10 percent cobbles; moderately acid (pH 5.9); abrupt wavy boundary.
R—11 inches; metasedimentary rock.

Range in Characteristics

Average annual soil temperature: 50 to 54 degrees F
Soil moisture control section: Dry for 75 to 90 consecutive days following summer solstice
Mollic epipedon thickness: 10 to 20 inches (A and Bw horizons)
Depth to lithic contact: 10 to 20 inches
Reaction: Moderately acid or strongly acid
Hue: 10YR or 7.5YR
Volcanic glass content: Less than 5 percent throughout

Particle size control section:
Clay content—5 to 18 percent
Texture—loam or sandy loam
Rock fragment content—0 to 35 percent total, including 0 to 35 percent gravel and 0 to 5 percent cobbles

A horizon:
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2 moist or dry

Bw horizon:
Value—3 or 4 moist, 4 or 5 dry
Chroma—2 or 3 moist or dry

Hiddenridge Series

Depth class: Deep to bedrock (lithic)
Drainage class: Well drained

Figure 13.—Typical profile of Haro loam in an area of Haro-Hiddenridge-Rock outcrop complex, 8 to 35 percent slopes. Numerals on tape are in centimeters.

Permeability: Moderately rapid or rapid
Landscape: Hills, mountains
Landform: Hillsides, mountainsides
Parent material: Glacial drift mixed with colluvium derived from metasedimentary rock
Slope range: 8 to 100 percent
Elevation: 0 to 650 feet
Mean annual precipitation: 18 to 35 inches

Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Loamy-skeletal, isotic, mesic Humic Dystroxerepts

Typical Pedon

Hiddenridge gravelly coarse sandy loam in an area of Haro-Hiddenridge-Rock outcrop complex, 50 to 100 percent slopes (fig. 14); 581 feet south and 1,851 feet west of northeast corner of sec. 32, T. 37 N., R. 1 W.; Mount Constitution, Washington, USGS quadrangle; latitude 48 degrees, 39 minutes, 29 seconds north and longitude 122 degrees, 50 minutes, 37 seconds west (Colors are for moist soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed plant material; abrupt smooth boundary.
A1—1 to 3 inches; very dark brown (10YR 2/2) gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine irregular and interstitial pores; 20 percent gravel; strongly acid (pH 5.5); abrupt smooth boundary.
A2—3 to 24 inches; very dark grayish brown (10YR 3/2) very gravelly coarse sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine, medium, and coarse roots; many very fine and fine irregular and interstitial pores; 40 percent gravel; strongly acid (pH 5.2); clear wavy boundary.
C—24 to 57 inches; very dark grayish brown (2.5Y 3/2) extremely gravelly coarse sandy loam, olive brown (2.5Y 4/3) dry; single grain; loose, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine and fine and common coarse irregular and interstitial pores; 70 percent gravel and 5 percent cobbles; strongly acid (pH 5.3); clear wavy boundary.
R—57 inches; metasedimentary rock.

Range in Characteristics

Average annual soil temperature: 50 to 54 degrees F
Soil moisture control section: Dry for 75 to 90 consecutive days following summer solstice
Umbric epipedon thickness: 10 to 24 inches
Depth to lithic contact: 40 to 60 inches
Reaction: Moderately acid or strongly acid

Particle size control section:
Clay content—0 to 18 percent
Rock fragment content—35 to 85 percent total, including 25 to 80 percent gravel and 0 to 10 percent cobbles

A1 horizon:
Hue—10YR or 7.5YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2 moist or dry
Texture—loam or sandy loam
Clay content—5 to 18 percent
Rock fragment content—15 to 35 percent gravel

A2 horizon:
Hue—10YR to 7.5YR
Value—2 or 3 moist, 3 or 4 dry

Figure 14.—Typical profile of Hiddenridge gravelly coarse sandy loam in an area of Haro-Hiddenridge-Rock outcrop complex, 50 to 100 percent slopes. Numerals on tape are in inches.

Chroma—1 or 2 moist or dry
Texture—loam, sandy loam, or coarse sandy loam
Clay content—5 to 18 percent
Rock fragment content—15 to 60 percent gravel

C horizon:
Hue—2.5Y to 10YR
Value—3 or 4 moist, 4 or 5 dry
Chroma—2 or 3 moist or dry
Texture—sandy loam or coarse sandy loam
Clay content—0 to 18 percent
Rock fragment content—35 to 80 percent total, including 35 to 80 percent gravel and 0 to 10 percent cobbles

Hoypus Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid
Landscape: Outwash plains (fig. 15)
Landform: Hillslopes
Parent material: Glacial outwash
Slope range: 3 to 50 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F

Figure 15.—Area of a Hoypus soil on an outwash plain. Area in foreground was cleared of trees for use as pasture.

Frost-free period: 200 to 240 days

Taxonomic class: Sandy-skeletal, isotic, mesic Typic Xerorthents

Typical Pedon

Hoypus sandy loam, 3 to 25 percent slopes (fig. 16); about 1,880 feet north and 930 feet east of the southwest corner of sec. 36, T. 32 N., R. 1 E.; Willamette Baseline Meridian; Coupeville, Washington, USGS quadrangle; latitude 48 degrees, 12 minutes, 54 seconds north and longitude 122 degrees, 37 minutes, 50 seconds west (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed plant material; abrupt smooth boundary.

A—1 to 5 inches; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium and common coarse roots; many very fine and fine irregular pores and many very fine and fine interstitial pores; 10 percent gravel; strongly acid (pH 5.4); clear wavy boundary.

Bw1—5 to 20 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 3/4) moist; single grain; loose, nonsticky and nonplastic; many fine and medium and common coarse roots; many very fine, fine, and medium interstitial and irregular pores; 10 percent gravel; strongly acid (pH 5.3); clear wavy boundary.

Bw2—20 to 36 inches; brown (10YR 5/3) very gravelly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; common fine roots; many very fine, fine, and medium irregular and interstitial pores; 55 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

Figure 16.—Typical profile of Hoypus sandy loam, 3 to 25 percent slopes. Numerals on tape are in inches.

C—36 to 60 inches; extremely gravelly sand; single grain; loose, nonsticky and nonplastic; few fine roots; many very fine irregular and interstitial pores; 55 percent gravel and 5 percent cobbles; moderately acid (pH 5.9).

Range in Characteristics

Average annual soil temperature: 47 to 52 degrees F
Soil moisture control section: Dry for 75 to 90 consecutive days following summer solstice

Particle size control section:
Rock fragment content—35 to 75 percent total, including 10 to 60 percent gravel, 0 to 10 percent cobbles, and 0 to 5 percent cobbles
Clay content—0 to 5 percent
Solum thickness—20 to 30 inches

A horizon:
Value—2 or 3 moist and 3 or 4 dry
Chroma—1 to 3 moist or dry
Reaction—moderately acid or strongly acid

Bw1 horizon:
Hue—7.5YR or 10YR
Value—3 or 5 moist or dry
Chroma—3 or 4 moist or dry
Reaction—moderately acid or strongly acid
Texture—loamy sand or sandy loam
Clay—3 to 5 percent
Rock fragment content—10 to 35 percent gravel, 0 to 10 percent cobbles, 0 to 5 percent stones

Bw2 horizon:
Hue—7.5YR or 10YR
Value—3 or 5 moist or dry
Chroma—3 or 4 moist or dry
Reaction—moderately acid or strongly acid
Texture—loamy sand or sand
Clay—1 to 5 percent
Rock fragment content—35 to 65 percent gravel, 0 to 10 percent cobbles, 0 to 5 percent stones

C horizon:
Reaction—slightly acid or moderately acid
Texture—loamy sand or sand
Clay—0 to 5 percent
Rock fragments—35 to 65 percent gravel, 0 to 10 percent cobbles, 0 to 5 percent stones

Limepoint Series

Depth class: Deep to dense material
Drainage class: Poorly drained
Permeability: Very slow to very rapid
Landscape: Outwash plains
Landform: Drainageways, valleys
Parent material: Alluvium over dense glaciomarine deposits
Slope range: 0 to 8 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 40 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Coarse-loamy, mixed, superactive, mesic Typic Epiaquolls

Typical Pedon

Limepoint mucky silt loam in an area of Limepoint and Sholander soils, 0 to 8 percent

slopes (fig. 17); 2,570 feet north and 200 feet east of the southwest corner of sec. 25, T. 36 N., R. 4 W.; Roche Harbor, Washington, USGS quadrangle; latitude 48 degrees, 35 minutes, 12 seconds north and longitude 123 degrees, 8 minutes, 51 seconds west (Colors are for moist soil unless otherwise noted.)

A1—0 to 6 inches; black (10YR 2/1) mucky silt loam, very dark grayish brown (10YR 3/2) dry; moderate coarse granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common very fine and fine dendritic tubular pores; slightly acid (pH 6.4); abrupt smooth boundary.

A2—6 to 14 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine dendritic tubular pores; 10 percent medium distinct irregular dark yellowish brown (10YR 4/4) masses of iron-manganese with sharp boundaries throughout, dark yellowish brown (10YR 4/6) dry; 5 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

Bg—14 to 31 inches; grayish brown (10YR 5/2) loamy coarse sand, light brownish gray (10YR 6/2) dry; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few very fine and fine dendritic tubular pores; 50 percent coarse distinct irregular dark yellowish brown (10YR 4/4) masses of iron-manganese with diffuse boundaries throughout, dark yellowish brown (10YR 4/6) dry, and 50 percent coarse distinct irregular grayish brown (10YR 5/2) reduced matrix with diffuse boundaries throughout, light brownish gray (10YR 6/2) dry; neutral (pH 6.7); abrupt wavy boundary.

Cg1—31 to 49 inches; grayish brown (10YR 5/2) loam, light gray (10YR 7/2) dry; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine irregular pores; 10 percent medium distinct irregular dark yellowish brown (10YR 4/4) masses of iron-manganese with clear boundaries in cracks, dark yellowish brown (10YR 4/6) dry; neutral (pH 6.8); clear wavy boundary.

Cg2—49 to 58 inches; gray (10YR 6/1) sandy loam, light gray (10YR 7/1) dry; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine irregular pores; 2 percent medium distinct irregular dark yellowish brown (10YR 4/4) masses of iron-manganese with clear boundaries throughout, dark yellowish brown (10YR 4/6) dry; neutral (pH 7.0); abrupt wavy boundary.

2Cd—58 to 60 inches; gray (10YR 5/1) silty clay loam, gray (10YR 6/1) dry; massive; extremely hard, extremely firm, moderately sticky and moderately plastic; 5 percent gravel; neutral (pH 7.0).

Range in Characteristics

Average annual soil temperature: 50 to 52 degrees F
Depth to redoximorphic features: 3 to 9 inches
Mollic epipedon thickness: 10 to 14 inches
Depth to densic contact: 40 to 60 inches
Reaction: Slightly acid or neutral

Particle size control section:
Clay content—2 to 18 percent
Rock fragment content—0 to 35 percent gravel

A horizon:
Hue—10YR or 7.5YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2 moist
Clay content—7 to 18 percent

Figure 17.—Typical profile of Limepoint mucky silt loam in an area of Limepoint and Sholander soils, 0 to 8 percent slopes. Numerals on tape are in inches.

Bg horizon:
Value—4 or 5 moist, 5 or 6 dry
Chroma—1 or 2 moist or dry
Texture—loamy coarse sand, loam, or sand
Clay content— 2 to 18 percent
Rock fragment content—0 to 35 percent gravel

Cg horizon:
Value—5 or 6 moist, 6 or 7 dry
Chroma—1 or 2 moist or dry
Texture—loam, sandy loam, or sand
Clay content—2 to 18 percent
Rock fragment content—0 to 35 percent gravel

2Cd horizon:
Value—5 or 6 moist, 6 or 7 dry
Chroma—1 or 2 moist, 2 or 3 dry
Texture—silt loam, silty clay loam, or clay loam
Clay content—15 to 40 percent
Rock fragment content—0 to 15 percent gravel

Mitchellbay Series

Depth class: Moderately deep to dense material
Drainage class: Somewhat poorly drained
Permeability: Very slow to moderately rapid
Landscape: Outwash plains (fig. 18)
Landform: Hillslopes, valleys
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 0 to 25 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 25 to 40 inches

Figure 18.—Area of a Mitchellbay soil on an outwash plain.

Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Fine-loamy, mixed, superactive, mesic Aquultic Haploxeralfs

Typical Pedon

Mitchellbay gravelly sandy loam, 5 to 15 percent slopes (fig. 19); 1,900 feet south and 1,020 feet east of the northwest corner of sec. 19, T. 36 N., R. 3 W.; Willamette Baseline Meridian; Friday Harbor, Washington, USGS quadrangle; latitude 48 degrees, 36 minutes, 12 seconds north and longitude 123 degrees, 7 minutes, 20 seconds west (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed plant material; slightly plastic; common very fine roots; abrupt smooth boundary.

A—1 to 5 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial and irregular pores; 15 percent gravel; very strongly acid (pH 5.0); clear wavy boundary.

Bw—5 to 13 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial and irregular pores; 15 percent gravel; moderately acid (pH 5.6); clear wavy boundary.

E—13 to 19 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure; moderately hard, firm, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common fine tubular and interstitial pores; 10 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

Btg—19 to 34 inches; yellowish brown (10YR 5/4) loam, brown (10YR 4/3) moist; moderate very coarse prismatic structure; very hard, extremely firm, moderately sticky and moderately plastic; common very fine and fine and few medium roots; common fine tubular and interstitial pores; 50 percent distinct weakly cemented iron-manganese concretions on faces of peds; 5 percent gravel; slightly acid (pH 6.4); gradual wavy boundary.

Cd—34 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; very hard, extremely firm, slightly sticky and slightly plastic; 20 percent distinct weakly cemented masses of iron-manganese in cracks; neutral (pH 7.3).

Range in Characteristics

Average annual soil temperature: 48 to 50 degrees F
Depth to redoximorphic features: 9 to 18 inches
Depth to densic contact: 20 to 40 inches

Particle-size control section:
Clay content—18 to 35 percent

A horizon:
Value—2 or 3 moist, 4 or 5 dry
Chroma—2 or 3 moist or dry

Bw horizon:
Value—3 or 4 moist, 4 or 5 dry
Chroma—2 or 3 moist or dry
Texture—sandy loam or loam
Clay content—8 to 18 percent

Figure 19.—Typical profile of Mitchellbay gravelly sandy loam, 5 to 15 percent slopes. Numerals on tape are in inches.

Rock fragment content—0 to 35 percent total, including 0 to 25 percent gravel and 0 to 10 percent cobbles

E horizon:
Value—4 or 5 moist, 5 to 7 dry
Chroma—1 to 2 moist or dry
Texture—sandy loam or loam

Clay content—4 to 12 percent
Rock fragment content—0 to 15 percent gravel

Btg horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 or 3 moist or dry
Texture—loam, silt loam, or silty clay loam
Clay content—18 to 35 percent
Rock fragment content—0 to 15 percent fine gravel

Cd horizon:
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 or 3 moist or dry
Texture—loam, sandy loam, or silt loam
Clay content—12 to 27 percent
Rock fragment content—0 to 15 percent fine gravel

Pilepoint Series

Depth class: Moderately deep to dense material
Drainage class: Moderately well drained
Permeability: Very slow to rapid
Landscape: Outwash plains
Landform: Hillslopes
Parent material: Eolian sand over glacial outwash and dense glaciomarine deposits
Slope range: 3 to 12 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Fine-loamy, mixed, superactive, mesic Xeric Argialbolls

Typical Pedon

Pilepoint loam, 3 to 12 percent slopes (fig. 20); 2,500 feet north and 1,000 feet west of the southeast corner of sec. 3, T. 34 N., R. 3 W.; False Bay, Washington, USGS quadrangle; latitude 48 degrees, 28 minutes, 14 seconds north and longitude 123 degrees, 2 minutes, 37 seconds west (Colors are for dry soil unless otherwise noted.)

A1—0 to 4 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate medium granular structure and moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and fine pores; 10 percent gravel; clear wavy boundary.

A2—4 to 13 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate medium granular structure and moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and fine irregular pores; 10 percent gravel; clear wavy boundary.

Bw—13 to 22 inches; dark brown (10YR 3/3) gravelly sandy loam, very dark brown (10YR 2/2) moist; single grain; loose, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial and irregular pores; 40 percent gravel; clear wavy boundary.

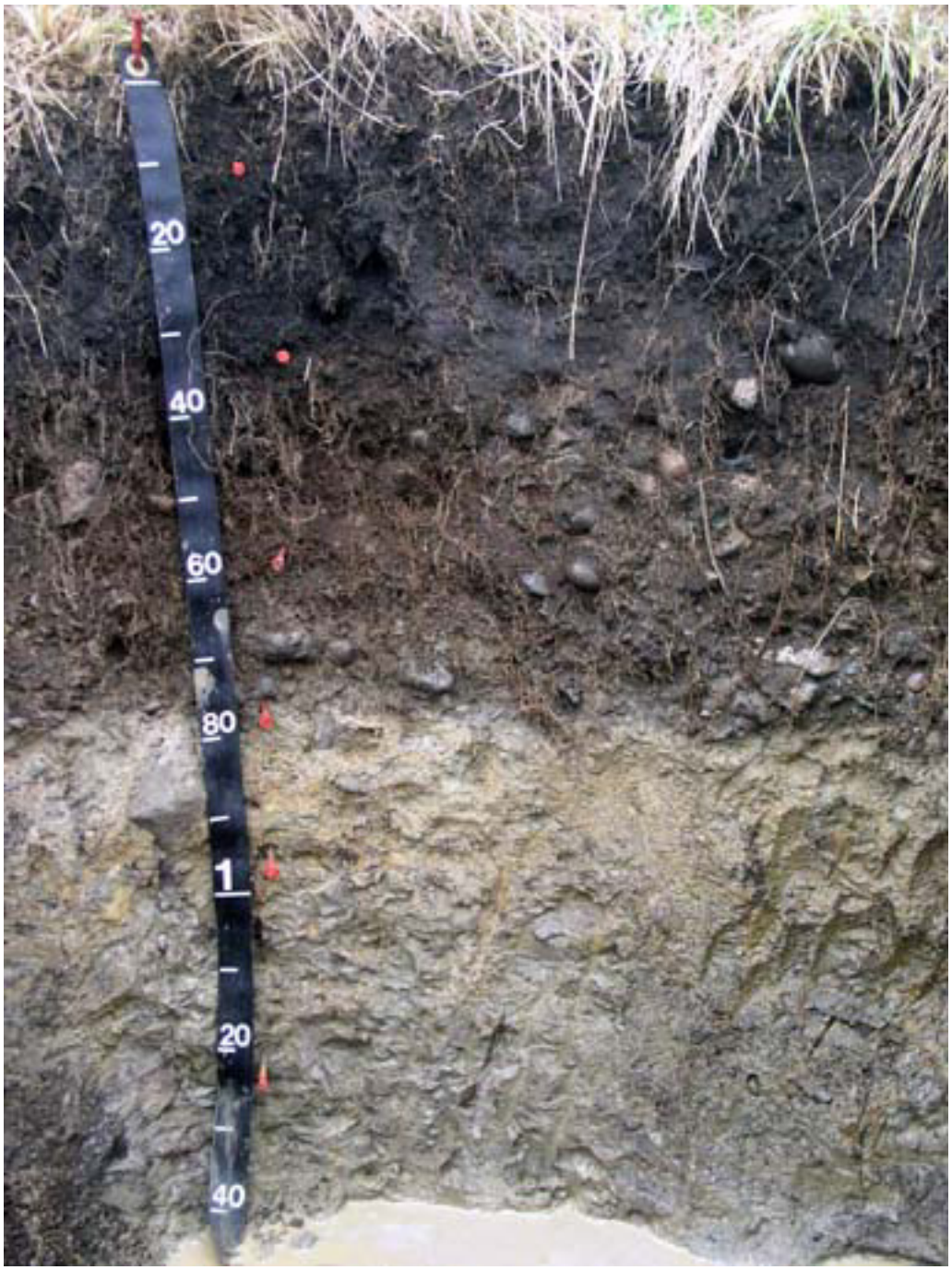

Figure 20.—Typical profile of Pilepoint loam, 3 to 12 percent slopes. Numerals on tape are in centimeters.

E—22 to 30 inches; grayish brown (2.5Y 5/2) gravelly loamy sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine irregular pores; 15 percent gravel and 5 percent cobbles; abrupt wavy boundary.

2Btg—30 to 36 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; strong coarse subangular blocky structure; moderately hard, friable, moderately sticky and moderately plastic; few very fine roots throughout and

many very fine roots in cracks; common very fine and fine irregular pores; 10 percent discontinuous faint clay films on faces of peds; many prominent dark yellowish brown (10YR 4/6) masses of iron-manganese with diffuse boundaries throughout, brownish yellow (10YR 6/6) dry; 5 percent gravel; gradual irregular boundary.

2Cd1—36 to 46 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; very hard, very firm, moderately sticky and moderately plastic; few very fine roots in cracks; 5 percent prominent dark yellowish brown (10YR 4/6) masses of iron-manganese with diffuse boundaries in cracks, brownish yellow (10YR 6/6) dry; 5 percent gravel; gradual irregular boundary.

2Cd2—46 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; very hard, very firm, moderately sticky and moderately plastic; few very fine roots in cracks; 5 percent gravel.

Range in Characteristics

Average annual soil temperature: 50 to 54 degrees F

Soil moisture control section: Dry for 75 to 90 consecutive days following summer solstice

Depth to redoximorphic features: 22 to 30 inches

Depth to densic contact: 20 to 40 inches

Reaction: Moderately acid or slightly acid

Particle-size control section:
Clay content—18 to 35 percent
Rock fragment content—0 to 15 percent gravel

A horizon:
Value—3 or 4 dry, 2 or 3 moist
Chroma—1 or 2 moist or dry
Clay content—8 to 18 percent
Rock fragment content—0 to 15 percent gravel

Bw horizon:
Value—3 or 4 dry, 2 or 3 moist
Chroma—2 or 3 moist or dry
Texture—sandy loam, loamy sand, or loamy coarse sand
Clay content—3 to 12 percent
Rock fragment content—15 to 50 percent gravel

E horizon:
Value—5 or 6 dry, 4 or 5 moist
Chroma—1 or 2 moist or dry
Texture—loamy sand or sandy loam
Clay content—2 to 8 percent
Rock fragment content—0 to 15 percent gravel and 0 to 5 percent cobbles

2Btg horizon:
Hue—10YR or 2.5Y
Value—5 or 6 dry, 4 or 5 moist
Chroma—2 or 3 moist or dry
Texture—silt loam, silty clay loam, or loam
Clay content—18 to 35 percent
Rock fragment content—0 to 15 percent gravel

Cd horizon:
Value—3 to 5 moist, 4 to 6 dry

Chroma—2 or 3 moist or dry
Texture—silt loam, loam, or sandy loam
Clay content—12 to 27 percent
Rock fragment content—0 to 15 percent gravel

Roche Series

Depth class: Moderately deep to dense material
Drainage class: Moderately well drained
Permeability: Very slow to moderately rapid
Landscape: Outwash plains
Landform: Hillslopes
Parent material: Glacial drift over dense glaciomarine deposits
Slope range: 0 to 40 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Coarse-loamy, isotic, mesic Aquic Dystroxerepts

Typical Pedon

Roche loam in an area of Roche-Rock outcrop complex, 8 to 50 percent slopes (fig. 21); 463 feet south and 2,142 feet east of the northwest corner of sec. 34, T. 37 N., R. 2 W.; Eastsound, Washington, USGS quadrangle; latitude 48 degrees, 39 minutes, 30 seconds north and longitude 122 degrees, 56 minutes, 8 seconds west (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed plant material; very strongly acid (pH 4.5); abrupt smooth boundary.

A—1 to 5 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots and common coarse roots; many very fine and fine irregular pores; 5 percent gravel; moderately acid (pH 5.7); clear wavy boundary.

Bw1—5 to 15 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and coarse and many medium roots; many very fine and fine irregular pores; 15 percent gravel; moderately acid (pH 5.8); clear wavy boundary.

2Bw2—15 to 23 inches; brown (7.5YR 5/3) loam, brown (7.5YR 5/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine, medium, and coarse roots; common very fine and fine irregular pores; 5 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

2Bg—23 to 39 inches; reddish gray (5YR 5/2) loam, dark reddish gray (5YR 4/2) moist; massive; hard, firm, nonsticky and nonplastic; few very fine roots; common very fine irregular pores; 20 percent medium prominent masses of iron-manganese that have diffuse boundaries throughout and are red (2.5YR 4/6) when moist and 20 percent medium distinct iron depletions that have diffuse boundaries throughout and are gray (7.5YR 6/1) when moist; 5 percent gravel; neutral (pH 6.7); gradual wavy boundary.

Cd—39 to 60 inches; brown (7.5YR 4/3) silt loam, brown (7.5YR 4/2) moist; hard, firm, slightly sticky and slightly plastic; 5 percent gravel; neutral (pH 6.9).

Figure 21.—Typical profile of Roche loam in an area of Roche-Rock outcrop complex, 8 to 50 percent slopes. Numerals on tape are in inches.

Range in Characteristics

Soil moisture control section—Dry for 60 to 90 consecutive days following summer solstice
Average annual soil temperature: 50 to 52 degrees F
Depth to densic contact: 20 to 40 inches
Depth to redoximorphic features: 18 to 36 inches
Reaction: Moderately acid to neutral

Particle size control section:
Clay content—2 to 18 percent
Rock fragment content—0 to 35 percent gravel

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

Bw1 horizon:
Hue—10YR or 7.5YR
Value—3 to 5 moist or dry
Chroma—3 or 4 moist or dry
Texture—loam, sandy loam, or loamy sand
Rock fragment content—0 to 35 percent gravel

2Bw2 horizon:
Hue—10YR or 7.5YR
Value—4 or 5 moist, 5 to 7 dry
Chroma—2 to 4 moist or dry
Texture—loam or sandy loam
Rock fragment content—0 to 35 percent gravel

2Bg horizon:
Hue—5YR or 2.5Y
Value—4 or 5 moist, 5 or 6 dry
Chroma—2 or 3 moist or dry
Texture—loam or sandy loam
Rock fragment content—0 to 35 percent gravel

2Cd horizon:
Hue—7.5YR to 2.5Y
Value—3 or 4 moist, 3 to 7 dry
Chroma—2 or 3 moist or dry
Texture—sandy loam, loam, or silt loam
Rock fragment content—0 to 35 percent gravel

San Juan Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid to very rapid
Landscape: Outwash plains
Landform: Hillslopes
Parent material: Eolian sand over glacial outwash
Slope range: 0 to 60 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Sandy, isotic, mesic Pachic Ultic Haploxerolls

Typical Pedon

San Juan sandy loam, 2 to 8 percent slopes; 590 feet south and 2,000 feet west of northeast corner of sec. 12, T. 34 N., R. 3 W.; False Bay, Washington, USGS quadrangle; latitude 48 degrees, 27 minutes, 43 seconds north and longitude

123 degrees, 0 minutes, 15 seconds west (Colors are for dry soil unless otherwise noted.)

A1—0 to 4 inches; dark gray (10YR 4/1) sandy loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine irregular pores; strongly acid (pH 5.1); abrupt smooth boundary.

A2—4 to 13 inches; dark gray (10YR 4/1) sandy loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine irregular pores; 5 percent gravel; moderately acid (pH 5.8); abrupt smooth boundary.

A3—13 to 19 inches; dark gray (10YR 4/1) sandy loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine irregular pores; 5 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

Bw—19 to 27 inches; brown (10YR 4/3) gravelly loamy coarse sand, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 30 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C1—27 to 41 inches; extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 80 percent gravel; neutral (pH 6.8); clear wavy boundary.

C2—41 to 62 inches; extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; 75 percent gravel; neutral (pH 6.7); clear wavy boundary.

C3—62 to 69 inches; extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; 75 percent gravel; neutral (pH 6.9).

Range in Characteristics

Average annual soil temperature: 50 to 54 degrees F

Soil moisture control section: Dry for 75 to 90 consecutive days following summer solstice

Mollic epipedon thickness: 20 to 32 inches

Base saturation by ammonium acetate: More than 50 percent in the epipedon

Base saturation by sum of cations: Less than 75 percent between depths of 10 and 30 inches

Particle size control section:

Clay content—0 to 12 percent

Rock fragment content—0 to 35 percent in the A2 and A3 horizons, 15 to 60 percent in the Bw horizon, and 35 to 85 percent in the C horizon, with a weighted average of 15 to 35 percent

A1 horizon:

Value—2 or 3 moist, 3 or 4 dry

Chroma—1 or 2 moist or dry

Reaction—strongly acid or moderately acid

Texture—sandy loam, loam, or loamy sand

Clay content—5 to 12 percent

Rock fragment content—0 to 35 percent total, including 0 to 35 percent gravel and 0 to 5 percent cobbles

A2 and A3 horizons:

Value—2 or 3 moist, 3 or 4 dry

Chroma—1 or 2 moist or dry

Reaction—moderately acid or slightly acid
Texture—sandy loam, loam, or loamy sand
Clay content—2 to 12 percent
Rock fragment content—0 to 35 percent total, including 0 to 35 percent gravel and 0 to 5 percent cobbles

Bw horizon:
Hue—10YR or 7.5YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 to 3 moist or dry
Reaction—slightly acid or moderately acid
Texture—loamy coarse sand, sandy loam, or loamy sand
Clay content—0 to 8 percent
Rock fragment content—15 to 60 percent total, including 15 to 60 percent gravel and 0 to 5 percent cobbles

C horizon:
Hue—2.5Y or variegated
Value—3 or 4 moist, 4 or 5 dry
Chroma—2 or 3 moist or dry
Reaction—slightly acid or neutral
Texture—coarse sand, loamy sand, or loamy coarse sand
Clay content—0 to 5 percent
Rock fragment content—35 to 85 percent total, including 35 to 80 percent gravel and 0 to 15 percent cobbles

Shalcar Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow to moderately rapid
Landform: Drainageways
Landscape: Outwash plains
Parent material: Organic material over glacial outwash or dense glaciomarine deposits
Slope range: 0 to 8 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Loamy, mixed, euic, mesic Terric Haplosaprists

Typical Pedon

Shalcar muck in an area of Shalcar soils, 0 to 2 percent slopes; 1,640 feet south and 100 feet east of the northwest corner of sec. 3, T. 35 N., R. 3 W.; Friday Harbor, Washington, USGS quadrangle; latitude 48 degrees, 33 minutes, 39 seconds north and longitude 123 degrees, 3 minutes, 40 seconds west (Colors are for moist soil unless otherwise noted.)

Oa1—0 to 3 inches; black (10YR 2/1) muck, black (10YR 2/1) dry; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine irregular pores; strongly acid (pH 5.2); clear smooth boundary.
Oa2—3 to 11 inches; black (10YR 2/1) muck, black (10YR 2/1) dry; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine,

fine, and medium roots; many very fine and fine irregular pores; slightly acid (pH 6.2); clear smooth boundary.

Oa3—11 to 22 inches; black (10YR 2/1) muck, black (10YR 2/1) dry; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine irregular pores; 5 percent medium distinct irregular dark yellowish brown (10YR 4/6) masses of iron-manganese with diffuse boundaries throughout, yellowish brown (10YR 5/6) dry, and 5 percent medium faint irregular dark gray (10YR 4/1) iron depletions with diffuse boundaries throughout, light gray (10YR 7/1) dry; slightly acid (pH 6.3); abrupt smooth boundary.

2Bg1—22 to 27 inches; gray (10YR 6/1) fine sandy loam, gray (10YR 5/1) dry; massive; soft, very friable, nonsticky and nonplastic; many very fine tubular pores; 15 percent medium distinct irregular dark yellowish brown (10YR 4/6) masses of iron-manganese with diffuse boundaries throughout, yellowish brown (10YR 5/6) dry, and 15 percent medium distinct irregular iron depletions with diffuse boundaries throughout; neutral (pH 7.3); gradual wavy boundary.

2Bg2—27 to 44 inches; gray (10YR 5/1) silt loam, gray (10YR 6/1) dry; massive; soft, very friable, slightly sticky and slightly plastic; many very fine tubular pores; 20 percent medium distinct irregular dark yellowish brown (10YR 4/6) masses of iron-manganese with diffuse boundaries throughout, yellowish brown (10YR 5/6) dry, and 15 percent medium distinct irregular iron depletions with diffuse boundaries throughout; slightly alkaline (pH 7.8); gradual wavy boundary.

2Cg—44 to 60 inches; gray (10YR 5/1) sandy loam, gray (10YR 6/1) dry; massive; soft, very friable, slightly sticky and slightly plastic; few very fine irregular pores; moderately alkaline (pH 8.1).

Range in Characteristics

Average annual soil temperature: 48 to 54 degrees F
Depth to mineral soil: 16 to 51 inches
Fiber content: 5 to 40 percent (2 to 15 percent rubbed)

Oa horizon:
Hue—2.5YR to 2.5Y, or neutral
Value—2 to 4 moist, 2 to 5 dry
Chroma—1 to 3 moist or dry
Reaction—extremely acid to moderately acid
Wood fragment content—0 to 10 percent

2Bg horizon:
Hue—10YR to 5Y, 5GY, or neutral
Value—3 to 5 moist, 5 to 8 dry
Chroma—1 or 2 moist or dry
Reaction—moderately acid or slightly acid
Texture—silt loam, sandy loam, loam, or sandy clay loam

2Cg horizon:
Hue—5Y, 5GY, or neutral
Value—4 or 5 moist, 5 to 7 dry
Reaction—moderately acid to neutral
Texture—sand, loamy sand, sandy loam, loam, silt loam, or silty clay loam
Coarse fragments—0 to 60 percent gravel

Sholander Series

Depth class: Deep to dense material

Drainage class: Somewhat poorly drained
Permeability: Very slow to very rapid
Landscape: Outwash plains
Landform: Valleys
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 0 to 8 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 40 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Sandy, isotic, mesic Aquic Dystroxerepts

Typical Pedon

Sholander gravelly loam in an area of Spieden and Sholander soils, 0 to 2 percent slopes; 600 feet north and 1,800 feet east of the southwest corner of sec. 9, T. 34 N., R. 1 W.; Lopez Pass, Washington, USGS quadrangle; latitude 48 degrees, 27 minutes, 3 seconds north and longitude 122 degrees, 48 minutes, 56 seconds west (Colors are for dry soil unless otherwise noted.)

A—0 to 8 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 10 percent gravel, 5 percent cobbles, and 5 percent stones; moderately acid (pH 5.9); clear wavy boundary.

E—8 to 16 inches; light brownish gray (10YR 6/2) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; moderately hard, very friable, nonsticky and nonplastic; common very fine and fine roots; 10 percent iron depletions in matrix that are light brownish gray (10YR 6/2) when moist and 15 percent prominent masses of iron-manganese throughout that are dark yellowish brown (10YR 4/6) when moist; 20 percent gravel, 5 percent cobbles, and 5 percent stones; moderately acid (pH 5.9); abrupt smooth boundary.

Bg1—16 to 28 inches; brown (10YR 5/3) gravelly loamy sand, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; 15 percent masses of iron-manganese throughout that are dark yellowish brown (10YR 4/6) when moist and 35 percent iron depletions in matrix that are light brownish gray (10YR 6/2) when moist; 20 percent gravel, 5 percent cobbles, and 5 percent stones; moderately acid (pH 5.9); gradual wavy boundary.

Bg2—28 to 51 inches; brown (10YR 5/3) gravelly sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; 15 percent masses of iron-manganese throughout that are dark yellowish brown (10YR 4/6) when moist and 20 percent iron depletions in matrix that are light brownish gray (10YR 6/2) when moist; 15 percent gravel; moderately acid (pH 5.9); gradual wavy boundary.

2Cd—51 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; very hard, extremely firm, slightly sticky and slightly plastic; slightly acid (pH 6.4).

Range in Characteristics

Average annual soil temperature: 50 to 52 degrees F
Soil moisture control section: Dry for 60 to 75 consecutive days following summer solstice
Depth to densic contact: 40 to 60 inches

Depth to redoximorphic features: 8 to 18 inches
Reaction: Moderately acid to neutral

Particle-size control section:
Rock fragment content—10 to 35 percent total, including 10 to 30 percent gravel, 0 to 15 percent cobbles, and 0 to 10 percent stones

A horizon:
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2 moist or dry
Texture—loam or sandy loam
Clay content—8 to 16 percent

E horizon:
Value—4 or 5 moist, 6 or 7 dry
Chroma—1 or 2 moist or dry
Clay content—0 to 8 percent

Bg horizon:
Value—3 or 4 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Texture—sand or loamy sand
Clay content—0 to 8 percent

Cd horizon:
Hue—7.5YR to 2.5Y
Value—5 or 6 moist, 4 to 7 dry
Chroma—2 or 3 moist or dry
Texture—loam or sandy loam
Clay content—8 to 15 percent

Spieden Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow to very rapid
Landscape: Outwash plains
Landform: Drainageways
Parent material: Glacial outwash
Slope range: 0 to 2 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Sandy, mixed, mesic Typic Endoaquolls

Typical Pedon

Spieden mucky silt loam in an area of Spieden and Sholander soils, 0 to 2 percent slopes; north of park headquarters in large depressional area; 1,230 feet north and 880 feet west of the southeast corner of sec. 2, T. 34 N. R. 3 W.; False Bay, Washington, USGS quadrangle; latitude 48 degrees, 28 minutes, 1 seconds north and longitude 123 degrees, 1 minutes, 16 seconds west (Colors are for moist soil unless otherwise noted.)

A1—0 to 4 inches; black (10YR 2/1) mucky silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure parting to moderate fine granular structure; soft, very

friable, slightly sticky and moderately plastic; many very fine and fine roots; many fine interstitial pores and common very fine and fine irregular pores; 10 percent gravel; moderately acid (pH 5.8); clear wavy boundary.

A2—4 to 11 inches; black (10YR 2/1) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure parting to moderate fine granular structure; soft, very friable, slightly sticky and moderately plastic; few very fine and fine roots; common very fine interstitial pores and few very fine irregular pores; 5 percent coarse irregular very weakly cemented masses of iron-manganese in matrix surrounding redoximorphic concentrations; 10 percent gravel; slightly acid (pH 6.3); abrupt wavy boundary.

E—11 to 24 inches; dark grayish brown (2.5Y 4/2) gravelly loamy sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; few very fine interstitial pores; 75 percent coarse irregular very weakly cemented masses of iron-manganese with diffuse boundaries in matrix surrounding redoximorphic concentrations; 15 percent gravel; neutral (pH 6.7); clear wavy boundary.

Bg—24 to 36 inches; dark olive brown (2.5Y 3/3) gravelly loamy coarse sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; few very fine interstitial pores; 75 percent coarse prominent irregular very weakly cemented masses of iron-manganese with diffuse boundaries in matrix surrounding redoximorphic concentrations; 15 percent gravel; neutral (pH 6.7); clear wavy boundary.

C1—36 to 48 inches; dark olive brown (2.5Y 3/3) coarse sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; few very fine interstitial pores; 10 percent gravel; neutral (pH 6.9); clear wavy boundary.

C2—48 to 60 inches; very dark grayish brown (2.5Y 3/2) coarse sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; few very fine interstitial pores; 10 percent gravel; neutral (pH 6.9).

Range in Characteristics

Average annual soil temperature: 50 to 52 degrees F
Mollic epipedon thickness: 10 to 14 inches
Depth to redoximorphic features: 0 to 8 inches
Reaction: Moderately acid to neutral
Rock fragment content: 10 to 35 percent total, including 10 to 30 percent gravel, 0 to 15 percent cobbles, and 0 to 10 percent stones

A horizon:
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2 moist or dry
Clay content—6 to 16 percent

E horizon:
Hue—7.5YR to 2.5Y
Value—3 or 4 moist, 5 or 6 dry
Chroma—1 or 2 moist or dry
Texture—loamy sand or sand
Clay content—0 to 5 percent

Bg horizon:
Hue—7.5YR to 2.5Y
Value—3 or 4 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Texture—loamy coarse sand, loamy sand, or sand
Clay content—0 to 5 percent

C horizon:
Hue—7.5YR to 2.5Y
Value—5 or 6 moist, 4 to 7 dry
Chroma—2 or 3 moist or dry
Texture—coarse sand, loamy sand, or sand
Clay content—0 to 5 percent

Sucia Series

Depth class: Deep to dense material
Drainage class: Moderately well drained
Permeability: Very slow to very rapid
Landscape: Outwash plains
Landform: Valleys
Parent material: Glacial outwash over dense glaciomarine deposits
Slope range: 3 to 8 percent
Elevation: 0 to 300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Sandy, isotic, mesic Aquic Xerorthents

Typical Pedon

Sucia sandy loam, 3 to 8 percent slopes; 100 feet north and 1,100 feet west of the southeast corner of sec. 13, T. 36 N., R. 4 W.; Roche Harbor, Washington, USGS quadrangle; latitude 48 degrees, 36 minutes, 33 seconds north and longitude 123 degrees, 7 minutes, 53 seconds west (Colors are for dry soil unless otherwise noted.)

A—0 to 9 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate coarse granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine irregular and interstitial pores; 5 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

Bw—9 to 19 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine irregular and interstitial pores; 5 percent gravel; slightly acid (pH 6.1); gradual smooth boundary.

Bg1—19 to 27 inches; gray (10YR 6/1) loamy sand, dark gray (10YR 4/1) moist; single grain; loose, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine irregular and interstitial pores; 40 percent distinct brown (7.5YR 5/4) iron-manganese concretions, light brown (7.5YR 6/4) dry, and 60 percent distinct dark gray (10YR 4/1) iron depletions, gray (10YR 6/1) dry; 10 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

Bg2—27 to 33 inches; gray (10YR 6/1) gravelly sand, dark gray (10YR 4/1) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine irregular and interstitial pores; 30 percent faint strong brown (7.5YR 4/6) masses of iron-manganese, strong brown (7.5YR 5/8) dry, and 70 percent faint dark gray (10YR 4/1) iron depletions, gray (10YR 6/1) dry; 25 percent gravel and 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

2Bg3—33 to 47 inches; light gray (10YR 7/1) gravelly sandy loam, gray (10YR 5/1) moist; single grain; loose, nonsticky and nonplastic; few fine roots; many very fine and fine irregular and interstitial pores; 40 percent prominent strong brown (7.5YR 4/6) masses of iron-manganese, strong brown (7.5YR 5/8) dry, and 60 percent prominent gray (10YR 6/1) iron depletions, light gray (10YR 7/2) dry; 30 percent gravel; neutral (pH 6.7); abrupt wavy boundary.

2Cd—47 to 60 inches; light gray (10YR 7/1) loam, gray (10YR 5/1) moist; massive; very hard, firm, slightly sticky and slightly plastic; 20 percent prominent strong brown (7.5YR 4/6) masses of iron-manganese, strong brown (7.5YR 5/8) dry, and 80 percent prominent gray (10YR 5/1) iron depletions, light gray (10YR 7/1) dry; 5 percent gravel; neutral (pH 6.9).

Range in Characteristics

Average annual soil temperature: 50 to 52 degrees F
Soil moisture control section: Dry for 75 to 90 consecutive days following summer solstice
Depth to densic contact: 40 to 60 inches
Depth to redoximorphic features: 18 to 27 inches
Reaction: Strongly acid to neutral

Particle size control section:
Clay content—0 to 5 percent
Rock fragment content—0 to 35 percent total, including 0 to 30 percent gravel and 0 to 10 percent cobbles

A horizon:
Value—3 or 4 moist, 4 or 5 dry
Chroma—1 or 2 moist or dry
Clay content—2 to 8 percent

Bw horizon:
Value—4 or 5 moist, 5 or 6 dry
Chroma—3 or 4 moist or dry
Clay content—0 to 5 percent

Bg horizon:
Hue—10YR or 7.5YR
Value—4 or 5 moist, 5 or 6 dry
Chroma—1 or 2 moist or dry
Texture—sand or loamy sand
Clay content—0 to 5 percent

2Bg horizon:
Hue—10YR or 7.5YR
Value—4 or 5 moist, 5 or 6 dry
Chroma—1 or 2 moist or dry
Texture—sandy loam or loam
Clay content—0 to 10 percent

2Cd horizon:
Hue—10YR or 7.5YR
Value—4 to 6 moist, 5 to 7 dry
Chroma—1 or 2 moist or dry
Texture—loam or sandy loam
Clay content—8 to 18 percent

Xerorthents

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Very rapid
Landscape: Shore complexes
Landform: Beaches, hillslopes, sea cliffs
Parent material: Beach sand and colluvium derived from glacial outwash
Slope range: 0 to 100 percent
Elevation: 0 to 100 feet
Mean annual precipitation: 18 to 45 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 200 to 240 days

Taxonomic class: Xerorthents

Reference Pedon

Xerorthents very gravelly sand in an area of Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes; 2,880 feet south and 430 feet east of the northwest corner of sec. 7, T. 34 N., R. 2 W.; Richardson, Washington, USGS quadrangle; latitude 48 degrees, 27 minutes, 20 seconds north and longitude 122 degrees, 59 minutes, 38 seconds west (Colors are for dry soil unless otherwise noted.)

A—0 to 1 inch; dark grayish brown (10YR 4/2) very gravelly sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine and few medium roots; many fine and medium interstitial pores; 50 percent gravel and 10 percent cobbles; moderately acid (pH 5.7); abrupt smooth boundary.

C1—1 to 20 inches; stratified very gravelly sand; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many fine and medium interstitial pores; 50 percent gravel and 10 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

C2—20 to 60 inches; stratified very gravelly sand; single grain; loose, nonsticky and nonplastic; many fine and medium interstitial pores; 50 percent gravel and 10 percent cobbles; neutral (pH 6.8).

Color of the C horizon is derived from parent material that is 40 percent dark colored, 40 percent light colored, and 20 percent intermediate colored.

Range in Characteristics

Depth to restrictive feature: More than 60 inches

Formation of the Soils

Nineteen soil types are described and delineated within the boundaries of San Juan Island National Historic Park. The appearance and properties of these soils are a result of the interaction of five soil-forming factors—parent material, climate, topography, biological factors, and time. Although each of the factors is discussed separately, they are inseparable with respect to soil formation. For example, a change in the climate influences the plant species that can grow in an area.

Parent Material

Three general types of parent material are in the park—glacial outwash, dense glaciomarine deposits, and colluvium derived from marine metasedimentary rock. Glacial outwash typically consists of coarser textured material that is poorly sorted. It typically overlies dense glaciomarine deposits, which typically are finer textured and well sorted. Colluvium derived from marine metasedimentary rock typically occurs as rock fragments and sand in soils that are on hillslopes.

Soils of the Mitchellbay, Sucia, and Sholander series are representative of those that consist of glacial outwash over root- and water-restrictive dense glaciomarine deposits. During the wetter months of the year (October through May), a perched water table develops above the dense glaciomarine deposits. In nearly level to gently sloping areas, the perched water table reaches the surface and water might pond on the soils during periods of frequent precipitation.

Soils of the San Juan, Hoypus, and Everett series are representative of those that consist of glacial outwash that extends beyond the depth of the soil material. These soils typically have additions of eolian sediment, small amounts of volcanic ash, or relatively high amounts of organic matter in the surface layer. These additions have a positive influence on the available water capacity for plants.

Soils of the Cady, Doebay, Haro, and Hiddenridge series are representative of those that consist of colluvium mixed with glacial drift. These soils occur in areas where glacial sediment is thin or where the sediment has been eroded, such as on Young Hill, at English Camp. These soils have a bedrock contact in the rooting zone. The bedrock consists mainly of marine metasedimentary rock of the Cretaceous-Jurassic period (Logan, 2003). Rock types included in this metasedimentary group, known as the Constitution Formation, are metamorphosed sandstone, argillite, mudstone, and conglomerate.

Climate

Climate in the San Juan Island National Historical Park is characterized by warm, dry summers and mild, moist winters. The park is on the leeward side of the Olympic Mountains in Washington and the mountains of Vancouver Island in British Columbia. The mountains produce a topographic rainshadow effect over the park. The American Camp unit of the park receives about 20 inches of precipitation, and the English Camp unit receives about 29 inches. Although the park is in a rainshadow, the proximity to temperature-moderating coastal water results in vegetation patterns that are characteristic of higher precipitation zones. The difference between American

Camp and English Camp in exposure to wind is pronounced. Except for areas on the leeward side of Mount Finlayson, American Camp is exposed to prevailing winds traveling over open water. English Camp, however, is protected from the winds by hills and the forest canopy. The San Juan soils in the American Camp unit reflect the effects of the exposure. These soils typically have 1 to 2 feet of eolian, or wind-transported, sediment on the surface.

Topography

The landscapes within the park are the result of a complex geologic history. The steep rocky hills originated during the Late Cretaceous as a result of a thrust-faulting orogeny (Brandon, 1988). Glaciation modified the hills and formed the glacial outwash plains and valleys between them. The last glacial episode, the Vashon Stade, produced the modern surface topography of the lowlands (Booth, 1994).

Following glaciation, the land surface rebounded as the weight of the glacial ice lessened. As a result of the rebounding surface and changes in sea level, sediment that was deposited in a marine environment is now at elevations of as much as about 300 feet (McLeelean, 1927).

Steepness, shape, and aspect of the slope significantly affect the distribution of soil moisture and the plant communities in an area. An excellent example of the topographic factor is the vegetation pattern on Mount Finlayson. The San Juan soils on the south-facing slopes are exposed to more direct solar radiation and prevailing winds; thus, they support rangeland vegetation. The Everett and Hoypus soils on the north-facing slopes are more protected from solar radiation and prevailing winds; thus, they support forest vegetation.

Slope shape affects erosion and deposition as exhibited by areas of the Haro-Hiddenridge-Rock outcrop complex, 50 to 100 percent slopes. The Rock outcrop and shallow to bedrock Haro soils typically are in convex areas that are subject to erosion. The deep Hiddenridge soils are in concave positions where soil material tends to accumulate.

In nearly level areas underlain by dense sediment, the soils have characteristics attributed to prolonged saturation, such as redoximorphic concentrations and depletions. Soils of the Bazal, Mitchellbay, and Sholander series are examples. The Spieden series and similar soils, which are in drainageways and depressions, have a very high organic matter content in the surface layer. This is due in part to the increased production of biomass in these moister soils and in part to the prolonged anaerobic conditions in the soils, which slows decomposition.

Biological Factors

Organisms affect soil formation in many ways. Pioneering organisms, such as lichens, facilitate the weathering of rock into soil. Organisms can also mix soils, such as when trees are toppled by wind or rabbits excavate warrens. At American Camp, European hares have brought gravel to the surface in some areas of the San Juan soils through repeated excavation of warrens. Soil fauna, such as burrowing insects or worms, increase the porosity of soils. Increased porosity increases the ability of a soil to perform functions such as storing water, cycling nutrients, and providing a medium for plant roots. The color and thickness of a surface layer is significantly influenced by the plant community. Soils that have formed under grassland, such as the San Juan series, have a thick, dark-colored surface layer as a result of the biomass in grassland being concentrated in the rooting zone. In contrast, forested soils, such as those of the Everett and Hoypus series, have a thin, lighter colored surface layer as a result of the biomass being concentrated in the canopy.

Time

The formation of a soil is a result of the interaction of the soil-forming factors over time. The end of the last glaciation of the Puget Lowlands, including the park, effectively set the time for soil formation to begin about 16,000 years ago (Porter and Swanson, 1998). Soil formation has progressed since that time as a result of four general soil-forming processes—additions, losses, transformations, and translocations. Soil horizonation is a result of these processes acting over time. The dark-colored surface layer of the rangeland and prairie soils, such as those of the San Juan, Pilepoint, Haro, and Hiddenridge series, forms relatively quickly. Redoximorphic concentrations and depletions in the subsoil of the Spieden, Michellbay, and Sholander soils are evidence of transformation and translocation of iron due to periodic saturation. A subsoil that contains a significant accumulation of clay (argillic horizon), such as that of the Mitchellbay, Coveland, Bazal, and Pilepoint soils, can take thousands of years to form (Birkeland, 1999). Presence of such a subsoil suggests that the landscape and soil-forming processes have been stable since the end of the glaciation. In contrast, soils such as those of the Cady and Doebay series exhibit little horizon development. The formation of these soils has been affected by the mixing of soil material as a result of windthrow of trees, erosion, and mass movement on steep slopes.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

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.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

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.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

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.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

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. 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).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

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.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

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.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

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.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but 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. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.
Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.
Chemical treatment. Control of unwanted vegetation through the use of chemicals.
Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.
Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.
Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
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.
Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.
COLE (coefficient of linear extensibility). See Linear extensibility.
Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.
Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.
Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.
Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of

grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

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."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

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.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

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.

Diamict. A nonsorted or poorly sorted, unconsolidated deposit that contains a wide range of particle sizes, commonly ranging from clay to cobble-sized or boulder-sized, rounded and/or angular fragments with a clayey, silty, or sandy matrix, depending on the local bedrock.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

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.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

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.

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 soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

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 layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

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.

Firebreak. 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. The normal flood plain of a stream, subject to frequent or occasional 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. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. 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.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of

given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock 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.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

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.

Head out. To form a flower head.

Head slope. 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.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

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 are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state.

Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration 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. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

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. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. 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.

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.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Longshore drift. Material such as sand or gravel that is moved parallel to and near a shore.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

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.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

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. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of

decomposition. 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 processes of mountain formation.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

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*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

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." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

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

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential 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.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

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 having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

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.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel;

sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

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.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

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. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

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.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

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.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subduction. The process of one lithospheric plate descending beneath another one.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.
Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.
Substratum. The part of the soil below the solum.
Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.
Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.
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. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.
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 deformation of the earth's crust or the resulting structures.
Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.
Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.
Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.
Terrane. A group of related rocks and the area in which they are exposed at the earth's surface.
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.
Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.
Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.
Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are

constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Olga 2 SE, Washington)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	45.2	35.3	40.3	57	18	81	3.85	2.11	5.53	10	1.7
February----	48.1	36.6	42.3	60	21	99	2.79	1.66	3.91	8	1.0
March-------	52.1	38.5	45.3	63	27	171	2.27	1.53	2.92	8	0.4
April-------	57.1	41.2	49.2	71	33	274	1.88	1.19	2.58	6	0.0
May---------	62.8	45.1	53.9	79	36	431	1.72	0.89	2.49	5	0.0
June--------	66.6	48.2	57.4	80	41	522	1.36	0.79	1.90	4	0.0
July--------	69.9	50.5	60.2	83	44	625	0.94	0.45	1.40	2	0.0
August------	70.2	50.9	60.6	83	44	637	1.07	0.32	1.80	2	0.0
September---	66.4	48.5	57.5	80	40	524	1.34	0.42	2.26	3	0.0
October-----	58.0	44.4	51.2	71	34	348	2.42	1.26	3.58	7	0.1
November----	49.6	39.0	44.3	62	23	152	4.36	2.51	6.10	11	0.5
December----	45.3	35.6	40.4	58	18	79	4.07	2.65	5.53	10	1.8
Yearly:											
Average---	57.6	42.8	50.2	---	---	---	---	---	---	---	---
Extreme---	89.0	-1	---	85	12	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,943	28.07	23.80	31.62	76	5.6

Average number of days per year with at least 1 inch of snow on the ground: 3

*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).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Olga 2 SE, Washington)

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-----	February 17	March 3	April 11
2 years in 10 later than-----	February 5	February 22	April 1
5 years in 10 later than-----	January 10	February 4	March 12
First freezing temperature in fall:			
1 year in 10 earlier than---	November 21	November 13	October 29
2 years in 10 earlier than---	December 6	November 24	November 6
5 years in 10 earlier than---	January 7	December 15	November 21

Table 3.--Growing Season

(Recorded in the period 1971-2000 at Olga 2 SE, Washington)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	*Days*	*Days*
9 years in 10	305	269	211
8 years in 10	324	284	225
5 years in 10	>365	316	250
2 years in 10	>365	>365	276
1 year in 10	>365	>365	290

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
999	Fresh water	8	0.5
1000	Spieden and Sholander soils, 0 to 2 percent slopes	108	6.2
1004	Limepoint and Sholander soils, 0 to 8 percent slopes	14	0.8
1009	Coveland-Mitchellbay complex, 8 to 25 percent slopes	65	3.7
1013	Bazal and Mitchellbay soils, 0 to 3 percent slopes	23	1.3
1014	Endoaquents,tidal-Xerorthents association, 0 to 5 percent slopes	73	4.2
2001	Mitchellbay gravelly sandy loam, 5 to 15 percent slopes	24	1.4
2002	Sucia sandy loam, 3 to 8 percent slopes	41	2.3
2004	Mitchellbay gravelly sandy loam, 2 to 5 percent slopes	82	4.7
3000	Pilepoint loam, 3 to 12 percent slopes	26	1.5
3001	Hoypus sandy loam, 3 to 25 percent slopes	132	7.5
3005	San Juan sandy loam, 2 to 8 percent slopes	166	9.5
3006	San Juan sandy loam, 30 to 60 percent slopes	36	2.1
3007	San Juan sandy loam, 15 to 35 percent slopes	333	19.0
3008	Xerorthents-Endoaquents, tidal association, 0 to 100 percent slopes	12	0.7
3010	San Juan-Dune land complex, 0 to 30 percent slopes	63	3.6
3012	Hoypus sandy loam, 25 to 50 percent slopes	40	2.3
3013	Everett sandy loam, 3 to 25 percent slopes	67	3.8
3014	Everett sandy loam, 25 to 50 percent slopes	12	0.7
5000	Cady-Rock outcrop complex, 8 to 40 percent slopes	127	7.2
5006	Cady-Rock outcrop-Doebay complex, 50 to 100 percent slopes	29	1.7
5007	Haro-Hiddenridge-Rock outcrop complex, 8 to 35 percent slopes	145	8.3
5008	Doebay-Cady-Rock outcrop complex, 5 to 50 percent slopes	99	5.6
5009	Haro-Hiddenridge-Rock outcrop complex, 50 to 100 percent slopes	30	1.7
	Total	1,755	100.0

Table 5.--Ecological Sites and Characteristic Plant Communities

(Absence of an entry indicates that data were not available. Composition of forest understory based on percent canopy cover)

Map symbol and component name	Ecological site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry Weight		Forest	Range
			Lb/acre		*Pct*	*Pct*
999:						
Fresh water-----	---	Favorable	---			
		Normal	---			
		Unfavorable	---			
1000:						
Spieden, undrained------	Picea sitchensis-Alnus rubra/Rubus spectabilis (F002XY904WA)	Favorable	---	Salmonberry	54	
		Normal	---	Common snowberry	28	
		Unfavorable	---	Trailing blackberry	25	
				Scouringrush horsetail	20	
				Field horsetail	18	
				Cluster rose	13	
				Red elderberry	8	
				Western swordfern	6	
				Softstem bulrush	5	
Spieden, drained	Picea sitchensis-Alnus rubra/Rubus spectabilis (F002XY904WA)	Favorable	---	Salmonberry	54	
		Normal	---	Common snowberry	28	
		Unfavorable	---	Trailing blackberry	25	
				Scouringrush horsetail	20	
				Field horsetail	18	
				Cluster rose	13	
				Red elderberry	8	
				Western swordfern	6	
				Softstem bulrush	5	
Sholander, undrained------	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
Sholander, drained--------	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
1004:						
Limepoint, undrained------	Picea sitchensis-Alnus rubra/Rubus spectabilis (F002XY904WA)	Favorable	---	Salmonberry	54	
		Normal	---	Common snowberry	28	
		Unfavorable	---	Trailing blackberry	25	
				Scouringrush horsetail	20	
				Field horsetail	18	
				Cluster rose	13	
				Red elderberry	8	
				Western swordfern	6	
				Softstem bulrush	5	

Table 5.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and component name	Ecological Site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry Weight		Forest	Range
			Lb/acre		*Pct*	*Pct*
1004:						
Limepoint, drained--------	Picea sitchensis-Alnus rubra/Rubus spectabilis (F002XY904WA)	Favorable	---	Salmonberry	54	
		Normal	---	Common snowberry	28	
		Unfavorable	---	Trailing blackberry	25	
				Scouringrush horsetail	20	
				Field horsetail	18	
				Cluster rose	13	
				Red elderberry	8	
				Western swordfern	6	
				Softstem bulrush	5	
Sholander, undrained------	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
Sholander, drained--------	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
Shalcar, undrained------	Salix lucida/Spiraea douglasii (F002XX905WA)	Favorable	---	Pacific willow		
		Normal	---	Douglas spiraea		
		Unfavorable	---			
1009:						
Coveland--------	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
Mitchellbay-----	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	

Table 5.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and component name	Ecological Site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry Weight		Forest	Range
			Lb/acre		*Pct*	*Pct*
1013:						
Bazal, undrained	Picea sitchensis-Alnus rubra/Rubus spectabilis (F002XY904WA)	Favorable	---	Salmonberry	54	
		Normal	---	Common snowberry	28	
		Unfavorable	---	Trailing blackberry	25	
				Scouringrush horsetail	20	
				Field horsetail	18	
				Cluster rose	13	
				Red elderberry	8	
				Western swordfern	6	
				Softstem bulrush	5	
Bazal, drained--	Picea sitchensis-Alnus rubra/Rubus spectabilis (F002XY904WA)	Favorable	---	Salmonberry	54	
		Normal	---	Common snowberry	28	
		Unfavorable	---	Trailing blackberry	25	
				Scouringrush horsetail	20	
				Field horsetail	18	
				Cluster rose	13	
				Red elderberry	8	
				Western swordfern	6	
				Softstem bulrush	5	
Mitchellbay-----	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
1014:						
Endoaquents, tidal----------	---	Favorable	---	Virginia glasswort		
		Normal	---			
		Unfavorable	---			
Xerorthents-----	SALT WATER SHORELINE FERU/CALE (R002XY302WA)	Favorable	750	Oregon gumweed		
		Normal	450	Roemer's fescue		
		Unfavorable	250	Common yarrow		
				Field chickweed		
				Great camas		
				Red fescue		
2001:						
Mitchellbay-----	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
2002:						
Sucia----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	

Table 5.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and component name	Ecological Site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry Weight		Forest	Range
			Lb/acre		*Pct*	*Pct*
2004:						
Mitchellbay-----	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
3000:						
Pilepoint-------	PUGET PRAIRIE QUGA4/FERO (R002XY102WA)	Favorable	1,800	Oregon white oak		
		Normal	1,600	Roemer's fescue		
		Unfavorable	1,200	Blue wildrye		
				Camas		
				Common yarrow		
				Field chickweed		
				Slender wheatgrass		
3001:						
Hoypus----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	
3005:						
San Juan--------	PUGET PRAIRIE QUGA4/FERO (R002XY102WA)	Favorable	1,800	Oregon white oak		
		Normal	1,500	Roemer's fescue		
		Unfavorable	1,200	Blue wildrye		
				Camas		
				Common yarrow		
				Field chickweed		
				Slender wheatgrass		
3006:						
San Juan--------	PUGET PRAIRIE QUGA4/FERO (R002XY102WA)	Favorable	1,800	Oregon white oak		
		Normal	1,500	Roemer's fescue		
		Unfavorable	1,200	Blue wildrye		
				Camas		
				Common yarrow		
				Field chickweed		
				Slender wheatgrass		
3007:						
San Juan--------	PUGET PRAIRIE QUGA4/FERO (R002XY102WA)	Favorable	1,800	Oregon white oak		
		Normal	1,500	Roemer's fescue		
		Unfavorable	1,200	Blue wildrye		
				Camas		
				Common yarrow		
				Field chickweed		
				Slender wheatgrass		
3008:						
Xerorthents-----	SALT WATER SHORELINE FERU/CALE (R002XY302WA)	Favorable	750	Oregon gumweed		
		Normal	450	Roemer's fescue		
		Unfavorable	250	Common yarrow		
				Field chickweed		
				Great camas		
				Red fescue		
Endoaquents, tidal----------	---	Favorable	---	Virginia glasswort		
		Normal	---			
		Unfavorable	---			

Table 5.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and component name	Ecological Site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry Weight		Forest	Range
			Lb/acre		*Pct*	*Pct*
3010:						
San Juan---------	PUGET PRAIRIE QUGA4/FERO (R002XY102WA)	Favorable	1,800	Roemer's fescue		
		Normal	1,500	Blue wildrye		
		Unfavorable	1,200	Camas		
				Common yarrow		
				Field chickweed		
				Slender wheatgrass		
Dune land-------	---	Favorable	---			
		Normal	---			
		Unfavorable	---			
3012:						
Hoypus----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	
3013:						
Everett---------	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
3014:						
Everett---------	Thuja plicata-Pseudotsuga menziesii/Polystichum munitum (F002XY903WA)	Favorable	---	Trailing blackberry	25	
		Normal	---	Western swordfern	19	
		Unfavorable	---	Western brackenfern	17	
				Cascade Oregongrape	13	
				Common snowberry	13	
				Creambush oceanspray	12	
				Salmonberry	10	
				Baldhip rose	9	
				Northern twinflower	5	
				Stinging nettle	5	
				Woodland strawberry	5	
5000:						
Cady----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	
Rock outcrop----	---	Favorable	---			
		Normal	---			
		Unfavorable	---			
Roche----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	

Table 5.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and component name	Ecological Site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry Weight		Forest	Range
			Lb/acre		*Pct*	*Pct*
5006:						
Cady----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	
Rock outcrop----	---	Favorable	---			
		Normal	---			
		Unfavorable	---			
Doebay----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	
5007:						
Haro----------	PUGET BALD QUGA4/FERO (R002XY202WA)	Favorable	1,000	California oatgrass		
		Normal	650	Oregon white oak		
		Unfavorable	500	Roemer's fescue		
				Camas		
				Common yarrow		
				Field chickweed		
				Prairie Junegrass		
Hiddenridge-----	PUGET PRAIRIE QUGA4/FERO (R002XY102WA)	Favorable	1,800	Oregon white oak		
		Normal	1,500	Roemer's fescue		
		Unfavorable	1,200	Blue wildrye		
				Camas		
				Common yarrow		
				Field chickweed		
				Slender wheatgrass		
Rock outcrop----	---	Favorable	---			
		Normal	---			
		Unfavorable	---			
5008:						
Doebay----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	
Cady----------	Pseudotsuga menziesii-Arbutus menziesii/Holodiscus discolor (F002XY901WA)	Favorable	---	Creambush oceanspray	23	
		Normal	---	Salal	23	
		Unfavorable	---	Cascade Oregongrape	16	
				Baldhip rose	14	
				Orange honeysuckle	8	
				Broadleaf starflower	7	
				Nootka rose	6	
				Western brackenfern	5	
Rock outcrop----	---	Favorable	---			
		Normal	---			
		Unfavorable	---			

Table 5.--Ecological Sites and Characteristic Plant Communities--Continued

Map symbol and component name	Ecological Site	Total production		Characteristic vegetation	Composition	
		Kind of year	Dry Weight		Forest	Range
			Lb/acre		*Pct*	*Pct*
5009:						
Haro----------	PUGET BALD QUGA4/FERO (R002XY202WA)	Favorable	1,000	California oatgrass		
		Normal	650	Oregon white oak		
		Unfavorable	500	Roemer's fescue		
				Camas		
				Common yarrow		
				Field chickweed		
				Prairie Junegrass		
Hiddenridge-----	PUGET PRAIRIE QUGA4/FERO (R002XY102WA)	Favorable	1,800	Oregon white oak		
		Normal	1,500	Roemer's fescue		
		Unfavorable	1,200	Blue wildrye		
				Camas		
				Common yarrow		
				Field chickweed		
				Slender wheatgrass		
Rock outcrop----	---	Favorable	---			
		Normal	---			
		Unfavorable	---			

Table 6.--Forage Suitability Group, Land Capability, and Yields per Acre of Forage

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and component name	Forage suitability group	Land capability		Grass-legume hay		Grass-legume pasture	
		N	I	N	I	N	I
				Tons	*Tons*	*AUM*	*AUM*
999:							
Fresh water	---	---	---	---	---	---	---
1000:							
Spieden, undrained	G002XY100WA	5w	5w	2.00	---	4.40	---
Spieden, drained	G002XY400WA	4w	4w	4.00	---	8.80	---
Sholander, undrained	G002XY400WA	5w	5w	2.00	---	4.40	---
Sholander, drained	G002XY400WA	4w	4w	4.00	---	8.80	---
1004:							
Limepoint, undrained	G002XY100WA	5w	5w	3.00	---	6.60	---
Limepoint, drained	G002XY400WA	4w	4w	5.00	---	11.00	---
Sholander, undrained	G002XY400WA	6w	6w	2.00	---	4.40	---
Sholander, drained	G002XY400WA	4w	4w	4.00	---	8.80	---
Shalcar, undrained	G002XY100WA	5w	5w	2.00	---	4.40	---
1009:							
Coveland	G002XY400WA	6w	6w	3.00	---	6.60	---
Mitchellbay	G002XY400WA	4w	---	2.50	---	5.50	---
1013:							
Bazal, undrained	G002XY100WA	5w	5w	3.00	---	6.60	---
Bazal, drained	G002XY400WA	5w	5w	5.00	---	11.00	---
Mitchellbay	G002XY400WA	5w	5w	2.50	---	5.50	---
1014:							
Endoaquents, tidal	---	8w	---	---	---	---	---
Xerorthents	G002XY300WA	7s	---	0.25	---	0.55	---
2001:							
Mitchellbay	G002XY400WA	4w	4w	2.50	---	5.50	---
2002:							
Sucia	G002XY300WA	4w	4w	2.00	---	4.40	---
2004:							
Mitchellbay	G002XY400WA	4w	4w	2.50	---	5.50	---
3000:							
Pilepoint	G002XY300WA	3s	4e	2.00	---	4.40	---
3001:							
Hoypus	G002XY300WA	4e	6e	1.00	---	2.20	---
3005:							
San Juan	G002XY300WA	4s	4s	1.50	---	3.30	---
3006:							
San Juan	G002XY300WA	7e	---	1.50	---	3.30	---
3007:							
San Juan	G002XY300WA	4e	6e	1.50	---	3.30	---

Table 6.--Forage Suitability Group, Land Capability, and Yields per Acre of Forage--Continued

Map symbol and component name	Forage suitability group	Land capability		Grass-legume hay		Grass-legume pasture	
		N	I	N	I	N	I
				Tons	*Tons*	*AUM*	*AUM*
3008:							
Xerorthents	G002XY300WA	7e	---	0.25	---	0.55	---
Endoaquents, tidal	---	8w	---	---	---	---	---
3010:							
San Juan	G002XY300WA	4s	4e	1.50	---	3.30	---
Dune land	---	8s	---	---	---	---	---
3012:							
Hoypus	G002XY300WA	6e	7e	1.00	---	2.20	---
3013:							
Everett	G002XY300WA	4s	4e	1.50	---	3.30	---
3014:							
Everett	G002XY300WA	6e	7e	1.50	---	3.30	---
5000:							
Cady	G002XY200WA	6s	---	1.50	---	3.30	---
Rock outcrop	---	8s	---	---	---	---	---
Roche	G002XY200WA	3s	---	2.00	---	4.40	---
5006:							
Cady	G002XY200WA	7e	---	1.50	---	3.30	---
Rock outcrop	---	8s	---	---	---	---	---
Doebay	G002XY600WA	7e	---	2.00	---	4.40	---
5007:							
Haro	G002XY300WA	6s	---	0.50	---	1.10	---
Hiddenridge	G002XY300WA	4e	---	1.50	---	3.30	---
Rock outcrop	---	8	---	---	---	---	---
5008:							
Doebay	G002XY600WA	6e	---	2.00	---	4.40	---
Cady	G002XY200WA	6e	---	1.50	---	3.30	---
Rock outcrop	---	8s	---	---	---	---	---
5009:							
Haro	G002XY300WA	7e	---	0.50	---	1.10	---
Hiddenridge	G002XY300WA	7e	---	1.50	---	3.30	---
Rock outcrop	---	8s	---	---	---	---	---

Table 7.--Prime Farmland and Other Important Farmland

(Only the soils considered prime farmland or other important farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland or other important farmland)

Map symbol	Map unit name	Farmland classification
1000	Spieden and Sholander soils, 0 to 2 percent slopes	Prime farmland if drained
1004	Limepoint and Sholander soils, 0 to 8 percent slopes	Prime farmland if drained
1009	Coveland-Mitchellbay complex, 8 to 25 percent slopes	Farmland of statewide importance
1013	Bazal and Mitchellbay soils, 0 to 3 percent slopes	Prime farmland if drained
2001	Mitchellbay gravelly sandy loam, 5 to 15 percent slopes	Farmland of statewide importance
2002	Sucia sandy loam, 3 to 8 percent slopes	Prime farmland if irrigated
2004	Mitchellbay gravelly sandy loam, 2 to 5 percent slopes	Prime farmland
3000	Pilepoint loam, 3 to 12 percent slopes	Prime farmland if irrigated
3001	Hoypus sandy loam, 3 to 25 percent slopes	Farmland of statewide importance
3005	San Juan sandy loam, 2 to 8 percent slopes	Prime farmland if irrigated
3013	Everett sandy loam, 3 to 25 percent slopes	Farmland of statewide importance

Table 8.--Forestland Productivity

(Absence of an entry indicates that data were not available or the soil does not support woodland vegetation)

Map symbol and component name	Potential productivity				Trees to manage
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)	
		Ft	*Yrs*	*Cu ft/ac/yr*	
999. Fresh water					
1000:					
Spieden, undrained	Red alder	---		---	Sitka spruce, lodgepole pine, red alder
	Sitka spruce	---		---	
Spieden, drained	Red alder	---		---	Sitka spruce, lodgepole pine, red alder
	Sitka spruce	---		---	
Sholander, undrained	Douglas-fir	100	50	136	Douglas-fir, western redcedar
	Grand fir	95	50	---	
	Lodgepole pine	---		---	
	Red alder	85	20	---	
	Western redcedar	---		---	
Sholander, drained	Douglas-fir	100	50	136	Douglas-fir, western redcedar
	Grand fir	95	50	---	
	Lodgepole pine	---		---	
	Red alder	85	20	---	
	Western redcedar	---		---	
1004:					
Limepoint, undrained	Red alder	89	20	99	Sitka spruce, lodgepole pine, red alder
	Sitka spruce	---		---	
Limepoint, drained	Red alder	89	20	99	Sitka spruce, lodgepole pine, red alder
	Sitka spruce	---		---	
Sholander, undrained	Douglas-fir	100	50	136	Douglas-fir, western redcedar
	Grand fir	95	50	---	
	Lodgepole pine	---		---	
	Red alder	85	20	---	
	Western redcedar	---		---	
Sholander, drained	Douglas-fir	100	50	136	Douglas-fir, western redcedar
	Grand fir	95	50	---	
	Lodgepole pine	---		---	
	Red alder	85	20	---	
	Western redcedar	---		---	
Shalcar, undrained.					
1009:					
Coveland	Douglas-fir	103	50	141	Douglas-fir, western redcedar
	Grand fir	---		---	
	Lodgepole pine	120	100	---	
	Red alder	---		---	
	Western redcedar	---		---	
Mitchellbay	Douglas-fir	94	50	123	Douglas-fir, western redcedar
	Grand fir	---		---	
	Lodgepole pine	110	100	---	
	Red alder	---		---	
	Western redcedar	---		---	

Table 8.--Forestland Productivity--Continued

Map symbol and component name	Potential productivity				Trees to manage
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)	
		Ft	*Yrs*	*Cu ft/ac/yr*	
1013:					
Bazal, undrained	Red alder	85	20	92	Sitka spruce, lodgepole pine, red alder
	Sitka spruce	---		---	
Bazal, drained	Red alder	85	20	92	Sitka spruce, lodgepole pine, red alder
	Sitka spruce	---		---	
Mitchellbay	Douglas-fir	94	50	123	Douglas-fir, western redcedar
	Grand fir	---		---	
	Lodgepole pine	110	100	---	
	Red alder	---		---	
	Western redcedar	---		---	
1014.					
Endoaquents, tidal					
Xerorthents					
2001:					
Mitchellbay	Douglas-fir	94	50	123	Douglas-fir, western redcedar
	Grand fir	---		---	
	Lodgepole pine	110	100	---	
	Red alder	---		---	
	Western redcedar	---		---	
2002:					
Sucia	Douglas-fir	95	50	125	Douglas-fir, lodgepole pine
	Lodgepole pine	---		---	
	Pacific madrone	---		---	
2004:					
Mitchellbay	Douglas-fir	94	50	123	Douglas-fir, western redcedar
	Grand fir	---		---	
	Lodgepole pine	110	100	---	
	Red alder	---		---	
	Western redcedar	---		---	
3000.					
Pilepoint					
3001:					
Hoypus	Douglas-fir	105	50	145	Douglas-fir, lodgepole pine
	Lodgepole pine	---		---	
	Pacific madrone	---		---	
3005.					
San Juan					
3006.					
San Juan					
3007.					
San Juan					
3008.					
Xerorthents					
Endoaquents, tidal					
3010.					
San Juan					
Dune land					

Table 8.--Forestland Productivity--Continued

Map symbol and component name	Potential productivity				Trees to manage
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)	
		Ft	*Yrs*	*Cu ft/ac/yr*	
3012:					
Hoypus	Douglas-fir	105	50	145	Douglas-fir, lodgepole pine
	Lodgepole pine	---		---	
	Pacific madrone	---		---	
3013:					
Everett	Douglas-fir	107	50	149	Douglas-fir, western redcedar
	Grand fir	100	50	---	
	Lodgepole pine	---		---	
	Red alder	---		---	
	Western hemlock	90	50	---	
	Western redcedar	73	50	---	
3014:					
Everett	Douglas-fir	107	50	149	Douglas-fir, western redcedar
	Grand fir	100	50	---	
	Lodgepole pine	---		---	
	Red alder	---		---	
	Western hemlock	90	50	---	
	Western redcedar	73	50	---	
5000:					
Cady	Douglas-fir	70	50	---	Douglas-fir, lodgepole pine
	Lodgepole pine	70	100	---	
	Pacific madrone	---		---	
Rock outcrop.					
Roche	Douglas-fir	103	50	141	Douglas-fir, lodgepole pine
	Grand fir	---		---	
	Lodgepole pine	---		---	
	Pacific madrone	---		---	
5006:					
Cady	Douglas-fir	70	50	---	Douglas-fir, lodgepole pine
	Lodgepole pine	70	100	---	
	Pacific madrone	---		---	
Rock outcrop.					
Doebay	Douglas-fir	70	50	---	Douglas-fir, lodgepole pine
	Lodgepole pine	---		---	
	Pacific madrone	---		---	
5007.					
Haro					
Hiddenridge					
Rock outcrop					
5008:					
Doebay	Douglas-fir	70	50	---	Douglas-fir, lodgepole pine
	Lodgepole pine	---		---	
	Pacific madrone	---		---	
Cady	Douglas-fir	70	50	---	Douglas-fir, lodgepole pine
	Lodgepole pine	70	100	---	
	Pacific madrone	---		---	
Rock outcrop.					
5009.					
Haro					
Hiddenridge					
Rock outcrop					

Table 9a.--Forestland Management (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 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 the table)

Map symbol and component name	Pct. of map unit	Hazard of off-road or off-trail 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
999:							
Fresh water	100	Not rated		Not rated		Not rated	
1000:							
Spieden, undrained	25	Slight		Slight		Poorly suited	
						Ponding	1.00
						Low strength	0.50
						Wetness	0.50
Spieden, drained	25	Slight		Slight		Moderately suited	
						Low strength	0.50
						Wetness	0.50
Sholander, undrained	20	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Low strength	0.50
Sholander, drained	20	Slight		Slight		Moderately suited	
						Low strength	0.50
						Wetness	0.50
1004:							
Limepoint, undrained	35	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Ponding	1.00
						Wetness	0.87
						Low strength	0.50
Limepoint, drained	35	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Low strength	0.50
						Wetness	0.50
Sholander, undrained	10	Slight		Slight		Poorly suited	
						Wetness	1.00
						Ponding	0.50
						Low strength	0.50
Sholander, drained	10	Slight		Slight		Moderately suited	
						Low strength	0.50
						Wetness	0.50
Shalcar, undrained	10	Very severe		Very severe		Poorly suited	
		High organic content	1.00	High organic content	1.00	Ponding	1.00
						Low strength	0.50
						Wetness	0.50
1009:							
Coveland	70	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Wetness	1.00
						Slope	0.50
						Low strength	0.50
Mitchellbay	25	Moderate		Moderate		Moderately suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	0.50
1013:							
Bazal, undrained	30	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Low strength	0.50
Bazal, drained	30	Slight		Slight		Poorly suited	
						Wetness	1.00
						Low strength	0.50

Table 9a.--Forestland Management (Part I)--Continued

Map symbol and component name	Pct. of map unit	Hazard of off-road or off-trail 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
1013:							
Mitchellbay---	40	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
1014:							
Endoaquents, tidal--	45	Slight		Slight		Poorly suited	
						Flooding	1.00
						Wetness	1.00
						Sandiness	0.50
Xerorthents---	45	Slight		Slight		Moderately suited	
						Sandiness	0.50
2001:							
Mitchellbay---	90	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Wetness	1.00
						Ponding	0.50
						Slope	0.50
2002:							
Sucia---	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Wetness	0.50
2004:							
Mitchellbay---	100	Slight		Slight		Poorly suited	
						Wetness	1.00
3000:							
Pilepoint---	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Low strength	0.50
						Slope	0.50
						Wetness	0.50
3001:							
Hoypus---	100	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
3005:							
San Juan---	100	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
3006:							
San Juan---	100	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
3007:							
San Juan---	100	Moderate		Severe		Moderately suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	0.50
3008:							
Xerorthents---	75	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Endoaquents, tidal--	25	Slight		Slight		Poorly suited	
						Flooding	1.00
						Wetness	1.00
						Sandiness	0.50
3010:							
San Juan---	60	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
Dune land---	30	Not rated		Not rated		Not rated	
3012:							
Hoypus---	100	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00

Table 9a.--Forestland Management (Part I)--Continued

Map symbol and component name	Pct. of map unit	Hazard of off-road or off-trail 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
3013:							
Everett	100	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
3014:							
Everett	100	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
5000:							
Cady	45	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Low strength	0.50
Rock outcrop	35	Not rated		Not rated		Not rated	
Roche	10	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Wetness	0.93
						Low strength	0.50
						Slope	0.50
5006:							
Cady	70	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Low strength	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
Doebay	15	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
5007:							
Haro	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Hiddenridge	30	Moderate		Moderate		Moderately suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
Rock outcrop	20	Not rated		Not rated		Not rated	
5008:							
Doebay	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Cady	35	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Low strength	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
5009:							
Haro	50	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
Hiddenridge	30	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Rock outcrop	20	Not rated		Not rated		Not rated	

Table 9b.--Forestland Management (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 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 the table)

Map symbol and component name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
999:					
Fresh water	100	Not rated		Not rated	
1000:					
Spieden, undrained	25	Well suited		Well suited	
Spieden, drained	25	Well suited		Unsuited Wetness	1.00
Sholander, undrained	20	Poorly suited Rock fragments	0.50	Well suited	
Sholander, drained	20	Poorly suited Rock fragments	0.50	Well suited	
1004:					
Limepoint, undrained	35	Well suited		Unsuited Wetness	1.00
Limepoint, drained	35	Well suited		Unsuited Wetness	1.00
Sholander, undrained	10	Poorly suited Rock fragments	0.50	Well suited	
Sholander, drained	10	Poorly suited Rock fragments	0.50	Well suited	
Shalcar, undrained	10	Unsuited Wetness	0.75	Unsuited Wetness	1.00
1009:					
Coveland	70	Well suited		Well suited	
Mitchellbay	25	Poorly suited Slope	0.50	Poorly suited Slope	0.50
1013:					
Bazal, undrained	30	Well suited		Well suited	
Bazal, drained	30	Well suited		Well suited	
Mitchellbay	40	Well suited		Well suited	
1014:					
Endoaquents, tidal	45	Poorly suited Wetness	0.50	Unsuited Wetness	1.00
Xerorthents	45	Poorly suited Rock fragments	0.50	Well suited	
2001:					
Mitchellbay	90	Well suited		Well suited	
2002:					
Sucia	90	Well suited		Well suited	
2004:					
Mitchellbay	100	Well suited		Well suited	
3000:					
Pilepoint	90	Well suited		Well suited	

Table 9b.--Forestland Management (Part II)--Continued

Map symbol and component name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
3001:					
Hoypus	100	Well suited		Well suited	
3005:					
San Juan	100	Well suited		Well suited	
3006:					
San Juan	100	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
3007:					
San Juan	100	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
3008:					
Xerorthents	75	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50		
Endoaquents, tidal	25	Poorly suited		Unsuited	
		Wetness	0.50	Wetness	1.00
3010:					
San Juan	60	Well suited		Well suited	
Dune land	30	Not rated		Not rated	
3012:					
Hoypus	100	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
3013:					
Everett	100	Poorly suited		Well suited	
		Rock fragments	0.50		
3014:					
Everett	100	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50		
5000:					
Cady	45	Poorly suited		Unsuited	
		Slope	0.50	Restrictive layer	1.00
				Slope	0.50
Rock outcrop	35	Not rated		Not rated	
Roche	10	Well suited		Well suited	
5006:					
Cady	70	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
				Restrictive layer	1.00
Rock outcrop	15	Not rated		Not rated	
Doebay	15	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
				Restrictive layer	0.50
5007:					
Haro	50	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
		Slope	0.50	Slope	0.50
Hiddenridge	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50		

Table 9b.--Forestland Management (Part II)--Continued

Map symbol and component name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
5007:					
Rock outcrop--------	20	Not rated		Not rated	
5008:					
Doebay--------------	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
				Restrictive layer	0.50
Cady----------------	35	Poorly suited		Unsuited	
		Slope	0.50	Restrictive layer	1.00
				Slope	0.50
Rock outcrop--------	15	Not rated		Not rated	
5009:					
Haro----------------	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Restrictive layer	1.00	Restrictive layer	1.00
Hiddenridge---------	30	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50		
Rock outcrop--------	20	Not rated		Not rated	

Table 9c.--Forestland Management (Part III)

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 the table)

Map symbol and component 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
999:					
Fresh water	100	Not rated		Not rated	
1000:					
Spieden, undrained	25	Low		High	
				Wetness	1.00
				Available water	0.50
Spieden, drained	25	Low		High	
				Wetness	1.00
				Available water	0.50
Sholander, undrained	20	Low		High	
		Texture/rock fragments	0.10	Wetness	1.00
				Available water	1.00
Sholander, drained	20	Low		High	
		Texture/rock fragments	0.10	Wetness	1.00
				Available water	1.00
1004:					
Limepoint, undrained	35	Low		High	
		Texture/rock fragments	0.10	Wetness	1.00
				Available water	0.50
Limepoint, drained	35	Low		High	
		Texture/rock fragments	0.10	Wetness	1.00
				Available water	0.50
Sholander, undrained	10	Low		High	
		Texture/rock fragments	0.10	Wetness	1.00
				Available water	1.00
Sholander, drained	10	Low		High	
		Texture/rock fragments	0.10	Wetness	1.00
				Available water	1.00
1009:					
Coveland	70	Low		High	
				Wetness	1.00
				Available water	0.50
Mitchellbay	25	Moderate		High	
		Texture/surface depth/rock fragments	0.50	Wetness	1.00
				Available water	0.50
1013:					
Bazal, undrained	30	Low		High	
				Wetness	1.00
Bazal, drained	30	Low		High	
				Wetness	1.00
Mitchellbay	40	Low		High	
				Wetness	1.00
				Available water	0.50
1014:					
Endoaquents, tidal	45	High		High	
		Texture/rock fragments	1.00	Wetness	1.00

Table 9c.--Forestland Management (Part III)--Continued

Map symbol and component 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
1014:					
Xerorthents	45	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
2001:					
Mitchellbay	90	Moderate Texture/surface depth/rock fragments	0.50	High Wetness Available water	1.00 0.50
2002:					
Sucia	90	Low Texture/rock fragments	0.10	High Wetness Available water	1.00 0.50
2004:					
Mitchellbay	100	Moderate Texture/surface depth/rock fragments	0.50	High Wetness Available waterb	1.00 0.50
3000:					
Pilepoint	90	Moderate Texture/surface depth/rock fragments	0.50	High Wetness Available water	1.00 0.50
3001:					
Hoypus	100	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water	0.50
3005:					
San Juan	100	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water	0.50
3006:					
San Juan	100	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
3007:					
San Juan	100	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
3008:					
Xerorthents	75	High Texture/slope/ surface depth	1.00	High Available water	1.00
Endoaquents, tidal	25	High Texture/rock fragments	1.00	High Wetness	1.00
3010:					
San Juan	60	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water	0.50
Dune land	30	Not rated		Not rated	

Table 9c.--Forestland Management (Part III)--Continued

Map symbol and component 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
3012:					
Hoypus	100	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
3013:					
Everett	100	Low Texture/rock fragments	0.10	High Available water	1.00
3014:					
Everett	100	Low Texture/slope/ rock fragments	0.10	Moderate Available water	0.50
5000:					
Cady	45	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Rock outcrop	35	Not rated		Not rated	
5006:					
Cady	70	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Rock outcrop	15	Not rated		Not rated	
Doebay	15	Low		Moderate Available water	0.50
5007:					
Haro	50	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Hiddenridge	30	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Rock outcrop	20	Not rated		Not rated	
5008:					
Doebay	40	Low		Moderate Available water	0.50
Cady	35	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Rock outcrop	15	Not rated		Not rated	
5009:					
Haro	50	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Hiddenridge	30	High Texture/slope/ surface depth	1.00	High Available water	1.00
Rock outcrop	20	Not rated		Not rated	

Table 9d.--Forestland Management (Part IV)

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 the table)

Map symbol and component name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
999:							
Fresh water	100	Not rated		Not rated		Not rated	
1000:							
Spieden, undrained	25	Well suited		Moderately suited		Severe	
				Rock fragments	0.50	Low strength	1.00
Spieden, drained	25	Well suited		Moderately suited		Severe	
				Rock fragments	0.50	Low strength	1.00
Sholander, undrained	20	Moderately suited		Poorly suited		Severe	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	1.00
Sholander, drained	20	Moderately suited		Poorly suited		Severe	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	1.00
1004:							
Limepoint, undrained	35	Well suited		Well suited		Severe	
						Low strength	1.00
Limepoint, drained	35	Well suited		Well suited		Severe	
						Low strength	1.00
Sholander, undrained	10	Moderately suited		Poorly suited		Severe	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	1.00
				Slope	0.50		
Sholander, drained	10	Moderately suited		Poorly suited		Severe	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	1.00
				Slope	0.50		
Shalcar, undrained	10	Poorly suited		Poorly suited		Severe	
		Wetness	0.75	Wetness	0.75	Low strength	1.00
1009:							
Coveland	70	Well suited		Moderately suited		Severe	
				Slope	0.50	Low strength	1.00
Mitchellbay	25	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
				Rock fragments	0.50		
1013:							
Bazal, undrained	30	Well suited		Well suited		Severe	
						Low strength	1.00
Bazal, drained	30	Well suited		Well suited		Severe	
						Low strength	1.00
Mitchellbay	40	Well suited		Moderately suited		Moderate	
				Rock fragments	0.50	Low strength	0.50
1014:							
Endoaquents, tidal	45	Moderately suited		Poorly suited		Moderate	
		Wetness	0.50	Wetness	0.75	Wetness	0.50
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
				Rock fragments	0.50		
Xerorthents	45	Moderately suited		Poorly suited		Slight	0.10
		Rock fragments	0.50	Rock fragments	0.75		
		Sandiness	0.50	Sandiness	0.50		

Table 9d.--Forestland Management (Part IV)--Continued

Map symbol and component name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2001:							
Mitchellbay---	90	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
				Rock fragments	0.50		
2002:							
Sucia---	90	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
2004:							
Mitchellbay---	100	Well suited		Moderately suited		Moderate	
				Rock fragments	0.50	Low strength	0.50
3000:							
Pilepoint---	90	Well suited		Moderately suited		Severe	
				Slope	0.50	Low strength	1.00
3001:							
Hoypus---	100	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
3005:							
San Juan---	100	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
3006:							
San Juan---	100	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
3007:							
San Juan---	100	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
3008:							
Xerorthents---	75	Moderately suited		Unsuited		Slight	0.10
		Rock fragments	0.50	Slope	1.00		
		Slope	0.50	Rock fragments	0.75		
		Sandiness	0.50	Sandiness	0.50		
Endoaquents, tidal--	25	Moderately suited		Poorly suited		Moderate	
		Wetness	0.50	Wetness	0.75	Wetness	0.50
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
				Rock fragments	0.50		
3010:							
San Juan---	60	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Dune land---	30	Not rated		Not rated		Not rated	
3012:							
Hoypus---	100	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
3013:							
Everett---	100	Moderately suited		Poorly suited		Moderate	
		Sandiness	0.50	Rock fragments	0.75	Low strength	0.50
		Rock fragments	0.50	Slope	0.50		
				Sandiness	0.50		
3014:							
Everett---	100	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	0.75		
		Rock fragments	0.50	Sandiness	0.50		
5000:							
Cady---	45	Well suited		Poorly suited		Severe	
				Slope	0.75	Low strength	1.00

Table 9d.--Forestland Management (Part IV)--Continued

Map symbol and component name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5000:							
Rock outcrop--------	35	Not rated		Not rated		Not rated	
Roche----------	10	Well suited		Moderately suited		Severe	
				Slope	0.50	Low strength	1.00
				Rock fragments	0.50		
5006:							
Cady----------	70	Moderately suited		Unsuited		Severe	
		Slope	0.50	Slope	1.00	Low strength	1.00
Rock outcrop--------	15	Not rated		Not rated		Not rated	
Doebay----------	15	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
5007:							
Haro----------	50	Unsuited		Unsuited		Slight	0.10
		Restrictive layer	1.00	Restrictive layer	1.00		
				Slope	0.75		
				Rock fragments	0.50		
Hiddenridge---------	30	Moderately suited		Poorly suited		Moderate	
		Sandiness	0.50	Rock fragments	0.75	Low strength	0.50
		Rock fragments	0.50	Slope	0.50		
				Sandiness	0.50		
Rock outcrop--------	20	Not rated		Not rated		Not rated	
5008:							
Doebay----------	40	Well suited		Unsuited		Moderate	
				Slope	1.00	Low strength	0.50
Cady----------	35	Well suited		Unsuited		Severe	
				Slope	1.00	Low strength	1.00
Rock outcrop--------	15	Not rated		Not rated		Not rated	
5009:							
Haro----------	50	Unsuited		Unsuited		Slight	0.10
		Restrictive layer	1.00	Slope	1.00		
		Slope	0.50	Restrictive layer	1.00		
				Rock fragments	0.50		
Hiddenridge---------	30	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Rock fragments	0.75		
		Rock fragments	0.50	Sandiness	0.50		
Rock outcrop--------	20	Not rated		Not rated		Not rated	

Table 10a.--Recreation (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 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 the table)

Map symbol and component name	Pct. of map unit	Camp areas		Paths and trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
999:					
Fresh water	100	Not rated		Not rated	
1000:					
Spieden, undrained	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Restricted permeability	0.45		
		Gravel content	0.01		
Spieden, drained	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.45		
		Gravel content	0.01		
Sholander, undrained	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
Sholander, drained	20	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.73
1004:					
Limepoint, undrained	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Restricted permeability	0.45		
Limepoint, drained	35	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.92
		Restricted permeability	0.60		
Sholander, undrained	10	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
Sholander, drained	10	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.73
1009:					
Coveland	70	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63		
Mitchellbay	25	Very limited		Not limited	
		Slope	1.00		
		Restricted permeability	0.45		

Table 10a.--Recreation (Part I)--Continued

Map symbol and component name	Pct. of map unit	Camp areas		Paths and trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1013:					
Bazal, undrained----	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00	Ponding	1.00
		Ponding	1.00		
Bazal, drained------	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00		
Mitchellbay---------	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Restricted permeability	0.45		
1014:					
Endoaquents, tidal--	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Too sandy	1.00
		Too sandy	1.00	Flooding	0.60
		Gravel content	0.01		
Xerorthents---------	45	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Gravel content	1.00		
2001:					
Mitchellbay---------	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Restricted permeability	0.45		
2002:					
Sucia---------------	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
2004:					
Mitchellbay---------	100	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.45		
3000:					
Pilepoint-----------	90	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.98
		Dusty	0.50	Dusty	0.50
		Restricted permeability	0.45		
		Gravel content	0.01		
3001:					
Hoypus--------------	100	Somewhat limited		Not limited	
		Slope	0.96		
3005:					
San Juan------------	100	Not limited		Not limited	

Table 10a.--Recreation (Part I)--Continued

Map symbol and component name	Pct. of map unit	Camp areas		Paths and trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
3006:					
San Juan	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
3007:					
San Juan	100	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.50
3008:					
Xerorthents	75	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Gravel content	1.00	Slope	1.00
		Slope	1.00		
Endoaquents, tidal	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Too sandy	1.00
		Too sandy	1.00	Flooding	0.60
		Gravel content	0.01		
3010:					
San Juan	60	Somewhat limited		Not limited	
		Slope	0.16		
Dune land	30	Not rated		Not rated	
3012:					
Hoypus	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
3013:					
Everett	100	Somewhat limited		Not limited	
		Slope	0.16		
3014:					
Everett	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
5000:					
Cady	45	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	1.00		
Rock outcrop	35	Not rated		Not rated	
5006:					
Cady	70	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00		
Rock outcrop	15	Not rated		Not rated	
Doebay	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
5007:					
Haro	50	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	1.00		
		Gravel content	0.01		
Hiddenridge	30	Very limited		Not limited	
		Slope	1.00		
Rock outcrop	20	Not rated		Not rated	
5008:					
Doebay	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00

Table 10a.--Recreation (Part I)--Continued

Map symbol and component name	Pct. of map unit	Camp areas		Paths and trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
5008:					
Cady	35	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	1.00		
Rock outcrop	15	Not rated		Not rated	
5009:					
Haro	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00		
		Gravel content	0.01		
Hiddenridge	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Rock outcrop	20	Not rated		Not rated	

Table 10b.--Recreation (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 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 the table)

Map symbol and component name	Pct. of map unit	Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value
999:					
Fresh water	100	Not rated		Not rated	
1000:					
Spieden, undrained	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Gravel content	1.00
		Restricted permeability	0.45	Ponding	1.00
		Gravel content	0.01	Restricted permeability	0.45
Spieden, drained	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.45	Gravel content	1.00
		Gravel content	0.01	Restricted permeability	0.45
Sholander, undrained	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
				Content of large stones	0.68
				Gravel content	0.32
Sholander, drained	20	Somewhat limited		Very limited	
		Depth to saturated zone	0.88	Depth to saturated zone	1.00
				Content of large stones	0.68
				Gravel content	0.32
1004:					
Limepoint, undrained	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Restricted permeability	0.45	Restricted permeability	0.45
				Slope	0.12
Limepoint, drained	35	Somewhat limited		Very limited	
		Depth to saturated zone	0.96	Depth to saturated zone	1.00
		Restricted permeability	0.60	Restricted permeability	0.60
				Slope	0.12
Sholander, undrained	10	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
				Slope	0.88
				Content of large stones	0.68
				Gravel content	0.32

Table 10b.--Recreation (Part II)--Continued

Map symbol and component name	Pct. of map unit	Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1004:					
Sholander, drained--	10	Somewhat limited		Very limited	
		Depth to saturated zone	0.88	Depth to saturated zone	1.00
				Slope	0.88
				Content of large stones	0.68
				Gravel content	0.32
1009:					
Coveland----------	70	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	1.00
Mitchellbay---------	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.45	Restricted permeability	0.45
1013:					
Bazal, undrained----	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00	Restricted permeability	1.00
		Ponding	1.00	Ponding	1.00
Bazal, drained------	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00	Restricted permeability	1.00
Mitchellbay---------	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Restricted permeability	0.45	Restricted permeability	0.45
1014:					
Endoaquents, tidal--	45	Very limited		Very limited	
		Too sandy	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Too sandy	1.00
		Flooding	0.60	Flooding	1.00
		Gravel content	0.01	Gravel content	1.00
Xerorthents---------	45	Very limited		Very limited	
		Too sandy	1.00	Gravel content	1.00
		Gravel content	1.00	Too sandy	1.00
				Content of large stones	0.32
				Slope	0.12
2001:					
Mitchellbay---------	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Slope	1.00
		Restricted permeability	0.45	Ponding	1.00
				Restricted permeability	0.45
2002:					
Sucia---------------	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Slope	0.88

Table 10b.--Recreation (Part II)--Continued

Map symbol and component name	Pct. of map unit	Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2004:					
Mitchellbay	100	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.45	Restricted permeability	0.45
				Slope	0.12
3000:					
Pilepoint	90	Somewhat limited		Very limited	
		Depth to saturated zone	0.99	Depth to saturated zone	1.00
		Dusty	0.50	Slope	1.00
		Restricted permeability	0.45	Gravel content	1.00
		Gravel content	0.01	Dusty	0.50
				Restricted permeability	0.45
3001:					
Hoypus	100	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00
3005:					
San Juan	100	Not limited		Somewhat limited	
				Slope	0.88
3006:					
San Juan	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
3007:					
San Juan	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
3008:					
Xerorthents	75	Very limited		Very limited	
		Too sandy	1.00	Gravel content	1.00
		Gravel content	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
				Content of large stones	0.32
Endoaquents, tidal	25	Very limited		Very limited	
		Too sandy	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Too sandy	1.00
		Flooding	0.60	Flooding	1.00
		Gravel content	0.01	Gravel content	1.00
3010:					
San Juan	60	Somewhat limited		Very limited	
		Slope	0.16	Slope	1.00
Dune land	30	Not rated		Not rated	
3012:					
Hoypus	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
3013:					
Everett	100	Somewhat limited		Very limited	
		Slope	0.16	Slope	1.00
3014:					
Everett	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00

Table 10b.--Recreation (Part II)--Continued

Map symbol and component name	Pct. of map unit	Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value
5000:					
Cady	45	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	1.00	Depth to bedrock	1.00
Rock outcrop	35	Not rated		Not rated	
5006:					
Cady	70	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
Rock outcrop	15	Not rated		Not rated	
Doebay	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
				Depth to bedrock	0.10
5007:					
Haro	50	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	1.00	Depth to bedrock	1.00
		Gravel content	0.01	Gravel content	1.00
Hiddenridge	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Rock outcrop	20	Not rated		Not rated	
5008:					
Doebay	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
				Depth to bedrock	0.10
Cady	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00
Rock outcrop	15	Not rated		Not rated	
5009:					
Haro	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel content	0.01	Gravel content	1.00
Hiddenridge	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Rock outcrop	20	Not rated		Not rated	

Table 11.--Hydric Soils

Map symbol and component name	Pct. of map unit	Hydric rating	Landform	Hydric soils criteria			
				Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
999:							
Fresh water	100	---	---	---	---	---	---
1000:							
Spieden, undrained	25	Hydric	Drainageways	2B3	Yes	No	No
Spieden, drained	25	Hydric	Drainageways	2B3	Yes	No	No
Sholander, undrained	20	Hydric	Valleys	2A	Yes	No	No
Sholander, drained	20	Hydric	Valleys	2A	Yes	No	No
Sucia	10	Nonhydric	Valleys	---	---	---	---
1004:							
Limepoint, undrained	35	Hydric	Drainageways, valleys	2B3	Yes	No	No
Limepoint, drained	35	Hydric	Drainageways, valleys	2B3	Yes	No	No
Sholander, undrained	10	Hydric	Valleys	2A	Yes	No	No
Sholander, drained	10	Hydric	Valleys	2A	Yes	No	No
Shalcar, undrained	10	Hydric	Depressions	1, 3	No	No	Yes
1009:							
Coveland	70	Hydric	Hillslopes, valleys	2A	Yes	No	No
Mitchellbay	25	Nonhydric	Hillslopes, valleys	---	---	---	---
Rock outcrop	5	Nonhydric	Hillslopes	---	---	---	---
1013:							
Bazal, undrained	30	Hydric	Drainageways, valleys	2B3	Yes	No	No
Bazal, drained	30	Hydric	Drainageways, valleys	2B3	Yes	No	No
Mitchellbay	40	Nonhydric	Hillslopes, valleys	---	---	---	---
1014:							
Endoaquents, tidal	45	Hydric	Beaches	4,2B1	Yes	Yes	No
Xerorthents	45	Nonhydric	Beaches, hillslopes	---	---	---	---
Rock outcrop	10	Nonhydric	Hillslopes	---	---	---	---
2001:							
Mitchellbay	90	Nonhydric	Hillslopes, valleys	---	---	---	---
Rock outcrop	10	Nonhydric	Hillslopes	---	---	---	---
2002:							
Sucia	90	Nonhydric	Valleys	---	---	---	---
Sholander	10	Hydric	Valleys	2A	Yes	No	No
2004:							
Mitchellbay	100	Nonhydric	Hillslopes, valleys	---	---	---	---

Table 11.--Hydric Soils--Continued

Map symbol and component name	Pct. of map unit	Hydric rating	Landform	Hydric soils criteria			
				Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
3000:							
Pilepoint	90	Nonhydric	Hillslopes	---	---	---	---
Rock outcrop	10	Nonhydric	Hillslopes	---	---	---	---
3001:							
Hoypus	100	Nonhydric	Hillslopes	---	---	---	---
3005:							
San Juan	100	Nonhydric	Hillslopes	---	---	---	---
3006:							
San Juan	100	Nonhydric	Hillslopes	---	---	---	---
3007:							
San Juan	100	Nonhydric	Hillslopes	---	---	---	---
3008:							
Xerorthents	75	Nonhydric	Beaches, hillslopes, sea cliffs	---	---	---	---
Endoaquents, tidal	25	Hydric	Beaches	4,2B1	Yes	Yes	No
3010:							
San Juan	60	Nonhydric	Blowouts, dunes	---	---	---	---
Dune land	30	Nonhydric	Dunes, outwash plains	---	---	---	---
Blownout land	10	Nonhydric	Blowouts, outwash plains	---	---	---	---
3012:							
Hoypus	100	Nonhydric	Hillslopes	---	---	---	---
3013:							
Everett	100	Nonhydric	Hillslopes	---	---	---	---
3014:							
Everett	100	Nonhydric	Hillslopes	---	---	---	---
5000:							
Cady	45	Nonhydric	Hillsides, mountainsides	---	---	---	---
Rock outcrop	35	Nonhydric	---	---	---	---	---
Doebay	10	Nonhydric	Hillsides, mountainsides	---	---	---	---
Roche	10	Nonhydric	Hillslopes	---	---	---	---
5006:							
Cady	70	Nonhydric	Hillsides, mountainsides	---	---	---	---
Rock outcrop	15	Nonhydric	---	---	---	---	---
Doebay	15	Nonhydric	Hillsides, mountainsides	---	---	---	---
5007:							
Haro	50	Nonhydric	Hillsides, mountainsides	---	---	---	---
Hiddenridge	30	Nonhydric	Hillsides, mountainsides	---	---	---	---

Table 11.--Hydric Soils--Continued

Map symbol and component name	Pct. of map unit	Hydric rating	Landform	Hydric soils criteria			
				Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
5007:							
Rock outcrop	20	Nonhydric	---	---	---	---	---
5008:							
Doebay	40	Nonhydric	Hillsides, mountainsides	---	---	---	---
Cady	35	Nonhydric	Hillsides, mountainsides	---	---	---	---
Rock outcrop	15	Nonhydric	---	---	---	---	---
Drainageway soils	10	Nonhydric	Drainageways	---	---	---	---
5009:							
Haro	50	Nonhydric	Hillsides, mountainsides	---	---	---	---
Hiddenridge	30	Nonhydric	Hillsides, mountainsides	---	---	---	---
Rock outcrop	20	Nonhydric	---	---	---	---	---

Explanation of the hydric criteria codes is as follows:

"1" indicates all Histels except Folistels, and all Histosols except Folists.

"2" indicates Aquic suborders, great groups, or subgroups; Albolls suborder; Historthels great group; Histoturbels great group; Pachic subgroups; or Cumulic subgroups. The "2" is further modified by an "A" or "B." An "A" indicates soils that are somewhat poorly drained and have a water table at the surface during the growing season. A "B" indicates soils that are poorly drained or very poorly drained. The "B" is further modified by a "1, 2," or "3." A "1" indicates a water table at the surface during the growing season and textures of coarse sand, sand, or fine sand in all layers within a depth of 20 inches. A "2" indicates a water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches. A "3" indicates a water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches.

"3" indicates soils that are frequently ponded for long or very long durations during the growing season.

"4" indicates soils that are frequently flooded for long or very long durations during the growing season.

Table 12a.--Building Site Development (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 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 the table)

Map symbol and component 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
999:							
Fresh water	100	Not rated		Not rated		Not rated	
1000:							
Spieden, undrained	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
Spieden, drained	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Sholander, undrained	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
Sholander, drained	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
1004:							
Limepoint, undrained	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
Limepoint, drained	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Sholander, undrained	10	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
						Slope	0.12
Sholander, drained	10	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Slope	0.12
Shalcar, undrained	10	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
1009:							
Coveland	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Mitchellbay	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 12a.--Building Site Development (Part I)--Continued

Map symbol and component 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
1013:							
Bazal, undrained----	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Bazal, drained------	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Mitchellbay---------	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
1014:							
Endoaquents, tidal--	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Xerorthents---------	45	Not limited		Not limited		Not limited	
2001:							
Mitchellbay---------	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Ponding	1.00
						Shrink-swell	0.50
2002:							
Sucia---------------	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Slope	0.12
2004:							
Mitchellbay---------	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
3000:							
Pilepoint-----------	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Shrink-swell	0.50	Slope	1.00
3001:							
Hoypus--------------	100	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
3005:							
San Juan------------	100	Not limited		Not limited		Somewhat limited	
						Slope	0.12
3006:							
San Juan------------	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
3007:							
San Juan------------	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 12a.--Building Site Development (Part I)--Continued

Map symbol and component 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
3008:							
Xerorthents	75	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Endoaquents, tidal	25	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
3010:							
San Juan	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
Dune land	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
3012:							
Hoypus	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
3013:							
Everett	100	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
3014:							
Everett	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
5000:							
Cady	45	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to hard bedrock	1.00
Rock outcrop	35	Not rated		Not rated		Not rated	
Roche	10	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Slope	1.00
5006:							
Cady	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
Doebay	15	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	0.10	Depth to hard bedrock	1.00	Depth to hard bedrock	0.10
5007:							
Haro	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to hard bedrock	1.00
Hiddenridge	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to hard bedrock	0.02		
Rock outcrop	20	Not rated		Not rated		Not rated	

Table 12a.--Building Site Development (Part I)--Continued

Map symbol and component 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
5008:							
Doebay	40	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Depth to hard bedrock	0.10	Slope	1.00	Depth to hard bedrock	0.10
Cady	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
5009:							
Haro	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
Hiddenridge	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to hard bedrock	0.02		
Rock outcrop	20	Not rated		Not rated		Not rated	

Table 12b.--Building Site Development (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 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 the table)

Map symbol and component name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value
999:					
Fresh water	100	Not rated		Not rated	
1000:					
Spieden, undrained	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Cutbanks cave	1.00
				Ponding	1.00
Spieden, drained	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Cutbanks cave	1.00
Sholander, undrained	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Cutbanks cave	1.00
				Ponding	1.00
				Dense layer	0.50
Sholander, drained	20	Somewhat limited		Very limited	
		Depth to saturated zone	0.88	Depth to saturated zone	1.00
				Cutbanks cave	1.00
				Dense layer	0.50
1004:					
Limepoint, undrained	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Cutbanks cave	1.00
				Ponding	1.00
				Dense layer	0.50
Limepoint, drained	35	Somewhat limited		Very limited	
		Depth to saturated zone	0.96	Depth to saturated zone	1.00
				Cutbanks cave	1.00
				Dense layer	0.50
Sholander, undrained	10	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Cutbanks cave	1.00
				Ponding	1.00
				Dense layer	0.50
Sholander, drained	10	Somewhat limited		Very limited	
		Depth to saturated zone	0.88	Depth to saturated zone	1.00
				Cutbanks cave	1.00
				Dense layer	0.50
Shalcar, undrained	10	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Content of organic matter	1.00
				Cutbanks cave	0.10

Table 12b.--Building Site Development (Part II)--Continued

Map symbol and component name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1009:					
Coveland	70	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Dense layer	0.50
				Cutbanks cave	0.10
Mitchellbay	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Dense layer	0.50
		Low strength	0.22	Cutbanks cave	0.10
1013:					
Bazal, undrained	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Cutbanks cave	1.00
		Shrink-swell	0.50	Ponding	1.00
				Dense layer	0.50
Bazal, drained	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Cutbanks cave	1.00
				Dense layer	0.50
Mitchellbay	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Shrink-swell	0.50	Dense layer	0.50
		Low strength	0.22	Cutbanks cave	0.10
1014:					
Endoaquents, tidal	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Flooding	1.00
		Flooding	1.00	Depth to saturated zone	1.00
				Cutbanks cave	1.00
Xerorthents	45	Not limited		Very limited	
				Cutbanks cave	1.00
2001:					
Mitchellbay	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Shrink-swell	0.50	Dense layer	0.50
		Low strength	0.22	Cutbanks cave	0.10
2002:					
Sucia	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Cutbanks cave	1.00
				Dense layer	0.50
2004:					
Mitchellbay	100	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Dense layer	0.50
		Low strength	0.22	Cutbanks cave	0.10

Table 12b.--Building Site Development (Part II)--Continued

Map symbol and component name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value
3000:					
Pilepoint	90	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone Cutbanks cave Dense layer	1.00 1.00 0.50
3001:					
Hoypus	100	Somewhat limited Slope	0.96	Very limited Cutbanks cave Slope	1.00 0.96
3005:					
San Juan	100	Not limited		Very limited Cutbanks cave	1.00
3006:					
San Juan	100	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 1.00
3007:					
San Juan	100	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 1.00
3008:					
Xerorthents	75	Very limited Slope	1.00	Very limited Cutbanks cave Slope	1.00 1.00
Endoaquents, tidal	25	Very limited Depth to saturated zone Flooding	1.00 1.00	Very limited Flooding Depth to saturated zone Cutbanks cave	1.00 1.00 1.00
3010:					
San Juan	60	Somewhat limited Slope	0.16	Very limited Cutbanks cave Slope	1.00 0.16
Dune land	30	Somewhat limited Slope	0.16	Not rated	
3012:					
Hoypus	100	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 1.00
3013:					
Everett	100	Somewhat limited Slope	0.16	Very limited Cutbanks cave Slope	1.00 0.16
3014:					
Everett	100	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 1.00
5000:					
Cady	45	Very limited Depth to hard bedrock Slope	1.00 1.00	Very limited Depth to hard bedrock Slope Cutbanks cave	1.00 1.00 0.10
Rock outcrop	35	Not rated		Not rated	

Table 12b.--Building Site Development (Part II)--Continued

Map symbol and component name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value
5000:					
Roche	10	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Dense layer	0.50
				Cutbanks cave	0.10
5006:					
Cady	70	Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
				Cutbanks cave	0.10
Rock outcrop	15	Not rated		Not rated	
Doebay	15	Very limited		Very limited	
		Slope	1.00	Depth to hard bedrock	1.00
		Depth to hard bedrock	0.10	Slope	1.00
				Cutbanks cave	1.00
5007:					
Haro	50	Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
				Cutbanks cave	0.10
Hiddenridge	30	Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00
				Slope	1.00
				Depth to hard bedrock	0.02
Rock outcrop	20	Not rated		Not rated	
5008:					
Doebay	40	Very limited		Very limited	
		Slope	1.00	Depth to hard bedrock	1.00
		Depth to hard bedrock	0.10	Cutbanks cave	1.00
				Slope	1.00
Cady	35	Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
				Cutbanks cave	0.10
Rock outcrop	15	Not rated		Not rated	
5009:					
Haro	50	Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
				Cutbanks cave	0.10
Hiddenridge	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
				Cutbanks cave	1.00
				Depth to hard bedrock	0.02
Rock outcrop	20	Not rated		Not rated	

Table 13a.--Sanitary Facilities (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 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 the table)

Map symbol and component name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
999:					
Fresh water	100	Not rated		Not rated	
1000:					
Spieden, undrained	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage (bottom layer)	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00	Ponding	1.00
		Ponding	1.00		
Spieden, drained	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage (bottom layer)	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		
Sholander, undrained	20	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
Sholander, drained	20	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
1004:					
Limepoint, undrained	35	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Ponding	1.00	Ponding	1.00
				Slope	0.08
Limepoint, drained	35	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Slope	0.08
Sholander, undrained	10	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
				Slope	0.68
Sholander, drained	10	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Slope	0.68

Table 13a.--Sanitary Facilities (Part I)--Continued

Map symbol and component name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1004:					
Shalcar, undrained--	10	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00	Seepage	1.00
		Subsidence	1.00	Content of organic matter	1.00
		Seepage (bottom layer)	1.00		
1009:					
Coveland----------	70	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Seepage	1.00
Mitchellbay---------	25	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
1013:					
Bazal, undrained----	30	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Ponding	1.00	Ponding	1.00
Bazal, drained------	30	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	1.00
Mitchellbay---------	40	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Ponding	1.00	Ponding	1.00
1014:					
Endoaquents, tidal--	45	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00
		Seepage (bottom layer)	1.00		
Xerorthents---------	45	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Seepage (bottom layer)	1.00	Slope	0.08
2001:					
Mitchellbay---------	90	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	1.00
		Ponding	1.00	Seepage	1.00
				Ponding	1.00

Table 13a.--Sanitary Facilities (Part I)--Continued

Map symbol and component name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2002:					
Sucia	90	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Slope	0.68
2004:					
Mitchellbay	100	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Slope	0.08
3000:					
Pilepoint	90	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Slope	1.00
3001:					
Hoypus	100	Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.96		
3005:					
San Juan	100	Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00
				Slope	0.68
		Filtering capacity	1.00		
3006:					
San Juan	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00
		Filtering capacity	1.00		
3007:					
San Juan	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00
		Filtering capacity	1.00		
3008:					
Xerorthents	75	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	1.00
		Seepage (bottom layer)	1.00		
		Slope	1.00		
Endoaquents, tidal	25	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Filtering capacity	1.00		
		Seepage (bottom layer)	1.00		

Table 13a.--Sanitary Facilities (Part I)--Continued

Map symbol and component name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
3010:					
San Juan	60	Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.16		
Dune land	30	Not rated		Very limited	
				Seepage	1.00
				Slope	1.00
3012:					
Hoypus	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00
		Filtering capacity	1.00		
3013:					
Everett	100	Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.16		
3014:					
Everett	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00
		Filtering capacity	1.00		
5000:					
Cady	45	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00		
		Seepage (bottom layer)	1.00	Slope	1.00
				Seepage	1.00
Rock outcrop	35	Not rated		Not rated	
Roche	10	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Seepage	1.00
				Slope	1.00
5006:					
Cady	70	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00		
		Seepage (bottom layer)	1.00	Slope	1.00
				Seepage	1.00
Rock outcrop	15	Not rated		Not rated	
Doebay	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00		
		Seepage (bottom layer)	1.00	Slope	1.00
				Seepage	1.00

Table 13a.--Sanitary Facilities (Part I)--Continued

Map symbol and component name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
5007:					
Haro	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00		
		Seepage (bottom layer)	1.00	Slope	1.00
Hiddenridge	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00
		Depth to bedrock	0.41	Depth to hard bedrock	0.02
Rock outcrop	20	Not rated		Not rated	
5008:					
Doebay	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00		
		Seepage (bottom layer)	1.00	Seepage	1.00
				Slope	1.00
Cady	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00		
		Seepage (bottom layer)	1.00	Seepage	1.00
				Slope	1.00
Rock outcrop	15	Not rated		Not rated	
5009:					
Haro	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00		
		Seepage (bottom layer)	1.00	Slope	1.00
Hiddenridge	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00
		Depth to bedrock	0.41	Depth to hard bedrock	0.02
Rock outcrop	20	Not rated		Not rated	

Table 13b.--Sanitary Facilities (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 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 component name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
999:							
Fresh water---	100	Not rated		Not rated		Not rated	
1000:							
Spieden, undrained--	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Seepage	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too sandy	0.50			Too sandy	0.50
Spieden, drained----	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	0.50			Too sandy	0.50
Sholander, undrained	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Seepage	1.00	Too sandy	1.00
		Ponding	1.00	Ponding	1.00	Seepage	1.00
						Ponding	1.00
Sholander, drained--	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Seepage	1.00	Too sandy	1.00
						Seepage	1.00
1004:							
Limepoint, undrained	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Seepage	1.00	Seepage	1.00
				Ponding	1.00	Ponding	1.00
Limepoint, drained--	35	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Seepage	1.00	Seepage	1.00
Sholander, undrained	10	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Seepage	1.00	Too sandy	1.00
		Ponding	1.00	Ponding	1.00	Seepage	1.00
						Ponding	1.00
Sholander, drained--	10	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Seepage	1.00	Too sandy	1.00
						Seepage	1.00
Shalcar, undrained--	10	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00		

Table 13b.--Sanitary Facilities (Part II)--Continued

Map symbol and component name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1009:							
Coveland	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slope	0.63	Seepage	1.00	Slope	0.63
		Too clayey	0.50	Slope	0.63	Too clayey	0.50
Mitchellbay	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
1013:							
Bazal, undrained	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Seepage	1.00	Ponding	1.00
				Ponding	1.00		
Bazal, drained	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Seepage	1.00		
Mitchellbay	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
1014:							
Endoaquents, tidal	45	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too sandy	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00			Gravel content	0.98
Xerorthents	45	Very limited		Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00			Seepate	1.00
						Gravel content	1.00
2001:							
Mitchellbay	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
2002:							
Sucia	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Seepage	1.00	Seepage	0.26
2004:							
Mitchellbay	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
3000:							
Pilepoint	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Seepage	1.00		
3001:							
Hoypus	100	Very limited		Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	0.96	Seepage	1.00
		Slope	0.96			Gravel content	0.99
						Slope	0.96

Table 13b.--Sanitary Facilities (Part II)--Continued

Map symbol and component name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
3005:							
San Juan	100	Very limited		Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
						Seepage	1.00
		Too sandy	1.00			Gravel content	1.00
3006:							
San Juan	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
						Seepage	1.00
		Too sandy	1.00			Gravel content	1.00
3007:							
San Juan	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
						Seepage	1.00
		Too sandy	1.00			Gravel content	1.00
3008:							
Xerorthents	75	Very limited		Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
				Slope	1.00	Seepage	1.00
		Too sandy	1.00			Gravel content	1.00
		Slope	1.00			Slope	1.00
Endoaquents, tidal	25	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too sandy	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Seepage	1.00
						Gravel content	0.98
		Too sandy	1.00				
3010:							
San Juan	60	Very limited		Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
				Slope	0.16	Seepage	1.00
		Too sandy	1.00			Gravel content	1.00
		Slope	0.16			Slope	0.16
Dune land	30	Not rated		Not rated		Not rated	
3012:							
Hoypus	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
						Seepage	1.00
		Too sandy	1.00			Gravel content	0.99
3013:							
Everett	100	Very limited		Very limited		Very limited	
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
				Slope	0.16	Seepage	1.00
		Too sandy	1.00			Gravel content	1.00
		Slope	0.16			Slope	0.16
3014:							
Everett	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Too sandy	1.00
						Seepage	1.00
		Too sandy	1.00			Gravel content	1.00
5000:							
Cady	45	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00			Seepage	0.26

Table 13b.--Sanitary Facilities (Part II)--Continued

Map symbol and component name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5000:							
Rock outcrop--------	35	Not rated		Not rated		Not rated	
Roche----------	10	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
5006:							
Cady----------	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage (bottom layer)	1.00			Seepage	0.26
Rock outcrop--------	15	Not rated		Not rated		Not rated	
Doebay----------	15	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Gravel content	0.94
						Seepage	0.26
5007:							
Haro----------	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00			Gravel content	0.37
						Seepage	0.26
Hiddenridge---------	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00	Seepage	1.00
		Seepage (bottom layer)	1.00	Depth to bedrock	0.02	Gravel content	1.00
						Depth to bedrock	0.02
Rock outcrop--------	20	Not rated		Not rated		Not rated	
5008:							
Doebay----------	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00	Seepage	1.00	Gravel content	0.94
						Seepage	0.26
Cady----------	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage (bottom layer)	1.00			Seepage	0.26
Rock outcrop--------	15	Not rated		Not rated		Not rated	
5009:							
Haro----------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Seepage (bottom layer)	1.00			Gravel content	0.37
						Seepage	0.26
Hiddenridge---------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Seepage	1.00	Seepage	1.00
		Seepage (bottom layer)	1.00	Depth to bedrock	0.02	Gravel content	1.00
						Depth to bedrock	0.02
Rock outcrop--------	20	Not rated		Not rated		Not rated	

Table 14a.--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 value columns range from 0.00 to 0.99. The closer the value is to 0, the greater the potential limitation. Values of 0 are absolute limitations based on the soil property criteria used to develop the interpretation. Values closer to 1.00 have less of a limitation. Limiting features with values of 1.00 have absolutely no limitation and are not shown in this table. Limiting features of fine-earth fraction and fragment content are reported on a weight basis. A brief rating criteria summary and abbreviations used in the ratings are at the end of the table)

Map symbol and component 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
999:							
Fresh water	100	Not rated		Not rated		Not rated	
1000:							
Spieden, undrained	25	Poor		Good		Poor	
		Bottom layer not a source	0.00	Thickest layer possible source	0.04	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.86	Wetness <1' depth	0.00
						Rock fragment content	0.12
Spieden, drained	25	Poor		Good		Poor	
		Bottom layer not a source	0.00	Thickest layer possible source	0.04	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer is a possible source	0.86	Wetness <1' depth	0.00
						Rock fragment content	0.12
Sholander, undrained	20	Poor		Fair		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.41	Wetness <1' depth	0.00
						Rock fragment content	0.00
						Bulk density >1.8 in 20-30" depth	0.35
Sholander, drained	20	Poor		Fair		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.41	Rock fragment content	0.00
						Wetness from 1.0 to 2.8'	0.07
						Bulk density >1.8 in 20-30" depth	0.35
1004:							
Limepoint, undrained	35	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Bulk density >1.8 in 20" depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Wetness <1' depth	0.00
						Sand fractions 75-85%	0.22
Limepoint, drained	35	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Bulk density >1.8 in 20" depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Wetness from 1.0 to 2.8'	0.02
						Sand fractions 75-85%	0.22

Table 14a.--Construction Materials (Part I)--Continued

Map symbol and component 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
1004:							
Sholander, undrained	10	Poor		Fair		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.41	Wetness <1' depth	0.00
						Rock fragment content	0.00
						Bulk density >1.8 in 20-30" depth	0.35
Sholander, drained	10	Poor		Fair		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.41	Rock fragment content	0.00
						Wetness from 1.0 to 2.8'	0.07
						Bulk density >1.8 in 20-30" depth	0.35
Shalcar, undrained	10	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Wetness <1' depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00		
1009:							
Coveland	70	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Wetness <1' depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Bulk density >1.8 in 20-30" depth	0.00
						Slope 12 to 15%	0.37
						Clay 27 to 40%	0.98
Mitchellbay	25	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Bulk density >1.8 in 20" depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Slope >15%	0.00
1013:							
Bazal, undrained	30	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Wetness <1' depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Bulk density >1.8 in 20-30" depth	0.08
Bazal, drained	30	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Wetness <1' depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Bulk density >1.8 in 20-30" depth	0.08
Mitchellbay	40	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Bulk density >1.8 in 20" depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Wetness <1' depth	0.00

Table 14a.--Construction Materials (Part I)--Continued

Map symbol and component 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
1014:							
Endoaquents, tidal	45	Fair		Good		Poor	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.38	Sand fraction >85%	0.00
				Bottom layer is a possible source	0.86	Wetness <1' depth	0.00
		Bottom layer possible source	0.50			Hard to reclaim	0.00
						Rock fragment content	0.12
						pH 3.5 to 5.5	0.95
Xerorthents--------	45	Fair		Fair		Poor	
		Bottom layer possible source	0.38	Bottom layer is a possible source	0.57	Sand fraction >85%	0.00
		Thickest layer possible source	0.38	Thickest layer possible source	0.57	Hard to reclaim	0.00
						Rock fragment content	0.00
2001:							
Mitchellbay--------	90	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Bulk density >1.8 in 20" depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Wetness <1' depth	0.00
2002:							
Sucia--------------	90	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Wetness <1' depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.02	Sand fractions 75-85%	0.22
						Bulk density >1.8 in 20-30" depth	0.29
2004:							
Mitchellbay--------	100	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Bulk density >1.8 in 20" depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Wetness <1' depth	0.00
3000:							
Pilepoint----------	90	Poor		Poor		Fair	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Wetness from 1.0 to 2.8'	0.01
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fragment content	0.12
						Bulk density >1.8 in 20-30" depth	0.46
3001:							
Hoypus-------------	100	Fair		Fair		Poor	
		Bottom layer possible source	0.38	Thickest layer possible source	0.10	Sand fraction >85%	0.00
		Thickest layer possible source	0.44	Bottom layer is a possible source	0.38	Hard to reclaim	0.00
						Rock fragment content	0.00
						Slope 12 to 15%	0.04
3005:							
San Juan-----------	100	Good		Fair		Poor	
		Thickest layer possible source	0.33	Thickest layer possible source	0.33	Sand fraction >85%	0.00
		Bottom layer possible source	0.75	Bottom layer is a possible source	0.47	Hard to reclaim	0.00
						Rock fragment content	0.00

Table 14a.--Construction Materials (Part I)--Continued

Map symbol and component 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
3006:							
San Juan----------	100	Good		Fair		Poor	
		Thickest layer possible source	0.33	Thickest layer possible source	0.33	Slope >15%	0.00
		Bottom layer possible source	0.75	Bottom layer is a possible source	0.47	Sand fraction >85%	0.00
						Rock fragment content	0.00
						Hard to reclaim	0.00
3007:							
San Juan----------	100	Good		Fair		Poor	
		Thickest layer possible source	0.33	Thickest layer possible source	0.33	Slope >15%	0.00
		Bottom layer possible source	0.75	Bottom layer is a possible source	0.47	Sand fraction >85%	0.00
						Rock fragment content	0.00
						Hard to reclaim	0.00
3008:							
Xerorthents--------	75	Fair		Fair		Poor	
		Bottom layer possible source	0.38	Bottom layer is a possible source	0.57	Rock fragment content	0.00
		Thickest layer possible source	0.38	Thickest layer possible source	0.57	Sand fraction >85%	0.00
						Slope >15%	0.00
						Hard to reclaim	0.00
Endoaquents, tidal	25	Fair		Good		Poor	
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.38	Sand fraction >85%	0.00
		Bottom layer possible source	0.50	Bottom layer is a possible source	0.86	Wetness <1' depth	0.00
						Hard to reclaim	0.00
						Rock fragment content	0.12
						pH 3.5 to 5.5	0.95
3010:							
San Juan----------	60	Good		Fair		Poor	
		Thickest layer possible source	0.33	Thickest layer possible source	0.33	Sand fraction >85%	0.00
		Bottom layer possible source	0.75	Bottom layer is a possible source	0.47	Hard to reclaim	0.00
						Rock fragment content	0.00
						Slope 8 to 12%	0.84
Dune land----------	30	Poor		Fair		Poor	
		Bottom layer not a source	0.00	Bottom layer is a possible source	0.48	Sand fraction >85%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer possible source	0.48	Slope 8 to 12%	0.84
3012:							
Hoypus----------	100	Fair		Fair		Poor	
		Bottom layer possible source	0.38	Thickest layer possible source	0.10	Slope >15%	0.00
		Thickest layer possible source	0.44	Bottom layer is a possible source	0.38	Sand fraction >85%	0.00
						Rock fragment content	0.00
						Hard to reclaim	0.00

Table 14a.--Construction Materials (Part I)--Continued

Map symbol and component 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
3013:							
Everett	100	Fair		Fair		Poor	
		Thickest layer possible source	0.25	Bottom layer is a possible source	0.47	Sand fraction >85%	0.00
		Bottom layer possible source	0.50	Thickest layer possible source	0.47	Hard to reclaim	0.00
						Rock fragment content	0.00
						Slope 8 to 12%	0.84
3014:							
Everett	100	Fair		Fair		Poor	
		Thickest layer possible source	0.25	Bottom layer is a possible source	0.47	Slope >15%	0.00
		Bottom layer possible source	0.50	Thickest layer possible source	0.47	Sand fraction >85%	0.00
						Rock fragment content	0.00
						Hard to reclaim	0.00
5000:							
Cady	45	Poor		Poor		Poor	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Depth to bedrock <20"	0.00
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Slope >15%	0.00
						Rock fragment content	0.50
Rock outcrop	35	Not rated		Not rated		Not rated	
Roche	10	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Wetness <1' depth	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Rock fragment content	0.00
						Bulk density >1.8 in 20-30" depth	0.05
5006:							
Cady	70	Poor		Poor		Poor	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Slope >15%	0.00
		Bottom layer not a source	0.00	Thickest layer not a source	0.00	Depth to bedrock <20"	0.00
						Rock fragment content	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
Doebay	15	Fair		Poor		Poor	
		Thickest layer possible source	0.09	Bottom layer is a possible source	0.04	Slope >15%	0.00
		Bottom layer possible source	0.62	Thickest layer possible source	0.04	Rock fragment content	0.00
						Depth to bedrock 20 to 40"	0.78
5007:							
Haro	50	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Depth to bedrock <20"	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Slope >15%	0.00
						Rock fragment content	0.00
Hiddenridge	30	Fair		Poor		Poor	
		Thickest layer possible source	0.71	Bottom layer is a possible source	0.06	Hard to reclaim	0.00
		Bottom layer possible source	0.71	Thickest layer possible source	0.06	Rock fragment content	0.00
						Slope >15%	0.00
						pH 3.5 to 5.5	0.95

Table 14a.--Construction Materials (Part I)--Continued

Map symbol and component 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
5007:							
Rock outcrop-------	20	Not rated		Not rated		Not rated	
5008:							
Doebay-------------	40	Fair		Poor		Poor	
		Thickest layer possible source	0.09	Bottom layer is a possible source	0.04	Rock fragment content	0.00
		Bottom layer possible source	0.62	Thickest layer possible source	0.04	Slope >15%	0.00
						Depth to bedrock 20 to 40"	0.78
Cady---------------	35	Poor		Poor		Poor	
		Thickest layer not a source due to fines or thin layer	0.00	Bottom layer not a source	0.00	Depth to bedrock <20"	0.00
				Thickest layer not a source	0.00	Slope >15%	0.00
		Bottom layer not a source	0.00			Rock fragment content	0.50
Rock outcrop-------	15	Not rated		Not rated		Not rated	
5009:							
Haro---------------	50	Poor		Poor		Poor	
		Bottom layer not a source	0.00	Bottom layer not a source	0.00	Slope >15%	0.00
		Thickest layer not a source due to fines or thin layer	0.00	Thickest layer not a source	0.00	Depth to bedrock <20"	0.00
						Rock fragment content	0.00
Hiddenridge--------	30	Fair		Poor		Poor	
		Thickest layer possible source	0.71	Bottom layer is a possible source	0.06	Slope >15%	0.00
		Bottom layer possible source	0.71	Thickest layer possible source	0.06	Hard to reclaim	0.00
						Rock fragment content	0.00
						pH 3.5 to 5.5	0.95
Rock outcrop-------	20	Not rated		Not rated		Not rated	

The interpretations for potential gravel source evaluate the content of coarse fragments greater than 0.2 inch in diameter in the bottom layer or in the thickest layer of the soil.

The interpretations for potential sand source evaluate the amount of sand and fine gravel in the thickest layer or in the bottom layer of the soil. Organic soil layers with a Unified engineering class for peat (PT) are also evaluated.

The interpretations for potential topsoil source evaluate the following soil properties at various depths: Calcium carbonate content, percent clay, soil bulk density, percent sand, soil wetness, content of coarse fragments 0.2 to 3.0 inches in diameter, content of fragments greater than 3 inches in diameter, organic matter content (OM), sodium content expressed as the sodium adsorption ratio (SAR), salinity expressed as millimhos per centimeter of electrical conductivity (EC), depth to bedrock, slope, and soil pH.

Table 14b.--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 value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in the table)

Map symbol and component 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
999:					
Fresh water---------	100	Not rated		Not rated	
1000:					
Spieden, undrained--	25	Poor		Poor	
		Too sandy	0.00	Depth to saturated zone	0.00
		Low content of organic matter	0.50		
		Droughty	0.75		
		Too acid	0.99		
Spieden, drained----	25	Poor		Poor	
		Too sandy	0.00	Depth to saturated zone	0.00
		Low content of organic matter	0.50		
		Droughty	0.75		
		Too acid	0.99		
Sholander, undrained	20	Poor		Poor	
		Too sandy	0.00	Depth to saturated zone	0.00
		Droughty	0.02	Stone content	0.98
		Low content of organic matter	0.50		
		Too acid	0.88		
Sholander, drained--	20	Poor		Fair	
		Too sandy	0.00	Depth to saturated zone	0.07
		Droughty	0.02	Stone content	0.98
		Low content of organic matter	0.50		
		Too acid	0.88		
1004:					
Limepoint, undrained	35	Fair		Poor	
		Too sandy	0.22	Depth to saturated zone	0.00
		Low content of organic matter	0.50		
		Too acid	0.84		
		Water erosion	0.99		
Limepoint, drained--	35	Fair		Fair	
		Too sandy	0.22	Depth to saturated zone	0.02
		Low content of organic matter	0.50		
		Too acid	0.84		
		Water erosion	0.99		
Sholander, undrained	10	Poor		Poor	
		Too sandy	0.00	Depth to saturated zone	0.00
		Droughty	0.02	Stone content	0.98
		Low content of organic matter	0.50		
		Too acid	0.88		
Sholander, drained--	10	Poor		Fair	
		Too sandy	0.00	Depth to saturated zone	0.07
		Droughty	0.02	Stone content	0.98
		Low content of organic matter	0.50		
		Too acid	0.88		

Table 14b.--Construction Materials (Part II)--Continued

Map symbol and component 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
1004:					
Shalcar, undrained--	10	Poor		Poor	
		Wind erosion	0.00	Depth to saturated zone	0.00
		Too acid	0.16		
		Low content of organic matter	0.88		
1009:					
Coveland----------	70	Fair		Poor	
		Water erosion	0.37	Depth to saturated zone	0.00
		Low content of organic matter	0.88	Shrink-swell	0.96
		Too clayey	0.98		
		Too acid	0.99		
Mitchellbay---------	25	Fair		Fair	
		Too acid	0.50	Shrink-swell	0.95
		Low content of organic matter	0.50		
		Droughty	0.82		
1013:					
Bazal, undrained----	30	Fair		Poor	
		Low content of organic matter	0.50	Depth to saturated zone	0.00
		Too acid	0.84	Low strength	0.00
				Shrink-swell	0.98
Bazal, drained------	30	Fair		Poor	
		Low content of organic matter	0.50	Depth to saturated zone	0.00
		Too acid	0.84	Low strength	0.00
				Shrink-swell	0.98
Mitchellbay---------	40	Fair		Poor	
		Too acid	0.50	Depth to saturated zone	0.00
		Low content of organic matter	0.50	Shrink-swell	0.95
		Droughty	0.82		
1014:					
Endoaquents, tidal--	45	Poor		Poor	
		Too sandy	0.00	Depth to saturated zone	0.00
		Wind erosion	0.00		
		Droughty	0.00		
		Too acid	0.46		
		Low content of organic matter	0.88		
Xerorthents---------	45	Poor		Good	
		Too sandy	0.00		
		Wind erosion	0.00		
		Droughty	0.00		
		Low content of organic matter	0.50		
		Too acid	0.80		
2001:					
Mitchellbay---------	90	Fair		Poor	
		Too acid	0.50	Depth to saturated zone	0.00
		Low content of organic matter	0.50	Shrink-swell	0.95
		Droughty	0.82		

Table 14b.--Construction Materials (Part II)--Continued

Map symbol and component 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
2002:					
Sucia	90	Fair		Poor	
		Too sandy	0.22	Depth to saturated zone	0.00
		Droughty	0.27		
		Too acid	0.74		
		Low content of organic matter	0.88		
2004:					
Mitchellbay	100	Fair		Poor	
		Too acid	0.50	Depth to saturated zone	0.00
		Low content of organic matter	0.50	Shrink-swell	0.95
		Droughty	0.82		
3000:					
Pilepoint	90	Fair		Fair	
		Low content of organic matter	0.50	Depth to saturated zone	0.01
		Droughty	0.58	Low strength	0.78
		Water erosion	0.68	Shrink-swell	0.99
		Too acid	0.95		
3001:					
Hoypus	100	Poor		Good	
		Too sandy	0.00		
		Droughty	0.00		
		Too acid	0.50		
		Low content of organic matter	0.50		
3005:					
San Juan	100	Poor		Good	
		Too sandy	0.00		
		Droughty	0.00		
		Too acid	0.39		
		Low content of organic matter	0.50		
3006:					
San Juan	100	Poor		Poor	
		Too sandy	0.00	Slope	0.00
		Droughty	0.00		
		Too acid	0.39		
		Low content of organic matter	0.50		
3007:					
San Juan	100	Poor		Fair	
		Too sandy	0.00	Slope	0.50
		Droughty	0.00		
		Too acid	0.39		
		Low content of organic matter	0.50		
3008:					
Xerorthents	75	Poor		Poor	
		Too sandy	0.00	Slope	0.00
		Wind erosion	0.00		
		Droughty	0.00		
		Low content of organic matter	0.50		
		Too acid	0.80		

Table 14b.--Construction Materials (Part II)--Continued

Map symbol and component 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
3008:					
Endoaquents, tidal--	25	Poor		Poor	
		Too sandy	0.00	Depth to saturated zone	0.00
		Wind erosion	0.00		
		Droughty	0.00		
		Too acid	0.46		
		Low content of organic matter	0.88		
3010:					
San Juan----------	60	Poor		Good	
		Too sandy	0.00		
		Droughty	0.00		
		Too acid	0.39		
		Low content of organic matter	0.50		
Dune land----------	30	Poor		Good	
		Too sandy	0.00		
		Wind erosion	0.00		
		Droughty	0.00		
		Low content of organic matter	0.01		
3012:					
Hoypus----------	100	Poor		Poor	
		Too sandy	0.00	Slope	0.00
		Droughty	0.00		
		Too acid	0.50		
		Low content of organic matter	0.50		
3013:					
Everett----------	100	Poor		Good	
		Too sandy	0.00		
		Droughty	0.01		
		Too acid	0.50		
		Low content of organic matter	0.50		
3014:					
Everett----------	100	Poor		Poor	
		Too sandy	0.00	Slope	0.00
		Droughty	0.01		
		Too acid	0.50		
		Low content of organic matter	0.50		
5000:					
Cady----------	45	Poor		Poor	
		Wind erosion	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.00
		Droughty	0.05		
		Too acid	0.80		
Rock outcrop--------	35	Not rated		Not rated	
Roche----------	10	Fair		Poor	
		Too acid	0.50	Depth to saturated zone	0.00
		Droughty	0.97		
5006:					
Cady----------	70	Poor		Poor	
		Wind erosion	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.00
		Droughty	0.05		
		Too acid	0.80		

Table 14b.--Construction Materials (Part II)--Continued

Map symbol and component 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
5006:					
Rock outcrop--------	15	Not rated		Not rated	
Doebay--------------	15	Fair		Poor	
		Droughty	0.41	Depth to bedrock	0.00
		Low content of organic matter	0.50	Slope	0.00
		Too acid	0.74		
		Depth to bedrock	0.90		
5007:					
Haro----------------	50	Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.00
		Too acid	0.50		
Hiddenridge---------	30	Poor		Fair	
		Droughty	0.00	Depth to bedrock	0.98
		Too acid	0.50		
		Low content of organic matter	0.50		
Rock outcrop--------	20	Not rated		Not rated	
5008:					
Doebay--------------	40	Fair		Poor	
		Droughty	0.41	Depth to bedrock	0.00
		Low content of organic matter	0.50	Slope	0.00
		Too acid	0.74		
		Depth to bedrock	0.90		
Cady----------------	35	Poor		Poor	
		Wind erosion	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.00
		Droughty	0.05		
		Too acid	0.80		
Rock outcrop--------	15	Not rated		Not rated	
5009:					
Haro----------------	50	Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.00
		Too acid	0.50		
Hiddenridge---------	30	Poor		Poor	
		Droughty	0.00	Slope	0.00
		Too acid	0.50	Depth to bedrock	0.98
		Low content of organic matter	0.50		
Rock outcrop--------	20	Not rated		Not rated	

Table 15.--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 the table)

Map symbol and component name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
999:							
Fresh water	100	Not rated		Not rated		Not rated	
1000:							
Spieden, undrained	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Ponding	1.00		
				Seepage	0.86		
Spieden, drained	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Seepage	0.86		
Sholander, undrained	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Ponding	1.00		
				Seepage	0.75		
Sholander, drained	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Seepage	0.75		
1004:							
Limepoint, undrained	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Ponding	1.00		
Limepoint, drained	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
Sholander, undrained	10	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Ponding	1.00		
				Seepage	0.75		
Sholander, drained	10	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Seepage	0.75		
Shalcar, undrained	10	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Ponding	1.00	Cutbanks cave	0.10
				Depth to saturated zone	1.00		
				Piping	1.00		
1009:							
Coveland	70	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	0.10
		Slope	0.01	Piping	0.99		
Mitchellbay	25	Somewhat limited		Very limited		Very limited	
		Seepage	0.57	Piping	1.00	No ground water	1.00
		Slope	0.03				

Table 15.--Water Management--Continued

Map symbol and component name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1013:							
Bazal, undrained----	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Piping	1.00		
				Ponding	1.00		
Bazal, drained------	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Piping	1.00		
Mitchellbay---------	40	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.57	Depth to saturated zone	1.00	Cutbanks cave	0.10
				Piping	1.00		
				Ponding	1.00		
1014:							
Endoaquents, tidal--	45	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Seepage	0.86		
Xerorthents---------	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.75	No ground water	1.00
2001:							
Mitchellbay---------	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.57	Depth to saturated zone	1.00	Cutbanks cave	0.10
				Piping	1.00		
				Ponding	1.00		
2002:							
Sucia---------------	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Seepage	0.02		
2004:							
Mitchellbay---------	100	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.57	Depth to saturated zone	1.00	Cutbanks cave	0.10
				Piping	1.00		
3000:							
Pilepoint-----------	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Piping	1.00		
3001:							
Hoypus--------------	100	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.50	No ground water	1.00
		Slope	0.02				
3005:							
San Juan------------	100	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.86	No ground water	1.00
3006:							
San Juan------------	100	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.86	No ground water	1.00
		Slope	0.88				
3007:							
San Juan------------	100	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.86	No ground water	1.00
		Slope	0.12				

Table 15.--Water Management--Continued

Map symbol and component name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
3008:							
Xerorthents---	75	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.75	No ground water	1.00
		Slope	1.00				
Endoaquents, tidal--	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Seepage	0.86		
3010:							
San Juan---	60	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.86	No ground water	1.00
Dune land---	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.48	No ground water	1.00
3012:							
Hoypus---	100	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.50	No ground water	1.00
		Slope	0.72				
3013:							
Everett---	100	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.50	No ground water	1.00
3014:							
Everett---	100	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.50	No ground water	1.00
		Slope	0.72				
5000:							
Cady---	45	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	No ground water	1.00
		Slope	0.28				
Rock outcrop---	35	Very limited		Not rated		Not rated	
		Depth to bedrock	1.00				
		Slope	0.28				
Roche---	10	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.02	Depth to saturated zone	1.00	Cutbanks cave	0.10
				Thin layer	0.86		
5006:							
Cady---	70	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	1.00				
Rock outcrop---	15	Very limited		Not rated		Not rated	
		Slope	1.00				
		Depth to bedrock	1.00				
Doebay---	15	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.70	No ground water	1.00
		Slope	1.00	Seepage	0.62		
		Depth to bedrock	0.69				
5007:							
Haro---	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	No ground water	1.00
		Slope	0.28				
Hiddenridge---	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.75	No ground water	1.00
		Slope	0.03	Thin layer	0.01		
		Depth to bedrock	0.01				

Table 15.--Water Management--Continued

Map symbol and component name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5007:							
Rock outcrop--------	20	Very limited		Not rated		Not rated	
		Depth to bedrock	1.00				
		Slope	0.28				
5008:							
Doebay--------------	40	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.70	No ground water	1.00
		Depth to bedrock	0.69	Seepage	0.62		
		Slope	0.50				
Cady----------------	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	No ground water	1.00
		Slope	0.50				
Rock outcrop--------	15	Very limited		Not rated		Not rated	
		Depth to bedrock	1.00				
		Slope	0.88				
5009:							
Haro----------------	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	No ground water	1.00
		Slope	1.00				
Hiddenridge---------	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.75	No ground water	1.00
		Slope	1.00	Thin layer	0.01		
		Depth to bedrock	0.01				
Rock outcrop--------	20	Very limited		Not rated		Not rated	
		Depth to bedrock	1.00				
		Slope	1.00				

Table 16.--Engineering Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
999:												
Fresh water-----	---	---	---	---	---	---	---	---	---	---	---	---
1000:												
Spieden, undrained------	0-4	Mucky silt loam	ML, CL, CL-ML	A-4	0	0-10	70-100	65-100	65-100	50-100	0-30	NP-10
	4-11	Loam, silt loam	SC-SM, CL-ML	A-2, A-4	0	0-10	70-100	65-100	60-100	35-90	0-30	NP-10
	11-24	Sand, gravelly loamy sand	SW-SM, SM	A-2, A-1	0	0-10	60-100	55-100	30-75	5-30	0-10	NP
	24-36	Sand, gravelly loamy coarse sand	SW-SM, SM	A-2, A-1	0	0-10	60-100	55-100	30-75	5-30	0-10	NP
	36-48	Loamy sand, coarse sand	SM, SW-SM	A-2, A-1	0	0-10	80-100	75-100	40-70	5-30	0-10	NP
	48-60	Loamy sand, coarse sand	SM, SW-SM	A-2, A-1	0	0-10	80-100	75-100	40-70	5-30	0-10	NP
Spieden, drained	0-4	Mucky silt loam	CL, CL-ML, ML	A-4	0	0-10	70-100	65-100	65-100	50-100	0-30	NP-10
	4-11	Silt loam, loam	SC-SM, CL-ML	A-2, A-4	0	0-10	70-100	65-100	60-100	35-90	0-30	NP-10
	11-24	Gravelly loamy sand, sand	SW-SM, SM	A-2, A-1	0	0-10	60-100	55-100	30-75	5-30	0-10	NP
	24-36	Gravelly loamy coarse sand, sand	SM, SW-SM	A-1, A-2	0	0-10	60-100	55-100	30-75	5-30	0-10	NP
	36-48	Coarse sand, loamy sand	SM, SW-SM	A-2, A-1	0	0-10	80-100	75-100	40-70	5-30	0-10	NP
	48-60	Loamy sand, coarse sand	SM, SW-SM	A-2, A-1	0	0-10	80-100	75-100	40-70	5-30	0-10	NP
Sholander, undrained------	0-8	Gravelly loam	SM, CL-ML	A-2, A-4	0-10	0-20	60-100	55-100	40-95	30-75	0-30	NP-10
	8-16	Loamy sand, gravelly sandy loam	SM, SC-SM	A-1, A-2	0-5	0-15	60-100	55-100	25-75	10-40	0-25	NP-5
	16-28	Gravelly loamy sand, sand	SW-SM, SM	A-2, A-1	0-10	0-15	55-100	50-100	25-75	5-40	0-10	NP
	28-51	Gravelly sand, loamy sand	SW-SM	A-1	0-10	0-15	60-100	55-100	30-75	5-40	0-10	NP
	51-60	Gravelly sandy loam, loam	SC-SM, CL-ML	A-2, A-4	0	0	85-100	80-100	45-95	25-75	0-30	NP-10

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
1000:												
Sholander, drained--------	0-8	Gravelly loam	SM, CL-ML	A-2, A-4	0-10	0-20	60-100	55-100	40-95	30-75	0-30	NP-10
	8-16	Gravelly sandy loam, loamy sand	SC-SM, SM	A-2, A-1	0-5	0-15	60-100	55-100	25-75	10-40	0-25	NP-5
	16-28	Gravelly loamy sand, sand	SW-SM, SM	A-2, A-1	0-10	0-15	55-100	50-100	25-75	5-40	0-10	NP
	28-51	Gravelly sand, loamy sand	SW-SM	A-1	0-10	0-15	60-100	55-100	30-75	5-40	0-10	NP
	51-60	Gravelly sandy loam, loam	CL-ML, SC-SM	A-2, A-4	0	0	85-100	80-100	45-95	25-75	0-30	NP-10
1004:												
Limepoint, undrained------	0-6	Mucky silt loam	CL-ML	A-4	0	0	75-100	70-100	65-100	50-100	0-30	NP-10
	6-14	Loam, gravelly silt loam	CL-ML	A-2, A-4	0	0	50-100	45-100	40-95	30-75	0-30	NP-10
	14-31	Loamy coarse sand, gravelly loam, sand	SM	A-1, A-2	0	0	55-100	50-100	25-75	0-40	0-30	NP-10
	31-49	Loam, gravelly sandy loam, sand	CL-ML, CL	A-1, A-4	0	0	50-100	45-100	30-95	0-75	0-30	NP-10
	49-58	Sandy loam, loam, gravelly sand	SM	A-2	0	0	50-100	45-100	45-70	5-40	0-30	NP-10
	58-60	Silty clay loam, silt loam	CL	A-6, A-4, A-7	0	0	85-100	80-100	45-100	35-100	25-50	5-25
Limepoint, drained--------	0-6	Mucky silt loam	CL-ML	A-4	0	0	75-100	70-100	60-100	40-100	0-30	NP-10
	6-14	Loam, gravelly silt loam	CL-ML	A-2, A-4	0	0	50-100	45-100	40-95	30-75	0-30	NP-10
	14-31	Loamy coarse sand, gravelly loam, sand	SM	A-1, A-2	0	0	55-100	50-100	25-75	0-40	0-30	NP-10
	31-49	Loam, gravelly sandy loam, sand	CL-ML, CL	A-1, A-4	0	0	50-100	45-100	30-95	0-75	0-30	NP-10
	49-58	Sandy loam, loam, gravelly sand	SM	A-2	0	0	50-100	45-100	45-70	5-40	0-30	NP-10
	58-60	Silty clay loam, silt loam	CL	A-6, A-4, A-7	0	0	85-100	80-100	45-100	35-100	25-50	5-25

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
1004:												
Sholander, undrained------	0-8	Gravelly loam	SM, CL-ML	A-2, A-4	0-10	0-20	60-100	55-100	40-95	30-75	0-30	NP-10
	8-16	Gravelly sandy loam, loamy sand	SC-SM, SM	A-2, A-1	0-5	0-15	60-100	55-100	25-75	10-40	0-25	NP-5
	16-28	Gravelly loamy sand, sand	SW-SM, SM	A-2, A-1	0-10	0-15	55-100	50-100	25-75	5-40	0-10	NP
	28-51	Gravelly sand, loamy sand	SW-SM	A-1	0-10	0-15	60-100	55-100	30-75	5-40	0-10	NP
	51-60	Gravelly sandy loam, loam	SC-SM, CL-ML	A-2, A-4	0	0	85-100	80-100	45-95	25-75	0-30	NP-10
Sholander, drained--------	0-8	Gravelly loam	SM, CL-ML	A-2, A-4	0-10	0-20	60-100	55-100	40-95	30-75	0-30	NP-10
	8-16	Gravelly sandy loam, loamy sand	SC-SM, SM	A-2, A-1	0-5	0-15	60-100	55-100	25-75	10-40	0-25	NP-5
	16-28	Gravelly loamy sand, sand	SW-SM, SM	A-2, A-1	0-10	0-15	55-100	50-100	25-75	5-40	0-10	NP
	28-51	Gravelly sand, loamy sand	SW-SM	A-1	0-10	0-15	60-100	55-100	30-75	5-40	0-10	NP
	51-60	Gravelly sandy loam, loam	CL-ML, SC-SM	A-2, A-4	0	0	85-100	80-100	45-95	25-75	0-30	NP-10
Shalcar, undrained------	0-3	Muck	PT	A-8	0	0	100	100	85-100	80-100	---	---
	3-11	Muck	PT	A-8	0	0	100	100	85-100	80-100	---	---
	11-22	Muck	PT	A-8	0	0	100	100	85-100	80-100	---	---
	22-27	Fine sandy loam, silt loam, sandy loam	SM, ML	A-2, A-4	0	0-10	95-100	90-100	55-95	25-95	0-30	NP-10
	27-44	Silt loam, sand, loam	SM, CL-ML	A-4, A-2	0	0-10	95-100	90-100	55-95	25-95	0-30	NP-10
	44-60	Silt loam, sandy loam	SM, CL-ML, SC-SM	A-2, A-4	0	0-10	95-100	90-100	55-100	25-100	0-30	NP-10

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
1009:												
Coveland--------	0-4	Loam	CL-ML, SC-SM	A-4	0	0	75-100	70-100	60-95	40-75	0-30	NP-10
	4-9	Loam, sandy loam, silt loam	CL, ML, SM	A-1, A-4, A-7	0	0	75-100	70-100	40-100	20-100	20-35	5-15
	9-20	Sandy loam, loam, loamy sand	CL, SC-SM, SM	A-7, A-1, A-2	0	0	85-100	80-100	35-95	10-75	0-35	NP-15
	20-36	Silty clay loam, silt loam, loam	CL, SC	A-7, A-4, A-6	0	0	85-100	80-100	60-100	40-100	30-45	10-20
	36-44	Silty clay loam, loam, silt loam	SC, CL	A-7, A-4, A-6	0	0	85-100	80-100	60-100	40-100	30-45	10-20
	44-60	Silty clay loam, loam, silt loam	CL, SC	A-4, A-6, A-7	0	0	85-100	80-100	60-100	40-100	30-45	10-20
Mitchellbay-----	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-5	Gravelly sandy loam	SC-SM, SC	A-4, A-2, A-1	0	0	50-100	45-100	30-70	15-40	15-35	NP-10
	5-13	Gravelly sandy loam, gravelly loam	SC, SC-SM	A-4, A-2, A-1	0	0	50-100	45-100	30-95	15-75	15-30	NP-10
	13-19	Sandy loam, loamy sand, gravelly loam	SC-SM, SM	A-4, A-2	0	0	60-100	55-100	25-95	10-75	15-30	NP-10
	19-34	Loam, silty clay loam, gravelly silt loam	SC, CL	A-4, A-6	0	0	60-100	55-100	40-100	30-100	30-45	10-20
	34-60	Loam, sandy loam, gravelly silt loam	SC, CL	A-6, A-4	0	0	60-100	55-100	40-100	15-100	30-45	10-20

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
1013:												
Bazal, undrained	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-4	Mucky loam	OL	A-4	0	0	100	100	70-100	40-100	20-30	5-10
	4-10	Fine sandy loam, silt loam, loam	SC-SM, CL-ML	A-4	0	0	95-100	90-100	65-100	35-100	20-30	5-10
	10-17	Silt loam, fine sandy loam, loam	SM, CL-ML	A-2, A-4	0	0	75-100	70-100	50-100	30-100	0-30	NP-10
	17-24	Loam, loamy sand, loamy coarse sand	SM	A-4, A-2, A-1	0	0	80-100	75-100	40-95	15-75	0-30	NP-10
	24-39	Clay loam, silt loam, loam	CL	A-6, A-4	0	0	90-100	85-100	65-100	50-100	30-40	10-20
	39-60	Clay loam, silt loam, loam	CL	A-4, A-6	0	0	90-100	85-100	75-100	55-100	30-40	10-20
Bazal, drained--	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-4	Mucky loam	OL	A-4	0	0	100	100	70-100	40-100	20-30	5-10
	4-10	Fine sandy loam, silt loam, loam	SC-SM, CL-ML	A-4	0	0	95-100	90-100	65-100	35-100	20-30	5-10
	10-17	Silt loam, fine sandy loam, loam	SM, CL-ML	A-2, A-4	0	0	75-100	70-100	50-100	30-100	0-30	NP-10
	17-24	Loam, loamy sand, loamy coarse sand	SM	A-4, A-2, A-1	0	0	80-100	75-100	40-95	15-75	0-30	NP-10
	24-39	Clay loam, silt loam, loam	CL	A-6, A-4	0	0	90-100	85-100	65-100	50-100	30-40	10-20
	39-60	Clay loam, silt loam, loam	CL	A-4, A-6	0	0	90-100	85-100	75-100	55-100	30-40	10-20

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
1013:												
Mitchellbay-----	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-5	Gravelly sandy loam	SC-SM, SC	A-4, A-2, A-1	0	0	50-100	45-100	30-70	15-40	15-35	NP-10
	5-13	Gravelly sandy loam, gravelly loam	SC, SC-SM	A-4, A-2, A-1	0	0	50-100	45-100	30-95	15-75	15-30	NP-10
	13-19	Sandy loam, loamy sand, loam	SC-SM, SM	A-4, A-2	0	0	60-100	55-100	25-95	10-75	15-30	NP-10
	19-34	Loam, gravelly silt loam, silty clay loam	SC, CL	A-4, A-6	0	0	60-100	55-100	40-100	30-100	30-45	10-20
	34-60	Loam, sandy loam, gravelly silt loam	SC, CL	A-6, A-4	0	0	60-100	55-100	40-100	15-100	30-45	10-20
1014:												
Endoaquents, tidal----------	0-29	Sand	SM	A-1	0	0-10	80-95	75-90	40-70	5-15	10-15	NP
	29-48	Extremely gravelly coarse sand, very gravelly coarse sand	GW-GM, GW	A-1	0	0-10	20-65	15-60	5-45	0-10	10-15	NP
	48-60	Very gravelly coarse sand, extremely gravelly coarse sand	GW-GM, GW	A-1	0	0-10	10-55	5-50	0-45	0-5	10-15	NP
Xerorthents-----	0-1	Very gravelly sand	GW-GM, GW	A-1	0	0-25	30-55	25-50	15-45	0-5	10-15	NP
	1-20	Very gravelly sand, extremely gravelly coarse sand	GW, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-5	10-15	NP
	20-60	Extremely gravelly coarse sand, very gravelly sand	GW, GP-GM	A-1	0	0-20	20-55	15-50	5-45	0-5	10-15	NP

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
2001:												
Mitchellbay-----	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-5	Gravelly sandy loam	SC-SM, SC	A-4, A-2, A-1	0	0	50-100	45-100	30-70	15-40	15-35	NP-10
	5-13	Gravelly sandy loam, gravelly loam	SC, SC-SM	A-4, A-2, A-1	0	0	50-100	45-100	30-95	15-75	15-30	NP-10
	13-19	Sandy loam, loamy sand, gravelly loam	SC-SM, SM	A-4, A-2	0	0	60-100	55-100	25-95	10-75	15-30	NP-10
	19-34	Loam, silty clay loam, gravelly silt loam	SC, CL	A-4, A-6	0	0	60-100	55-100	40-100	30-100	30-45	10-20
	34-60	Loam, sandy loam, gravelly silt loam	SC, CL	A-6, A-4	0	0	60-100	55-100	40-100	15-100	30-45	10-20
2002:												
Sucia-----------	0-9	Sandy loam	SM	A-2	0	0	60-100	55-100	40-70	20-40	0-10	NP
	9-19	Loamy sand, gravelly sandy loam	SM	A-2, A-1	0	0	70-100	65-100	30-75	10-40	0-10	NP
	19-27	Gravelly sand, loamy sand	SM, SW-SM	A-2, A-1	0	0	70-100	65-100	30-75	10-40	0-10	NP
	27-33	Gravelly sand, loamy sand	SM, SW-SM	A-1, A-2	0	0-20	55-100	50-100	25-75	0-30	0-10	NP
	33-47	Loamy sand, gravelly sandy loam, sand	SM, SW-SM	A-1, A-2	0	0	50-100	45-100	25-75	10-40	0-10	NP
	47-60	Sandy loam, loam	CL-ML, CL	A-4, A-2	0	0	85-100	80-100	45-95	25-75	0-30	NP-10

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
2004:												
Mitchellbay-----	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-5	Gravelly sandy loam	SC-SM, SC	A-4, A-2, A-1	0	0	50-100	45-100	30-70	15-40	15-35	NP-10
	5-13	Gravelly sandy loam, gravelly loam	SC, SC-SM	A-4, A-2, A-1	0	0	50-100	45-100	30-95	15-75	15-30	NP-10
	13-19	Sandy loam, loamy sand, gravelly loam	SC-SM, SM	A-4, A-2	0	0	60-100	55-100	25-95	10-75	15-30	NP-10
	19-34	Loam, silty clay loam, gravelly silt loam	SC, CL	A-4, A-6	0	0	60-100	55-100	40-100	30-100	30-45	10-20
	34-60	Loam, sandy loam, gravelly silt loam	SC, CL	A-6, A-4	0	0	60-100	55-100	40-100	15-100	30-45	10-20
3000:												
Pilepoint-------	0-4	Loam	ML, CL-ML	A-4	0	0	75-100	70-100	60-95	40-75	15-25	NP-5
	4-13	Loam, gravelly sandy loam	CL-ML, ML	A-1, A-2, A-4	0	0	45-100	40-100	25-95	15-75	15-25	NP-5
	13-22	Gravelly loamy sand, very gravelly sandy loam	SM, GM	A-2, A-1	0	0-10	32-77	20-70	10-50	5-30	10-25	NP-5
	22-29	Gravelly loam, very gravelly loamy sand, sandy loam	ML, GM, SM	A-2, A-4, A-1	0	0-10	51-100	46-100	25-85	10-75	10-25	NP-5
	29-36	Loam, silty clay loam, silt loam	CL	A-6, A-4, A-2	0	0	45-100	40-100	35-100	30-100	30-45	10-20
	36-46	Silt loam, loam	CL	A-2, A-6, A-4	0	0	60-100	55-100	50-100	35-100	30-43	10-20
	46-60	Silt loam, loam	CL	A-2, A-4, A-6	0	0	60-100	55-100	50-100	35-100	30-43	10-20

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
3001:												
Hoypus----------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-5	Sandy loam	SC-SM, SM	A-2, A-1	0	0-10	80-95	75-90	40-65	20-35	0-10	NP
	5-20	Loamy sand, very gravelly loamy sand, very gravelly sandy loam	SM, SW-SM	A-2, A-1	0-10	0-15	50-95	45-90	20-70	5-35	0-10	NP
	20-36	Very gravelly loamy sand, very gravelly sand	GW, GW-GM	A-1	0-10	0-15	20-55	15-50	5-45	0-15	0-10	NP
	36-60	Extremely gravelly sand, very gravelly loamy sand	GW, GP-GM	A-1	0-10	0-15	20-55	15-50	10-45	0-15	0-10	NP
3005:												
San Juan--------	0-4	Sandy loam	SC-SM, SM	A-2	0	0-10	75-100	70-100	40-70	20-40	0-25	NP-5
	4-13	Gravelly loamy sand, loam, sandy loam	SW-SM, SC-SM, SM	A-1, A-4, A-2	0	0-10	50-100	45-100	25-95	10-75	0-25	NP-5
	13-19	Sandy loam, loam, gravelly loamy sand	SW-SM, SC-SM, SM	A-1, A-4, A-2	0	0-10	50-100	45-100	25-95	10-75	0-25	NP-5
	19-27	Gravelly loamy coarse sand, gravelly sandy loam, very gravelly loamy sand	GW-GM, SM	A-2, A-1	0	0-10	30-80	25-75	15-50	5-30	0-10	NP
	27-41	Extremely gravelly loamy coarse sand, very gravelly loamy sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-15	0-10	NP
	41-62	Very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	15-55	10-50	5-45	0-15	0-10	NP
	62-70	Very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-15	0-10	NP

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
3006:												
San Juan--------	0-4	Sandy loam	SC-SM, SM	A-2	0	0-10	75-100	70-100	40-70	20-40	0-25	NP-5
	4-13	Gravelly loamy sand, loam, sandy loam	SW-SM, SC-SM, SM	A-1, A-4, A-2	0	0-10	50-100	45-100	25-95	10-75	0-25	NP-5
	13-19	Sandy loam, loam, gravelly loamy sand	SW-SM, SC-SM, SM	A-1, A-4, A-2	0	0-10	50-100	45-100	25-95	10-75	0-25	NP-5
	19-27	Gravelly loamy coarse sand, gravelly sandy loam, very gravelly loamy sand	GW-GM, SM	A-2, A-1	0	0-10	30-80	25-75	15-50	5-30	0-10	NP
	27-41	Extremely gravelly loamy coarse sand, very gravelly loamy sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-15	0-10	NP
	41-62	Very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	15-55	10-50	5-45	0-15	0-10	NP
	62-70	Very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-15	0-10	NP

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
3007:												
San Juan--------	0-4	Sandy loam	SC-SM, SM	A-2	0	0-10	75-100	70-100	40-70	20-40	0-25	NP-5
	4-13	Gravelly loamy sand, loam, sandy loam	SW-SM, SC-SM, SM	A-1, A-4, A-2	0	0-10	50-100	45-100	25-95	10-75	0-25	NP-5
	13-19	Sandy loam, loam, gravelly loamy sand	SW-SM, SC-SM, SM	A-1, A-4, A-2	0	0-10	50-100	45-100	25-95	10-75	0-25	NP-5
	19-27	Gravelly loamy coarse sand, gravelly sandy loam, very gravelly loamy sand	GW-GM, SM	A-2, A-1	0	0-10	30-80	25-75	15-50	5-30	0-10	NP
	27-41	Extremely gravelly loamy coarse sand, very gravelly loamy sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-15	0-10	NP
	41-62	Very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	15-55	10-50	5-45	0-15	0-10	NP
	62-70	Very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-15	0-10	NP
3008:												
Xerorthents-----	0-1	Very gravelly sand	GW-GM, GW	A-1	0	0-25	30-55	25-50	15-45	0-5	10-15	NP
	1-20	Extremely gravelly coarse sand, very gravelly sand	GW, GP-GM	A-1	0	0-20	20-55	15-50	5-45	0-5	10-15	NP
	20-60	Extremely gravelly coarse sand, very gravelly sand	GW, GP-GM	A-1	0	0-20	20-55	15-50	5-45	0-5	10-15	NP

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
3008:												
Endoaquents, tidal----------	0-29	Sand	SM	A-1	0	0-10	80-95	75-90	40-70	5-15	10-15	NP
	29-48	Extremely gravelly coarse sand, very gravelly coarse sand	GW-GM, GW	A-1	0	0-10	20-65	15-60	5-45	0-10	10-15	NP
	48-60	Very gravelly coarse sand, extremely gravelly coarse sand	GW-GM, GW	A-1	0	0-10	10-55	5-50	0-45	0-5	10-15	NP
3010:												
San Juan--------	0-4	Sandy loam	SC-SM, SM	A-2	0	0-10	75-100	70-100	40-70	20-40	0-25	NP-5
	4-13	Gravelly loamy sand, loam, sandy loam	SW-SM, SC-SM, SM	A-1, A-4, A-2	0	0-10	50-100	45-100	25-95	10-75	0-25	NP-5
	13-19	Sandy loam, loam, gravelly loamy sand	SW-SM, SC-SM, SM	A-1, A-4, A-2	0	0-10	50-100	45-100	25-95	10-75	0-25	NP-5
	19-27	Gravelly loamy coarse sand, gravelly sandy loam, very gravelly loamy sand	GW-GM, SM	A-2, A-1	0	0-10	30-80	25-75	15-50	5-30	0-10	NP
	27-41	Extremely gravelly loamy coarse sand, very gravelly loamy sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-15	0-10	NP
	41-62	Very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	15-55	10-50	5-45	0-15	0-10	NP
	62-70	Very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM	A-1	0	0-20	20-55	15-50	5-45	0-15	0-10	NP
Dune land-------	0-60	Fine sand	SP, SP-SM, SM	A-2, A-3	0	0	100	100	60-80	0-25	0-15	NP

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
3012:												
Hoypus----------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-5	Sandy loam	SC-SM, SM	A-2, A-1	0	0-10	80-95	75-90	40-65	20-35	0-10	NP
	5-20	Loamy sand, very gravelly loamy sand, very gravelly sandy loam	SM, SW-SM	A-2, A-1	0-10	0-15	50-95	45-90	20-70	5-35	0-10	NP
	20-36	Very gravelly loamy sand, very gravelly sand	GW, GW-GM	A-1	0-10	0-15	20-55	15-50	5-45	0-15	0-10	NP
	36-60	Extremely gravelly sand, very gravelly loamy sand	GW, GP-GM	A-1	0-10	0-15	20-55	15-50	10-45	0-15	0-10	NP
3013:												
Everett----------	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	85-100	50-100	---	---
	2-9	Sandy loam	SC-SM, SM	A-2, A-1	0	0	80-95	75-90	40-65	20-35	0-25	NP-5
	9-13	Gravelly sandy loam, loamy sand, very gravelly coarse sandy loam	SC-SM, SM	A-2, A-1	0-10	0-10	50-95	45-90	20-70	5-35	0-25	NP-5
	13-30	Extremely gravelly loamy coarse sand, very gravelly coarse sand	GW-GM	A-1	0-10	0-10	25-85	20-80	10-60	0-25	0-10	NP
	30-60	Fine sand, very gravelly loamy coarse sand, extremely gravelly coarse sand	GW-GM	A-1	0-10	0-10	20-40	15-35	10-30	0-15	0-10	NP

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
3014:												
Everett---------	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	85-100	50-100	---	---
	2-9	Sandy loam	SC-SM, SM	A-2, A-1	0	0	80-95	75-90	40-65	20-35	0-25	NP-5
	9-13	Very gravelly sandy loam, loamy sand, very gravelly coarse sandy loam	SC-SM, SM	A-2, A-1	0-10	0-10	50-95	45-90	20-70	5-35	0-25	NP-5
	13-30	Extremely gravelly loamy coarse sand, very gravelly coarse sand	GW-GM	A-1	0-10	0-10	25-85	20-80	10-60	0-25	0-10	NP
	30-60	Fine sand, very gravelly loamy coarse sand, extremely gravelly coarse sand	GW-GM	A-1	0-10	0-10	20-40	15-35	10-30	0-15	0-10	NP
5000:												
Cady------------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	65-100	50-90	---	---
	1-4	Loam	ML, CL-ML	A-4	0-10	0-10	90-100	85-100	75-95	55-75	0-25	NP-5
	4-16	Medium gravelly coarse sandy loam, fine sandy loam, gravelly loam	ML, SC-SM	A-2, A-4	0-5	0-15	40-100	35-100	10-95	10-75	15-25	NP-5
	16-26	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
5000:												
Roche----------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-5	Loam	ML, SM	A-4	0	0	75-100	70-100	60-95	40-75	0-10	15-30
	5-15	Loamy sand, loam, gravelly sandy loam	ML, SM	A-1, A-2, A-4	0	0	50-100	50-100	25-95	10-75	0-10	15-30
	15-23	Gravelly sandy loam, loam	ML, SC-SM	A-1, A-2, A-4	0	0-5	50-100	40-100	20-95	5-75	0-10	10-30
	23-39	Gravelly sandy loam, loam	ML, SC-SM	A-4, A-2	0	0-5	60-100	50-100	30-95	15-75	0-10	15-30
	39-60	Sandy loam, gravelly loam, silt loam	CL	A-6, A-4	0	0-5	60-100	55-100	35-100	15-100	0-10	15-30
5006:												
Cady----------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-4	Loam	CL-ML, ML	A-4	0-10	0-10	90-100	85-100	75-95	55-75	0-25	NP-5
	4-16	Fine sandy loam, medium gravelly coarse sandy loam, gravelly loam	SC-SM, ML	A-4, A-2	0-5	0-15	40-100	35-100	10-95	10-75	15-25	NP-5
	16-26	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			---	---	---	---	---	---	---	---
Doebay----------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-6	Loam	SC-SM, SM	A-4	0	0	75-95	70-90	60-85	40-70	15-30	NP-10
	6-16	Fine sandy loam, gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0	50-85	45-80	30-75	15-50	15-30	NP-10
	16-21	Gravelly loam, very gravelly sandy loam	SC-SM, GM, GC-GM	A-2, A-4	0-10	0-20	30-55	25-50	10-45	5-45	15-30	NP-10
	21-35	Extremely gravelly sandy loam, very gravelly coarse sandy loam	GW-GM, GW	A-1	0-10	0-20	20-40	15-35	5-20	0-15	15-30	NP-5
	35-45	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
5007:												
Haro----------	0-1	Loam	SM, CL-ML	A-4	0	0-10	70-100	70-100	60-95	40-75	0-25	NP-5
	1-5	Gravelly sandy loam, gravelly loam	SM, GC-GM	A-2, A-4	0	0-10	45-100	40-100	25-95	10-75	0-25	NP-5
	5-11	Gravelly sandy loam	SC-SM, SM	A-1, A-2	0	0-10	50-100	45-100	30-70	15-40	0-25	NP-5
	11-21	Unweathered bedrock			---	---	---	---	---	---	---	---
Hiddenridge-----	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	80-100	---	---
	1-3	Gravelly coarse sandy loam	SC-SM, SM	A-2, A-4, A-1	0	0	55-95	50-90	30-85	15-50	0-30	NP-10
	3-24	Very gravelly coarse sandy loam, gravelly sandy loam, gravelly loam	GC-GM, SM, GM	A-2, A-4, A-1	0	0	30-70	25-65	10-65	5-40	0-30	NP-10
	24-57	Very gravelly coarse sandy loam, extremely gravelly coarse sandy loam, very gravelly sandy loam	GP, GW-GM, GC	A-2, A-1	0	0-20	15-50	10-45	5-30	0-15	0-30	NP-10
	57-60	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
5008:												
Doebay----------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-6	Loam	SC-SM, SM	A-4	0	0	75-95	70-90	60-85	40-70	15-30	NP-10
	6-16	Fine sandy loam, gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0	50-85	45-80	30-75	15-50	15-30	NP-10
	16-21	Gravelly loam, very gravelly sandy loam	SC-SM, GM, GC-GM	A-2, A-4	0-10	0-20	30-55	25-50	10-45	5-45	15-30	NP-10
	21-35	Extremely gravelly sandy loam, very gravelly coarse sandy loam	GW-GM, GW	A-1	0-10	0-20	20-40	15-35	5-20	0-15	15-30	NP-5
	35-45	Unweathered bedrock			---	---	---	---	---	---	---	---
Cady------------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	50-90	---	---
	1-4	Loam	CL-ML, ML	A-4	0-10	0-10	90-100	85-100	75-95	55-75	15-25	NP-5
	4-16	Fine sandy loam, gravelly loam, medium gravelly coarse sandy loam	SC-SM, ML	A-4, A-2	0-5	0-15	39-100	34-100	10-95	10-75	15-25	NP-5
	16-26	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			---	---	---	---	---	---	---	---
5009:												
Haro------------	0-1	Loam	SM, CL-ML	A-4	0	0-10	75-100	70-100	60-95	40-75	0-25	NP-5
	1-5	Gravelly sandy loam, gravelly loam	SM, GC-GM	A-2, A-4	0	0-10	45-100	40-100	25-95	10-75	0-25	NP-5
	5-11	Gravelly sandy loam	SC-SM, SM	A-1, A-2	0	0-10	50-100	45-100	30-70	15-40	0-25	NP-5
	11-21	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 16.--Engineering Properties--Continued

Map symbol and component name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
5009:												
Hiddenridge-----	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	60-100	80-100	---	---
	1-3	Gravelly coarse sandy loam	SC-SM, SM	A-1, A-2, A-4	0	0	55-80	50-70	30-50	15-30	0-30	NP-10
	3-24	Very gravelly coarse sandy loam, gravelly sandy loam, gravelly loam	GM, GC-GM, SM	A-1, A-2, A-4	0	0	30-70	25-65	10-65	5-40	0-30	NP-10
	24-57	Very gravelly coarse sandy loam, extremely gravelly coarse sandy loam, very gravelly sandy loam	GW-GM, GP, GC	A-1, A-2	0	0-20	15-50	10-45	5-30	0-15	0-30	NP-10
	57-60	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 17.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
999:														
Fresh water----------	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1000:														
Spieden, undrained----	0-4	20-45	50-75	6-18	0.80-1.20	0.2-0.6	0.26-0.37	0.0-2.9	10-25	.28	.37	5	3	86
	4-11	25-50	30-65	6-18	0.80-1.45	0.2-6	0.15-0.21	0.0-2.9	7.0-12	.28	.37			
	11-24	80-95	0-20	0-5	1.50-1.70	6-101	0.04-0.08	0.0-2.9	0.2-1.0	.05	.10			
	24-36	80-95	0-20	0-5	1.50-1.70	6-101	0.03-0.07	0.0-2.9	0.2-1.0	.02	.02			
	36-48	80-100	0-20	0-5	1.50-1.70	6-101	0.03-0.06	0.0-2.9	0.2-1.0	.02	.02			
	48-60	80-100	0-20	0-5	1.50-1.70	6-101	0.03-0.06	0.0-2.9	0.2-1.0	.02	.02			
Spieden, drained------	0-4	20-45	50-75	6-18	0.80-1.20	0.2-0.6	0.26-0.37	0.0-2.9	10-25	.28	.37	5	3	86
	4-11	25-50	30-65	6-18	0.80-1.45	0.2-6	0.15-0.21	0.0-2.9	7.0-12	.28	.37			
	11-24	80-95	0-20	0-5	1.50-1.70	6-101	0.04-0.08	0.0-2.9	0.2-1.0	.05	.10			
	24-36	80-95	0-20	0-5	1.50-1.70	6-101	0.03-0.07	0.0-2.9	0.2-1.0	.02	.02			
	36-48	80-100	0-20	0-5	1.50-1.70	6-101	0.03-0.06	0.0-2.9	0.2-1.0	.02	.02			
	48-60	80-100	0-20	0-5	1.50-1.70	6-101	0.03-0.06	0.0-2.9	0.2-1.0	.02	.02			
Sholander, undrained--	0-8	30-55	30-50	8-18	1.10-1.45	0.6-2	0.10-0.18	0.0-2.9	7.0-12	.15	.24	4	5	56
	8-16	60-85	5-35	2-12	1.50-1.80	2-6	0.07-0.13	0.0-2.9	0.2-1.0	.05	.17			
	16-28	60-90	5-30	0-8	1.50-1.70	6-20	0.03-0.08	0.0-2.9	0.2-1.0	.02	.05			
	28-51	65-95	0-30	0-5	1.50-1.70	20-101	0.03-0.06	0.0-2.9	0.2-1.0	.02	.05			
	51-60	35-70	30-50	8-18	1.70-1.90	0.0015-0.06	0.00-0.00	0.0-2.9	0.2-1.0	.28	.37			
Sholander, drained----	0-8	30-55	30-50	8-18	1.10-1.45	0.6-2	0.10-0.18	0.0-2.9	7.0-12	.15	.24	4	5	56
	8-16	60-85	5-35	2-12	1.50-1.80	2-6	0.07-0.13	0.0-2.9	0.2-1.0	.05	.17			
	16-28	60-90	5-30	0-8	1.50-1.70	6-20	0.03-0.08	0.0-2.9	0.2-1.0	.02	.05			
	28-51	65-95	0-30	0-5	1.50-1.70	20-101	0.03-0.06	0.0-2.9	0.2-1.0	.02	.05			
	51-60	35-70	30-50	8-18	1.70-1.90	0.0015-0.06	0.00-0.00	0.0-2.9	0.2-1.0	.28	.37			
1004:														
Limepoint, undrained--	0-6	15-50	50-80	7-18	0.80-1.20	0.2-2	0.15-0.21	0.0-2.9	10-25	.37	.37	4	5	56
	6-14	15-50	30-75	7-18	0.80-1.20	0.2-2	0.10-0.21	0.0-2.9	5.0-10	.20	.24			
	14-31	50-100	0-50	2-18	1.25-1.50	0.6-101	0.02-0.18	0.0-2.9	0.2-1.0	.02	.02			
	31-49	35-100	0-50	2-18	1.20-1.50	0.6-101	0.02-0.18	0.0-2.9	0.2-1.0	.32	.37			
	49-58	35-100	0-50	2-18	1.25-1.50	0.6-101	0.02-0.18	0.0-2.9	0.2-1.0	.20	.24			
	58-60	15-45	30-80	15-40	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.37	.43			
Limepoint, drained----	0-6	15-50	30-75	7-18	0.80-1.20	0.2-2	0.15-0.21	0.0-2.9	10-25	.37	.37	4	5	56
	6-14	15-50	30-75	7-18	0.80-1.20	0.2-2	0.10-0.21	0.0-2.9	5.0-10	.20	.24			
	14-31	50-100	0-50	2-18	1.25-1.50	0.6-101	0.02-0.18	0.0-2.9	0.2-1.0	.02	.02			
	31-49	35-100	0-50	2-18	1.20-1.50	0.6-101	0.02-0.18	0.0-2.9	0.2-1.0	.32	.37			
	49-58	35-100	0-50	2-18	1.25-1.50	0.6-101	0.02-0.18	0.0-2.9	0.2-1.0	.20	.24			
	58-60	15-45	30-80	15-40	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.37	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
1004:														
Sholander, undrained--	0-8	30-55	30-50	8-18	1.10-1.45	0.6-2	0.10-0.18	0.0-2.9	7.0-12	.15	.24	4	5	56
	8-16	60-85	5-35	2-12	1.50-1.80	2-6	0.07-0.13	0.0-2.9	0.2-1.0	.05	.17			
	16-28	60-90	5-30	0-8	1.50-1.70	6-20	0.03-0.08	0.0-2.9	0.2-1.0	.02	.05			
	28-51	65-95	0-30	0-5	1.50-1.70	20-101	0.03-0.06	0.0-2.9	0.2-1.0	.02	.05			
	51-60	35-70	30-50	8-18	1.70-1.90	0.0015-0.06	0.00-0.00	0.0-2.9	0.2-1.0	.28	.37			
Sholander, drained----	0-8	30-55	30-50	8-18	1.10-1.45	0.6-2	0.10-0.18	0.0-2.9	7.0-12	.15	.24	4	5	56
	8-16	60-85	5-35	2-12	1.50-1.80	2-6	0.07-0.13	0.0-2.9	0.2-1.0	.05	.17			
	16-28	60-90	5-30	0-8	1.50-1.70	6-20	0.03-0.08	0.0-2.9	0.2-1.0	.02	.05			
	28-51	65-95	0-30	0-5	1.50-1.70	20-101	0.03-0.06	0.0-2.9	0.2-1.0	.02	.05			
	51-60	35-70	30-50	8-18	1.70-1.90	0.0015-0.06	0.00-0.00	0.0-2.9	0.2-1.0	.28	.37			
Shalcar, undrained----	0-3	5-15	50-85	10-35	0.10-0.30	0.6-2	0.30-0.30	---	25-45	.02	.02	2	2	134
	3-11	5-15	50-85	10-35	0.10-0.30	0.6-2	0.45-0.45	---	25-45	.02	.02			
	11-22	5-15	50-85	10-35	0.10-0.30	0.6-2	0.60-0.60	---	25-45	.02	.02			
	22-27	25-70	15-70	2-18	1.20-1.50	0.2-6	0.13-0.15	0.0-2.9	0.5-1.0	.32	.32			
	27-44	25-100	5-70	2-18	1.20-1.50	0.2-11	0.19-0.21	0.0-2.9	0.5-1.0	.55	.55			
	44-60	25-70	15-70	2-18	1.20-1.50	0.2-6	0.11-0.13	0.0-2.9	0.5-1.0	.24	.24			
1009:														
Coveland----------	0-4	30-50	30-50	7-18	0.80-1.20	0.6-2	0.14-0.18	0.0-2.9	5.0-10	.20	.24	4	5	56
	4-9	15-65	25-70	10-25	0.80-1.20	0.2-3	0.14-0.18	0.0-2.9	1.0-5.0	.28	.32			
	9-20	15-80	15-80	5-25	1.60-1.80	0.6-6	0.09-0.13	0.0-2.9	0.5-1.0	.20	.24			
	20-36	15-50	30-65	18-35	1.50-1.75	0.06-2	0.16-0.21	3.0-5.9	0.5-1.0	.43	.49			
	36-44	15-50	30-65	18-35	1.50-1.75	0.06-2	0.16-0.21	3.0-5.9	0.5-1.0	.55	.64			
	44-60	15-50	30-65	18-35	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.5-1.0	.55	.64			
Mitchellbay----------	0-1	55-75	10-35	8-20	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	4	3	86
	1-5	55-75	10-35	8-20	1.10-1.45	0.6-6	0.07-0.13	0.0-2.9	7.0-12	.10	.15			
	5-13	30-70	20-45	5-20	1.10-1.45	0.6-6	0.12-0.20	0.0-2.9	1.0-4.0	.10	.17			
	13-19	30-85	20-45	5-20	1.60-1.80	0.6-6	0.07-0.13	0.0-2.9	0.2-1.0	.17	.24			
	19-34	15-50	30-65	18-35	1.50-1.75	0.2-2	0.10-0.18	3.0-5.9	0.2-1.0	.32	.37			
	34-60	15-50	35-65	18-35	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.32	.37			
1013:														
Bazal, undrained------	0-1	15-65	25-60	10-20	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	4	5	56
	1-4	15-65	25-60	10-20	0.80-1.20	0.6-2	0.28-0.32	0.0-2.9	10-25	.20	.20			
	4-10	15-65	25-60	10-20	0.80-1.20	2-6	0.20-0.25	0.0-2.9	7.0-12	.17	.20			
	10-17	15-65	25-60	3-18	0.80-1.45	2-6	0.16-0.21	0.0-2.9	1.0-4.0	.20	.24			
	17-24	45-80	15-30	2-19	1.50-1.70	2-20	0.04-0.07	0.0-2.9	0.2-1.0	.02	.02			
	24-39	20-45	30-50	18-33	1.50-1.75	0.2-0.6	0.14-0.18	3.0-5.9	0.2-1.0	.37	.43			
	39-60	15-45	30-70	19-30	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.37	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
1013:														
Bazal, drained--------	0-1	15-65	25-60	10-20	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	4	5	56
	1-4	15-65	25-60	10-20	0.80-1.20	2-6	0.28-0.32	0.0-2.9	10-25	.20	.20			
	4-10	15-65	25-60	10-20	0.80-1.20	2-6	0.20-0.25	0.0-2.9	7.0-12	.17	.20			
	10-17	15-65	25-60	3-18	0.80-1.45	2-6	0.16-0.21	0.0-2.9	1.0-4.0	.20	.24			
	17-24	45-80	15-30	2-19	1.50-1.70	2-20	0.04-0.07	0.0-2.9	0.2-1.0	.02	.02			
	24-39	20-45	30-50	18-33	1.50-1.75	0.2-0.6	0.14-0.18	3.0-5.9	0.2-1.0	.37	.43			
	39-60	15-45	30-70	19-30	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.37	.43			
Mitchellbay-----------	0-1	55-75	10-35	8-20	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	4	3	86
	1-5	55-75	10-35	8-20	1.10-1.45	0.6-6	0.07-0.13	0.0-2.9	7.0-12	.10	.15			
	5-13	30-70	20-45	5-20	1.10-1.45	0.6-6	0.12-0.20	0.0-2.9	1.0-4.0	.10	.17			
	13-19	30-85	20-45	5-20	1.60-1.80	0.6-6	0.07-0.13	0.0-2.9	0.2-1.0	.17	.24			
	19-34	15-50	30-65	18-35	1.50-1.75	0.2-2	0.10-0.18	3.0-5.9	0.2-1.0	.32	.37			
	34-60	15-50	35-65	18-35	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.32	.37			
1014:														
Endoaquents, tidal----	0-29	70-100	0-25	0-3	1.50-1.70	20-101	0.01-0.06	0.0-2.9	0.5-1.2	.02	.05	5	1	220
	29-48	85-100	0-15	0-3	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.05			
	48-60	85-100	0-15	0-3	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-0.8	.02	.05			
Xerorthents-----------	0-1	75-95	0-10	0-3	1.25-1.50	20-101	0.01-0.04	0.0-2.9	3.0-6.0	.02	.02	5	1	220
	1-20	80-100	0-5	0-3	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.05			
	20-60	80-100	0-5	0-3	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.05			
2001:														
Mitchellbay-----------	0-1	55-75	10-35	8-20	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	4	3	86
	1-5	55-75	10-35	8-20	1.10-1.45	0.6-6	0.07-0.13	0.0-2.9	7.0-12	.10	.15			
	5-13	30-70	20-45	5-20	1.10-1.45	0.6-6	0.12-0.20	0.0-2.9	1.0-4.0	.10	.17			
	13-19	30-85	20-45	5-20	1.60-1.80	0.6-6	0.07-0.13	0.0-2.9	0.2-1.0	.17	.24			
	19-34	15-50	30-65	18-35	1.50-1.75	0.2-2	0.10-0.18	3.0-5.9	0.2-1.0	.32	.37			
	34-60	15-50	35-65	18-35	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.32	.37			
2002:														
Sucia-----------------	0-9	55-85	10-35	2-8	1.10-1.45	2-6	0.09-0.13	0.0-2.9	5.0-10	.15	.15	4	3	86
	9-19	55-85	5-35	0-5	1.25-1.50	2-20	0.07-0.13	0.0-2.9	1.0-5.0	.05	.05			
	19-27	55-90	5-35	0-5	1.50-1.70	6-101	0.04-0.08	0.0-2.9	0.5-1.0	.05	.10			
	27-33	55-95	0-35	0-5	1.50-1.70	6-101	0.02-0.06	0.0-2.9	0.5-1.0	.02	.05			
	33-47	55-90	10-35	0-8	1.50-1.70	2-20	0.07-0.13	0.0-2.9	0.5-1.0	.10	.24			
	47-60	35-50	30-50	8-18	1.70-1.90	0.0015-0.06	0.00-0.00	0.0-2.9	0.5-1.0	.32	.37			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
2004:														
Mitchellbay----------	0-1	55-75	10-35	8-20	0.10-0.30	6-101	0.05-0.10	---	60-90	---	---	4	3	86
	1-5	55-75	10-35	8-20	1.10-1.45	0.6-6	0.07-0.13	0.0-2.9	7.0-12	.10	.15			
	5-13	30-70	20-45	5-20	1.10-1.45	0.6-6	0.12-0.20	0.0-2.9	1.0-4.0	.10	.17			
	13-19	30-80	20-45	5-20	1.60-1.80	0.6-6	0.07-0.13	0.0-2.9	0.2-1.0	.17	.24			
	19-34	15-50	30-65	18-35	1.50-1.75	0.2-2	0.10-0.18	3.0-5.9	0.2-1.0	.32	.37			
	34-60	15-50	35-65	18-35	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.32	.37			
3000:														
Pilepoint----------	0-4	40-70	20-50	5-12	0.80-1.20	0.6-2	0.10-0.18	0.0-2.9	7.0-12	.24	.32	4	5	56
	4-13	40-70	20-50	5-12	0.80-1.45	0.6-3	0.10-0.18	0.0-2.9	6.0-10	.24	.32			
	13-22	50-80	10-50	2-12	1.10-1.50	2-11	0.04-0.11	0.0-2.9	1.0-4.0	.02	.10			
	22-29	50-80	5-50	2-15	0.80-1.50	2-11	0.07-0.13	0.0-2.9	0.2-1.0	.10	.20			
	29-36	20-50	35-60	18-35	0.80-1.35	0.06-1	0.12-0.21	3.0-5.9	0.2-1.0	.37	.43			
	36-46	20-50	35-60	18-35	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.49	.55			
	46-60	20-50	35-60	18-35	1.70-1.90	0.0015-0.06	0.00-0.00	3.0-5.9	0.2-1.0	.49	.55			
3001:														
Hoypus----------	0-1	55-75	0-30	0-15	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	5	3	86
	1-5	55-75	0-30	0-15	1.10-1.45	2-6	0.05-0.13	0.0-2.9	7.0-12	.05	.10			
	5-20	60-90	0-25	0-5	1.25-1.50	6-20	0.05-0.14	0.0-2.9	1.0-4.0	.02	.02			
	20-36	70-100	0-20	0-5	1.25-1.50	6-20	0.01-0.05	0.0-2.9	0.8-3.5	.02	.05			
	36-60	70-100	0-15	0-5	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
3005:														
San Juan----------	0-4	45-75	15-50	2-12	1.10-1.45	2-6	0.09-0.13	0.0-2.9	7.0-12	.15	.15	5	3	86
	4-13	45-75	15-50	2-12	0.80-1.50	2-20	0.07-0.13	0.0-2.9	6.0-12	.15	.15			
	13-19	45-75	15-50	2-12	0.80-1.50	2-20	0.07-0.13	0.0-2.9	3.0-6.0	.15	.15			
	19-27	65-85	5-35	0-8	1.10-1.50	2-20	0.01-0.06	0.0-2.9	1.0-4.0	.02	.02			
	27-41	75-95	5-25	0-5	1.50-1.70	6-20	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
	41-62	75-100	0-25	0-5	1.50-1.70	6-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
	62-70	75-100	0-25	0-5	1.50-1.70	6-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
3006:														
San Juan----------	0-4	45-75	15-50	2-12	1.10-1.45	2-6	0.09-0.13	0.0-2.9	7.0-12	.15	.15	5	3	86
	4-13	45-75	15-50	2-12	0.80-1.50	2-20	0.07-0.13	0.0-2.9	6.0-12	.15	.15			
	13-19	45-75	15-50	2-12	0.80-1.50	2-20	0.07-0.13	0.0-2.9	3.0-6.0	.15	.15			
	19-27	65-85	5-35	0-8	1.10-1.50	2-20	0.01-0.06	0.0-2.9	1.0-4.0	.02	.02			
	27-41	75-95	5-25	0-5	1.50-1.70	6-20	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
	41-62	75-100	0-25	0-5	1.50-1.70	6-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
	62-70	75-100	0-25	0-5	1.50-1.70	6-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
3007:														
San Juan	0-4	45-75	15-50	2-12	1.10-1.45	2-6	0.09-0.13	0.0-2.9	7.0-12	.15	.15	5	3	86
	4-13	45-75	15-50	2-12	0.80-1.50	2-20	0.07-0.13	0.0-2.9	6.0-12	.15	.15			
	13-19	45-75	15-50	2-12	0.80-1.50	2-20	0.07-0.13	0.0-2.9	3.0-6.0	.15	.15			
	19-27	65-85	5-35	0-8	1.10-1.50	2-20	0.01-0.06	0.0-2.9	1.0-4.0	.02	.02			
	27-41	75-95	5-25	0-5	1.50-1.70	6-20	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
	41-62	75-100	0-25	0-5	1.50-1.70	6-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
	62-70	75-100	0-25	0-5	1.50-1.70	6-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
3008:														
Xerorthents	0-1	75-95	0-10	0-3	1.25-1.50	20-101	0.01-0.04	0.0-2.9	3.0-6.0	.02	.02	5	1	220
	1-20	80-100	0-5	0-3	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.05			
	20-60	80-100	0-5	0-3	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.05			
Endoaquents, tidal	0-29	70-100	0-25	0-3	1.50-1.70	20-101	0.01-0.06	0.0-2.9	0.5-1.2	.02	.05	5	1	220
	29-48	85-100	0-15	0-3	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.05			
	48-60	85-100	0-15	0-3	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-0.8	.02	.05			
3010:														
San Juan	0-4	45-75	15-50	2-12	1.10-1.45	2-6	0.09-0.13	0.0-2.9	7.0-12	.15	.15	5	3	86
	4-13	45-75	15-50	2-12	0.80-1.50	2-20	0.07-0.13	0.0-2.9	6.0-12	.15	.15			
	13-19	45-75	15-50	2-12	0.80-1.50	2-20	0.07-0.13	0.0-2.9	3.0-6.0	.15	.15			
	19-27	65-85	5-35	0-8	1.10-1.50	2-20	0.01-0.06	0.0-2.9	1.0-4.0	.02	.02			
	27-41	75-95	5-25	0-5	1.50-1.70	6-20	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
	41-62	75-100	0-25	0-5	1.50-1.70	6-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
	62-70	75-100	0-25	0-5	1.50-1.70	6-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
Dune land	0-60	---	---	0-1	1.40-1.60	6-20	0.03-0.05	0.0-2.9	0.0-0.1	.17	.17	5	1	250
3012:														
Hoypus	0-1	55-75	0-30	0-15	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	5	3	86
	1-5	55-75	0-30	0-15	1.10-1.45	2-6	0.05-0.13	0.0-2.9	7.0-12	.05	.10			
	5-20	60-90	0-25	0-5	1.25-1.50	6-20	0.05-0.14	0.0-2.9	1.0-4.0	.02	.02			
	20-36	70-100	0-20	0-5	1.25-1.50	6-20	0.01-0.05	0.0-2.9	0.8-3.5	.02	.05			
	36-60	70-100	0-15	0-5	1.50-1.70	20-101	0.01-0.04	0.0-2.9	0.2-1.0	.02	.02			
3013:														
Everett	0-2	50-75	10-45	0-25	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	5	3	86
	2-9	50-75	10-35	5-12	1.10-1.45	2-6	0.09-0.13	0.0-2.9	7.0-12	.10	.15			
	9-13	50-85	5-35	2-12	1.10-1.45	2-6	0.12-0.21	0.0-2.9	1.0-4.0	.10	.17			
	13-30	70-95	5-25	0-5	1.10-1.50	6-20	0.02-0.07	0.0-2.9	0.5-3.0	.02	.05			
	30-60	70-95	5-25	0-4	1.50-1.70	20-101	0.02-0.04	0.0-2.9	0.2-1.0	.02	.02			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
3014:														
Everett	0-2	50-75	10-45	0-25	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	5	3	86
	2-9	50-75	10-35	5-12	1.10-1.45	2-6	0.09-0.13	0.0-2.9	7.0-12	.10	.15			
	9-13	50-85	5-35	2-12	1.10-1.45	2-6	0.12-0.21	0.0-2.9	1.0-4.0	.10	.17			
	13-30	70-95	5-25	0-5	1.10-1.50	6-20	0.02-0.07	0.0-2.9	0.5-3.0	.02	.05			
	30-60	70-95	5-25	0-4	1.50-1.70	6-20	0.02-0.04	0.0-2.9	0.2-1.0	.02	.02			
5000:														
Cady	0-1	35-50	30-50	8-15	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	1	2	86
	1-4	35-50	30-50	8-15	0.80-1.20	0.6-2	0.14-0.18	0.0-2.9	7.0-12	.24	.28			
	4-16	40-75	20-50	5-15	0.80-1.20	2-6	0.08-0.27	0.0-2.9	1.0-4.0	.17	.24			
	16-26	---	---	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	---	---	---	---	---	---	---	---
Roche	0-1	35-75	10-50	0-18	0.10-0.30	6-101	0.30-0.60	---	60-90	---	---	4	5	56
	1-5	35-75	10-50	5-18	0.80-1.20	0.6-3	0.14-0.18	0.0-2.9	7.0-12	.20	.24			
	5-15	35-85	5-50	2-18	0.80-1.40	1-6	0.12-0.22	0.0-2.9	1.0-4.0	.10	.15			
	15-23	35-85	5-50	2-18	1.50-1.75	0.2-0.6	0.10-0.18	0.0-2.9	0.5-2.0	.32	.37			
	23-39	35-75	10-50	5-18	1.70-1.90	0.2-0.6	0.10-0.18	0.0-2.9	0.2-1.0	.37	.43			
	39-60	15-70	30-75	8-18	---	0.0015-0.06	0.00-0.00	0.0-2.9	0.2-1.0	.55	.64			
5006:														
Cady	0-1	35-50	30-50	8-15	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	1	2	86
	1-4	35-50	30-50	8-15	0.80-1.20	0.6-2	0.14-0.18	0.0-2.9	7.0-12	.24	.28			
	4-16	40-75	20-50	5-15	0.80-1.20	2-6	0.09-0.26	0.0-2.9	1.0-4.0	.17	.24			
	16-26	---	---	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	---	---	---	---	---	---	---	---
Doebay	0-1	45-70	20-40	5-16	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	2	5	56
	1-6	45-70	20-40	5-16	0.80-1.20	0.6-2	0.14-0.18	0.0-2.9	7.0-12	.28	.37			
	6-16	50-75	20-40	5-16	1.10-1.45	0.6-6	0.14-0.25	0.0-2.9	1.0-4.0	.17	.24			
	16-21	50-75	20-40	5-16	0.80-1.30	0.6-6	0.05-0.14	0.0-2.9	0.5-2.0	.10	.37			
	21-35	60-80	15-30	2-12	1.10-1.45	2-6	0.02-0.07	0.0-2.9	0.2-1.0	.05	.28			
	35-45	---	---	---	---	---	---	---	---	---	---			
5007:														
Haro	0-1	35-55	30-45	8-15	0.80-1.45	0.6-20	0.14-0.18	0.0-2.9	7.0-12	.17	.24	1	5	56
	1-5	40-65	20-45	5-15	0.80-1.45	2-20	0.07-0.18	0.0-2.9	4.0-8.0	.15	.24			
	5-11	55-70	20-40	5-15	1.10-1.45	2-20	0.07-0.13	0.0-2.9	1.0-4.0	.10	.17			
	11-21	---	---	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
5007:														
Hiddenridge----------	0-1	50-75	10-45	5-18	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	3	4	86
	1-3	50-75	10-45	5-18	1.10-1.45	2-6	0.06-0.09	0.0-2.9	7.0-12	.02	.02			
	3-24	45-75	10-45	5-18	0.80-1.45	2-20	0.03-0.12	0.0-2.9	4.0-9.0	.02	.02			
	24-57	55-80	5-40	0-18	1.10-1.45	2-20	0.01-0.08	0.0-2.9	0.2-1.0	.02	.15			
	57-60	---	---	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	---	---	---	---
5008:														
Doebay----------	0-1	45-70	20-40	5-16	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	2	5	56
	1-6	45-70	20-40	5-16	0.80-1.20	0.6-2	0.14-0.18	0.0-2.9	7.0-12	.28	.37			
	6-16	50-75	20-40	5-16	1.10-1.45	0.6-6	0.14-0.25	0.0-2.9	1.0-4.0	.17	.24			
	16-21	50-75	20-40	5-16	0.80-1.30	0.6-6	0.05-0.14	0.0-2.9	0.5-2.0	.10	.37			
	21-35	60-80	15-30	2-12	1.10-1.45	2-6	0.02-0.07	0.0-2.9	0.2-1.0	.05	.28			
	35-45	---	---	---	---	---	---	---	---	---	---			
Cady----------	0-1	35-50	30-50	8-15	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	1	2	86
	1-4	35-50	30-50	8-15	0.80-1.20	0.6-2	0.14-0.18	0.0-2.9	7.0-12	.24	.28			
	4-16	40-73	20-50	5-15	0.80-1.20	2-6	0.09-0.26	0.0-2.9	1.0-4.0	.17	.24			
	16-26	---	---	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	---	---	---	---
5009:														
Haro----------	0-1	35-55	30-45	8-15	0.80-1.45	0.6-20	0.14-0.18	0.0-2.9	7.0-12	.17	.24	1	5	56
	1-5	40-65	20-45	5-15	0.80-1.45	2-20	0.07-0.18	0.0-2.9	4.0-8.0	.15	.24			
	5-11	55-70	20-40	5-15	1.10-1.45	2-20	0.07-0.13	0.0-2.9	1.0-4.0	.10	.17			
	11-21	---	---	---	---	---	---	---	---	---	---			
Hiddenridge----------	0-1	50-75	10-45	5-18	0.10-0.30	6-101	0.05-0.10	---	60-95	---	---	3	4	86
	1-3	50-75	10-45	5-18	1.10-1.45	2-6	0.06-0.09	0.0-2.9	7.0-12	.02	.02			
	3-24	45-75	10-45	5-18	0.80-1.45	2-20	0.03-0.12	0.0-2.9	4.0-9.0	.02	.02			
	24-57	55-80	5-40	0-18	1.10-1.45	2-20	0.01-0.08	0.0-2.9	0.2-1.0	.02	.15			
	57-60	---	---	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and component name	Depth	Cation exchange capacity	Soil reaction	Calcium carbonate	Salinity	Sodium adsorption ratio
	In	*meq/100 g*	*pH*	*Pct*	*mmhos/cm*	
999:						
Fresh water----------	---	---	---	---	---	---
1000:						
Spieden, undrained---	0-4	23-66	6.1-6.5	0	0	0
	4-11	17-40	6.1-6.5	0	0	0
	11-24	0.0-4.0	6.6-7.3	0	0	0
	24-36	0.0-4.0	6.6-7.3	0	0	0
	36-48	0.0-4.0	6.6-7.3	0	0	0
	48-60	0.0-4.0	6.6-7.3	0	0	0
Spieden, drained-----	0-4	23-66	6.1-6.5	0	0	0
	4-11	17-40	6.1-6.5	0	0	0
	11-24	0.0-4.0	6.6-7.3	0	0	0
	24-36	0.0-4.0	6.6-7.3	0	0	0
	36-48	0.0-4.0	6.6-7.3	0	0	0
	48-60	0.0-4.0	6.6-7.3	0	0	0
Sholander, undrained	0-8	19-40	5.6-6.0	0	0	0
	8-16	2.0-11	5.6-6.0	0	0	0
	16-28	0.0-7.0	5.6-6.0	0	0	0
	28-51	0.0-4.0	5.6-6.0	0	0	0
	51-60	7.0-16	6.1-6.5	0	0	0
Sholander, drained---	0-8	19-40	5.6-6.0	0	0	0
	8-16	2.0-11	5.6-6.0	0	0	0
	16-28	0.0-7.0	5.6-6.0	0	0	0
	28-51	0.0-4.0	5.6-6.0	0	0	0
	51-60	7.0-16	6.1-6.5	0	0	0
1004:						
Limepoint, undrained	0-6	13-34	5.6-6.0	0	0	0
	6-14	13-34	5.6-6.0	0	0	0
	14-31	0.0-16	6.1-6.5	0	0	0
	31-49	0.0-16	6.6-7.3	0	0	0
	49-58	0.0-16	6.6-7.3	0	0	0
	58-60	13-36	7.4-7.8	0	0	0
Limepoint, drained---	0-6	13-34	5.6-6.0	0	0	0
	6-14	13-34	5.6-6.0	0	0	0
	14-31	0.0-16	6.1-6.5	0	0	0
	31-49	0.0-16	6.6-7.3	0	0	0
	49-58	0.0-16	6.6-7.3	0	0	0
	58-60	13-36	7.4-7.8	0	0	0
Sholander, undrained	0-8	19-40	5.6-6.0	0	0	0
	8-16	2.0-11	5.6-6.0	0	0	0
	16-28	0.0-7.0	5.6-6.0	0	0	0
	28-51	0.0-4.0	5.6-6.0	0	0	0
	51-60	7.0-16	6.1-6.5	0	0	0
Sholander, drained---	0-8	19-40	5.6-6.0	0	0	0
	8-16	2.0-11	5.6-6.0	0	0	0
	16-28	0.0-7.0	5.6-6.0	0	0	0
	28-51	0.0-4.0	5.6-6.0	0	0	0
	51-60	7.0-16	6.1-6.5	0	0	0
Shalcar, undrained---	0-3	40-120	4.5-5.0	0	0	0
	3-11	40-120	4.5-5.0	0	0	0
	11-22	40-120	4.5-5.0	0	0	0
	22-27	2.0-16	5.6-6.5	0	0	0
	27-44	2.0-16	5.6-6.5	0	0	0
	44-60	2.0-16	5.6-6.5	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and component name	Depth	Cation exchange capacity	Soil reaction	Calcium carbonate	Salinity	Sodium adsorption ratio
	In	*meq/100 g*	*pH*	*Pct*	*mmhos/cm*	
1009:						
Coveland	0-4	13-34	6.1-6.5	0	0	0
	4-9	9.0-30	6.1-6.5	0	0	0
	9-20	4.0-22	6.6-7.3	0	0	0
	20-36	16-31	6.1-6.5	0	0	0
	36-44	16-31	6.1-6.5	0	0	0
	44-60	16-31	6.6-7.3	0	0	0
Mitchellbay	0-1	---	3.5-5.5	0	0	0
	1-5	19-47	4.5-5.5	0	0	0
	5-13	4.0-24	5.6-6.0	0	0	0
	13-19	3.0-14	5.6-6.0	0	0	0
	19-34	13-24	6.6-7.3	0	0	0
	34-60	13-24	6.6-7.3	0	0	0
1013:						
Bazal, undrained	0-1	---	5.6-6.0	---	---	---
	1-4	27-68	5.6-6.0	0	0	0
	4-10	21-42	6.6-7.3	0	0	0
	10-17	2.0-22	6.6-7.3	0	0	0
	17-24	2.0-16	6.6-7.3	0	0	0
	24-39	16-29	6.6-7.3	0	0	0
	39-60	13-21	7.4-7.8	0	0	0
Bazal, drained	0-1	---	5.6-6.0	---	---	---
	1-4	27-68	5.6-6.0	0	0	0
	4-10	21-42	6.6-7.3	0	0	0
	10-17	2.0-22	6.6-7.3	0	0	0
	17-24	2.0-16	6.6-7.3	0	0	0
	24-39	16-29	6.6-7.3	0	0	0
	39-60	13-21	7.4-7.8	0	0	0
Mitchellbay	0-1	---	3.5-5.5	0	0	0
	1-5	19-47	4.5-5.5	0	0	0
	5-13	4.0-24	5.6-6.0	0	0	0
	13-19	3.0-14	5.6-6.0	0	0	0
	19-34	13-24	6.6-7.3	0	0	0
	34-60	13-24	6.6-7.3	0	0	0
1014:						
Endoaquents, tidal	0-29	0.0-2.0	5.1-5.5	0	0.3-3.0	0-2
	29-48	0.0-2.0	6.6-7.3	0	0.3-3.0	0-2
	48-60	0.0-2.0	6.6-7.3	0	0.3-3.0	0-2
Xerorthents	0-1	4.0-12	5.6-6.0	0	0	0
	1-20	0.0-2.0	6.1-6.5	0	0	0
	20-60	0.0-2.0	6.6-7.3	0	0	0
2001:						
Mitchellbay	0-1	---	4.5-5.5	0	0	0
	1-5	19-47	4.5-5.5	0	0	0
	5-13	4.0-24	5.6-6.0	0	0	0
	13-19	3.0-14	5.6-6.0	0	0	0
	19-34	13-24	6.6-7.3	0	0	0
	34-60	13-24	6.6-7.3	0	0	0
2002:						
Sucia	0-9	10-25	5.5-6.0	0	0	0
	9-19	0.0-12	5.6-6.0	0	0	0
	19-27	0.0-4.0	6.1-6.5	0	0	0
	27-33	0.0-4.0	6.1-6.5	0	0	0
	33-47	0.0-7.0	6.6-7.3	0	0	0
	47-60	7.0-16	6.6-7.3	0	0	0
2004:						
Mitchellbay	0-1	---	3.5-5.5	0	0	0
	1-5	19-47	4.5-5.5	0	0	0
	5-13	4.0-24	5.6-6.0	0	0	0
	13-19	3.0-14	5.6-6.0	0	0	0
	19-34	13-24	6.6-7.3	0	0	0
	34-60	13-24	6.6-7.3	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and component name	Depth	Cation exchange capacity	Soil reaction	Calcium carbonate	Salinity	Sodium adsorption ratio
	In	*meq/100 g*	*pH*	*Pct*	*mmhos/cm*	
3000:						
Pilepoint	0-4	15-35	6.1-6.5	0	0	0
	4-13	14-29	6.1-6.5	0	0	0
	13-22	2.0-17	6.6-7.3	0	0	0
	22-29	2.0-13	6.6-7.3	0	0	0
	29-36	9.0-31	6.6-7.3	0	0	0
	36-46	9.0-31	6.6-7.3	0	0	0
	46-60	9.0-31	7.4-7.8	0	0	0
3001:						
Hoypus	0-1	---	3.5-5.5	0	0	0
	1-5	12-31	5.1-5.6	0	0	0
	5-20	0.0-10	5.1-5.6	0	0	0
	20-36	0.0-8.0	5.2-5.7	0	0	0
	36-60	0.0-4.0	5.5-6.1	0	0	0
3005:						
San Juan	0-4	12-35	5.1-5.5	0	0	0
	4-13	12-35	5.6-6.0	0	0	0
	13-19	6.0-21	6.1-6.5	0	0	0
	19-27	0.0-13	6.1-6.5	0	0	0
	27-41	0.0-4.0	6.6-7.3	0	0	0
	41-62	0.0-4.0	6.6-7.3	0	0	0
	62-70	0.0-4.0	6.6-7.3	0	0	0
3006:						
San Juan	0-4	12-35	5.1-5.5	0	0	0
	4-13	12-35	5.6-6.0	0	0	0
	13-19	6.0-21	6.1-6.5	0	0	0
	19-27	0.0-13	6.1-6.5	0	0	0
	27-41	0.0-4.0	6.6-7.3	0	0	0
	41-62	0.0-4.0	6.6-7.3	0	0	0
	62-70	0.0-4.0	6.6-7.3	0	0	0
3007:						
San Juan	0-4	12-35	5.1-5.5	0	0	0
	4-13	12-35	5.6-6.0	0	0	0
	13-19	6.0-21	6.1-6.5	0	0	0
	19-27	0.0-13	6.1-6.5	0	0	0
	27-41	0.0-4.0	6.6-7.3	0	0	0
	41-62	0.0-4.0	6.6-7.3	0	0	0
	62-70	0.0-4.0	6.6-7.3	0	0	0
3008:						
Xerorthents	0-1	4.0-12	5.6-6.0	0	0	0
	1-20	0.0-2.0	6.1-6.5	0	0	0
	20-60	0.0-2.0	6.6-7.3	0	0	0
Endoaquents, tidal	0-29	0.0-2.0	5.1-5.5	0	0.3-3.0	0-2
	29-48	0.0-2.0	6.6-7.3	0	0.3-3.0	0-2
	48-60	0.0-2.0	6.6-7.3	0	0.3-3.0	0-2
3010:						
San Juan	0-4	12-35	5.1-5.5	0	0	0
	4-13	12-35	5.6-6.0	0	0	0
	13-19	6.0-21	6.1-6.5	0	0	0
	19-27	0.0-13	6.1-6.5	0	0	0
	27-41	0.0-4.0	6.6-7.3	0	0	0
	41-62	0.0-4.0	6.6-7.3	0	0	0
	62-70	0.0-4.0	6.6-7.3	0	0	0
Dune land	0-60	---	6.6-7.3	---	---	---
3012:						
Hoypus	0-1	---	3.5-5.5	0	0	0
	1-5	12-31	5.1-5.6	0	0	0
	5-20	0.0-10	5.1-5.6	0	0	0
	20-36	0.0-8.0	5.2-5.7	0	0	0
	36-60	0.0-4.0	5.5-6.1	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and component name	Depth	Cation exchange capacity	Soil reaction	Calcium carbonate	Salinity	Sodium adsorption ratio
	In	*meq/100 g*	*pH*	*Pct*	*mmhos/cm*	
3013:						
Everett	0-2	120-213	3.5-5.5	0	0	0
	2-9	16-35	5.1-5.7	0	0	0
	9-13	2.0-17	5.3-6.0	0	0	0
	13-30	0.0-8.0	5.5-6.2	0	0	0
	30-60	0.0-2.0	5.6-6.2	0	0	0
3014:						
Everett	0-2	120-213	3.5-5.5	0	0	0
	2-9	16-35	5.1-5.7	0	0	0
	9-13	2.0-17	5.3-6.0	0	0	0
	13-30	0.0-8.0	5.5-6.2	0	0	0
	30-60	0.0-2.0	5.6-6.2	0	0	0
5000:						
Cady	0-1	---	5.6-6.0	0	0	0
	1-4	12-31	5.6-6.0	0	0	0
	4-16	4.0-21	5.6-6.0	0	0	0
	16-26	---	7.4-7.8	---	---	---
Rock outcrop	0-60	---	---	---	---	---
Roche	0-1	---	3.5-5.5	0	0	0
	1-5	16-40	5.6-6.0	0	0	0
	5-15	2.0-22	5.6-6.2	0	0	0
	15-23	2.0-18	5.6-6.2	0	0	0
	23-39	4.0-16	6.6-7.3	0	0	0
	39-60	7.0-16	6.6-7.3	0	0	0
5006:						
Cady	0-1	---	5.6-6.0	0	0	0
	1-4	12-31	5.6-6.0	0	0	0
	4-16	4.0-21	5.6-6.0	0	0	0
	16-26	---	7.4-7.8	---	---	---
Rock outcrop	0-60	---	---	---	---	---
Doebay	0-1	0.0-0.0	5.6-6.0	0	0	0
	1-6	12-32	5.1-6.0	0	0	0
	6-16	4.0-22	5.1-6.0	0	0	0
	16-21	4.0-16	5.1-6.0	0	0	0
	21-35	2.0-11	5.1-6.0	0	0	0
	35-45	---	---	---	---	---
5007:						
Haro	0-1	19-38	5.1-5.5	0	0	0
	1-5	10-27	5.1-5.5	0	0	0
	5-11	4.0-19	5.6-6.0	0	0	0
	11-21	---	---	---	---	---
Hiddenridge	0-1	---	3.5-5.5	0	0	0
	1-3	16-40	5.1-5.5	0	0	0
	3-24	10-32	5.1-5.5	0	0	0
	24-57	0.0-16	5.1-5.5	0	0	0
	57-60	---	---	---	---	---
Rock outcrop	0-60	---	---	---	---	---
5008:						
Doebay	0-1	0.0-0.0	5.6-6.0	0	0	0
	1-6	12-32	5.1-6.0	0	0	0
	6-16	4.0-22	5.1-6.0	0	0	0
	16-21	4.0-16	5.1-6.0	0	0	0
	21-35	2.0-11	5.1-6.0	0	0	0
	35-45	---	---	---	---	---
Cady	0-1	---	5.6-6.0	0	0	0
	1-4	12-31	5.6-6.0	0	0	0
	4-16	4.0-21	5.6-6.0	0	0	0
	16-26	---	7.4-7.8	---	---	---
Rock outcrop	0-60	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and component name	Depth	Cation exchange capacity	Soil reaction	Calcium carbonate	Salinity	Sodium adsorption ratio
	In	*meq/100 g*	*pH*	*Pct*	*mmhos/cm*	
5009:						
Haro----------	0-1	16-38	5.1-5.5	0	0	0
	1-5	10-27	5.1-5.5	0	0	0
	5-11	4.0-19	5.6-6.0	0	0	0
	11-21	---	---	---	---	---
Hiddenridge----------	0-1	---	3.5-5.5	0	0	0
	1-3	16-40	5.1-5.5	0	0	0
	3-24	10-32	5.1-5.5	0	0	0
	24-57	0.0-16	5.1-5.5	0	0	0
	57-60	---	---	---	---	---
Rock outcrop---------	0-60	---	---	---	---	---

Table 19.--Water Features

(Depths of layers are in inches. 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 component name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			In	*In*	*In*				
999:									
Fresh water									
1000:									
Spieden, undrained	D								
		January	0	>72	3-9	Very long	Frequent	---	None
		February	0	>72	3-9	Very long	Frequent	---	None
		March	0	>72	3-9	Very long	Frequent	---	None
		April	0-11	>72	1-6	Brief	Frequent	---	None
		June	36-48	>72	---	---	None	---	None
		July	36-48	>72	---	---	None	---	None
		August	36-48	>72	---	---	None	---	None
		September	36-48	>72	---	---	None	---	None
		October	0-36	>72	1-6	Brief	Frequent	---	None
		November	0-36	>72	1-6	Brief	Frequent	---	None
		December	0	>72	3-9	Very long	Frequent	---	None
Spieden, drained	D								
		January	11	>72	---	---	None	---	None
		February	11	>72	---	---	None	---	None
		March	11	>72	---	---	None	---	None
		April	11	>72	---	---	None	---	None
		May	11-24	>72	---	---	None	---	None
		June	36-48	>72	---	---	None	---	None
		July	36-48	>72	---	---	None	---	None
		August	36-48	>72	---	---	None	---	None
		September	36-48	>72	---	---	None	---	None
		October	11-36	>72	---	---	None	---	None
		November	11-36	>72	---	---	None	---	None
		December	11	>72	---	---	None	---	None
Sholander, undrained	D								
		January	0-16	40-60	1-6	Long	Frequent	---	None
		February	0-16	40-60	1-6	Long	Frequent	---	None
		March	8-28	40-60	1-6	Long	Frequent	---	None
		April	16-28	40-60	0-2	Brief	Frequent	---	None
		May	28-51	40-60	---	---	None	---	None
		October	0-51	40-60	0-2	Brief	Frequent	---	None
		November	0-16	40-60	0-2	Brief	Frequent	---	None
		December	0-16	40-60	1-6	Long	Frequent	---	None

Table 19.--Water Features--Continued

Map symbol and component name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			In	*In*	*In*				
1000:									
Sholander, drained	D								
		January	16	40-60	---	---	None	---	None
		February	16	40-60	---	---	None	---	None
		March	16-28	40-60	---	---	None	---	None
		April	16-28	40-60	---	---	None	---	None
		May	28-51	40-60	---	---	None	---	None
		October	16-51	40-60	---	---	None	---	None
		November	16	40-60	---	---	None	---	None
		December	16	40-60	---	---	None	---	None
1004:									
Limepoint, undrained	D								
		January	0	40-60	1-6	Brief	Occasional	---	None
		February	0	40-60	1-6	Brief	Occasional	---	None
		March	0	40-60	1-6	Brief	Occasional	---	None
		April	0-14	40-60	0-2	Very brief	Occasional	---	None
		May	14-31	40-60	---	---	None	---	None
		June	31-49	40-60	---	---	None	---	None
		July	31-58	40-60	---	---	None	---	None
		August	31-58	40-60	---	---	None	---	None
		September	31-58	40-60	---	---	None	---	None
		October	0-31	40-60	0-2	Very brief	Occasional	---	None
		November	0-14	40-60	0-2	Very brief	Occasional	---	None
		December	0	40-60	1-6	Brief	Occasional	---	None
Limepoint, drained	D								
		January	14	40-60	---	---	None	---	None
		February	14	40-60	---	---	None	---	None
		March	14	40-60	---	---	None	---	None
		April	14	40-60	---	---	None	---	None
		May	14-31	40-60	---	---	None	---	None
		June	31-49	40-60	---	---	None	---	None
		July	31-58	40-60	---	---	None	---	None
		August	31-58	40-60	---	---	None	---	None
		September	31-58	40-60	---	---	None	---	None
		October	14-49	40-60	---	---	None	---	None
		November	14	40-60	---	---	None	---	None
		December	14	40-60	---	---	None	---	None
Sholander, undrained	D								
		January	0-16	40-60	0-2	Brief	Occasional	---	None
		February	0-16	40-60	0-2	Brief	Occasional	---	None
		March	8-28	40-60	0-2	Brief	Occasional	---	None
		April	16-28	40-60	---	---	None	---	None
		May	28-51	40-60	---	---	None	---	None
		October	0-51	40-60	---	---	None	---	None
		November	0-16	40-60	---	---	None	---	None
		December	0-16	40-60	0-2	Brief	Occasional	---	None

Table 19.--Water Features--Continued

Map symbol and component name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			In	*In*	*In*				
1004:									
Sholander, drained	D								
		January	16	40-60	---	---	None	---	None
		February	16	40-60	---	---	None	---	None
		March	16-28	40-60	---	---	None	---	None
		April	16-28	40-60	---	---	None	---	None
		May	28-51	40-60	---	---	None	---	None
		October	16-51	40-60	---	---	None	---	None
		November	16	40-60	---	---	None	---	None
		December	16	40-60	---	---	None	---	None
1009:									
Coveland	B								
		January	0-9	40-60	---	---	None	---	None
		February	0-9	40-60	---	---	None	---	None
		March	0-9	40-60	---	---	None	---	None
		April	9-20	40-60	---	---	None	---	None
		May	20-36	40-60	---	---	None	---	None
		June	36-44	40-60	---	---	None	---	None
		October	9-36	40-60	---	---	None	---	None
		November	0-9	40-60	---	---	None	---	None
		December	0-9	40-60	---	---	None	---	None
Mitchellbay	B								
		January	5-34	20-40	---	---	None	---	None
		February	5-34	20-40	---	---	None	---	None
		March	5-34	20-40	---	---	None	---	None
		April	5-34	20-40	---	---	None	---	None
		May	13-34	20-40	---	---	None	---	None
		October	1-34	20-40	---	---	None	---	None
		November	1-34	20-40	---	---	None	---	None
		December	1-5	20-40	---	---	None	---	None
1013:									
Bazal, undrained	D								
		January	0	20-40	3-9	Very long	Frequent	---	None
		February	0-4	20-40	3-9	Very long	Frequent	---	None
		March	0-4	20-40	3-9	Very long	Frequent	---	None
		April	0-4	20-40	1-6	Brief	Frequent	---	None
		May	10-24	20-41	---	---	None	---	None
		June	24-39	20-40	---	---	None	---	None
		October	0-17	20-40	1-6	Brief	Frequent	---	None
		November	0-4	20-40	1-6	Brief	Frequent	---	None
		December	0	20-40	3-9	Very long	Frequent	---	None

Table 19.--Water Features--Continued

Map symbol and component name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			In	*In*	*In*				
1013:									
Bazal, drained	D								
		January	10	20-40	---	---	None	---	None
		February	10	20-40	---	---	None	---	None
		March	10	20-40	---	---	None	---	None
		April	10	20-40	---	---	None	---	None
		May	10-24	20-40	---	---	None	---	None
		June	24-39	20-40	---	---	None	---	None
		October	10-17	20-40	---	---	None	---	None
		November	10	20-40	---	---	None	---	None
		December	10	20-40	---	---	None	---	None
Mitchellbay	B								
		January	5-34	20-40	1-6	Long	Frequent	---	None
		February	5-34	20-40	1-6	Long	Frequent	---	None
		March	5-34	20-40	1-6	Long	Frequent	---	None
		April	5-34	20-40	0-2	Brief	Frequent	---	None
		May	13-34	20-40	---	---	None	---	None
		October	1-34	20-40	0-2	Brief	Frequent	---	None
		November	1-34	20-40	0-2	Brief	Frequent	---	None
		December	1-5	20-40	1-6	Long	Frequent	---	None
1014:									
Endoaquents, tidal	D								
		January	0	>72	---	---	None	Very long	Very frequent
		February	0	>72	---	---	None	Very long	Very frequent
		March	0	>72	---	---	None	Very long	Very frequent
		April	0	>72	---	---	None	Very long	Very frequent
		May	0	>72	---	---	None	Very long	Very frequent
		June	0	>72	---	---	None	Very long	Very frequent
		July	0	>72	---	---	None	Very long	Very frequent
		August	0	>72	---	---	None	Very long	Very frequent
		September	0	>72	---	---	None	Very long	Very frequent
		October	0	>72	---	---	None	Very long	Very frequent
		November	0	>72	---	---	None	Very long	Very frequent
		December	0	>72	---	---	None	Very long	Very frequent
Xerorthents	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.--Water Features--Continued

Map symbol and component name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			In	*In*	*In*				
2001:									
Mitchellbay	B								
		January	5-34	20-40	0-2	Very brief	Occasional	---	None
		February	5-34	20-40	0-2	Very brief	Occasional	---	None
		March	5-34	20-40	0-2	Very brief	Occasional	---	None
		April	5-34	20-40	---	---	None	---	None
		May	13-34	20-40	---	---	None	---	None
		October	1-34	20-40	---	---	None	---	None
		November	1-34	20-40	---	---	None	---	None
		December	1-5	20-40	0-2	Very brief	Occasional	---	None
2002:									
Sucia	C								
		January	9-27	40-60	---	---	None	---	None
		February	9-27	40-60	---	---	None	---	None
		March	9-27	40-60	---	---	None	---	None
		April	19-33	40-60	---	---	None	---	None
		May	27-33	40-60	---	---	None	---	None
		June	33-47	40-60	---	---	None	---	None
		October	9-33	40-60	---	---	None	---	None
		November	9-27	40-60	---	---	None	---	None
		December	9-27	40-60	---	---	None	---	None
2004:									
Mitchellbay	B								
		January	5-34	20-40	---	---	None	---	None
		February	5-34	20-40	---	---	None	---	None
		March	5-34	20-40	---	---	None	---	None
		April	5-34	20-40	---	---	None	---	None
		May	13-34	20-40	---	---	None	---	None
		October	1-34	20-40	---	---	None	---	None
		November	1-34	20-40	---	---	None	---	None
		December	1-5	20-40	---	---	None	---	None
3000:									
Pilepoint	C								
		January	13-22	33-60	---	---	None	---	None
		February	13-22	33-60	---	---	None	---	None
		March	13-31	33-60	---	---	None	---	None
		April	22-31	33-60	---	---	None	---	None
		May	22-31	33-60	---	---	None	---	None
		June	29-31	33-60	---	---	None	---	None
		October	13-31	33-60	---	---	None	---	None
		November	13-31	33-60	---	---	None	---	None
		December	13-31	33-60	---	---	None	---	None
3001:									
Hoypus	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.--Water Features--Continued

Map symbol and component name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			In	*In*	*In*				
3005:									
San Juan	A								
		Jan-Dec	---	---	---	---	None	---	None
3006:									
San Juan	A								
		Jan-Dec	---	---	---	---	None	---	None
3007:									
San Juan	A								
		Jan-Dec	---	---	---	---	None	---	None
3008:									
Xerorthents	A								
		Jan-Dec	---	---	---	---	None	---	None
Endoaquents, tidal	D								
		January	0	>72	---	---	None	Very long	Very frequent
		February	0	>72	---	---	None	Very long	Very frequent
		March	0	>72	---	---	None	Very long	Very frequent
		April	0	>72	---	---	None	Very long	Very frequent
		May	0	>72	---	---	None	Very long	Very frequent
		June	0	>72	---	---	None	Very long	Very frequent
		July	0	>72	---	---	None	Very long	Very frequent
		August	0	>72	---	---	None	Very long	Very frequent
		September	0	>72	---	---	None	Very long	Very frequent
		October	0	>72	---	---	None	Very long	Very frequent
		November	0	>72	---	---	None	Very long	Very frequent
		December	0	>72	---	---	None	Very long	Very frequent
3010:									
San Juan	A								
		Jan-Dec	---	---	---	---	None	---	None
Dune land	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.--Water Features--Continued

Map symbol and component name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			In	*In*	*In*				
3012:									
Hoypus	A	Jan-Dec	---	---	---	---	None	---	None
3013:									
Everett	A	Jan-Dec	---	---	---	---	None	---	None
3014:									
Everett	A	Jan-Dec	---	---	---	---	None	---	None
5000:									
Cady	D	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D	Jan-Dec	---	---	---	---	None	---	None
5006:									
Cady	D	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D	Jan-Dec	---	---	---	---	None	---	None
Doebay	C	Jan-Dec	---	---	---	---	None	---	None
5007:									
Haro	D	Jan-Dec	---	---	---	---	None	---	None
Hiddenridge	B	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D	Jan-Dec	---	---	---	---	None	---	None
5008:									
Doebay	C	Jan-Dec	---	---	---	---	None	---	None
Cady	D	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D	Jan-Dec	---	---	---	---	None	---	None

Table 19.--Water Features--Continued

Map symbol and component name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			In	*In*	*In*				
5009:									
Haro	D								
		Jan-Dec	---	---	---	---	None	---	None
Hiddenridge	B								
		Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D								
		Jan-Dec	---	---	---	---	None	---	None

Table 20.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and component name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
999:									
Fresh water	---	---	---	---	0	---	---	---	---
1000:									
Spieden, undrained	---	---	---	---	0	---	None	Moderate	Moderate
Spieden, drained	---	---	---	---	0	---	None	Moderate	Moderate
Sholander, undrained	Dense material	40-60	---	Noncemented	0	---	None	Moderate	Moderate
Sholander, drained	Dense material	40-60	---	Noncemented	0	---	None	Moderate	Moderate
1004:									
Limepoint, undrained	Dense material	40-60	---	Noncemented	0	---	None	High	Moderate
Limepoint, drained	Dense material	40-60	---	Noncemented	0	---	None	High	Moderate
Sholander, undrained	Dense material	40-60	---	Noncemented	0	---	None	Moderate	Moderate
Sholander, drained	Dense material	40-60	---	Noncemented	0	---	None	Moderate	Moderate
Shalcar, undrained	---	---	---	---	6-10	16-51	None	High	High
1009:									
Coveland	Dense material	40-60	---	Noncemented	0	---	None	Moderate	Low
Mitchellbay	Dense material	20-40	---	Noncemented	0	---	None	Moderate	Low
1013:									
Bazal, undrained	Dense material	20-40	---	Noncemented	0	---	None	High	Moderate
Bazal, drained	Dense material	20-40	---	Noncemented	0	---	None	High	Moderate
Mitchellbay	Dense material	20-40	---	Noncemented	0	---	None	Moderate	Low
1014:									
Endoaquents, tidal	---	---	---	---	0	---	None	High	Low
Xerorthents	---	---	---	---	0	---	None	Moderate	Moderate
2001:									
Mitchellbay	Dense material	20-40	---	Noncemented	0	---	None	Moderate	Low
2002:									
Sucia	Dense material	40-60	---	Noncemented	0	---	None	Moderate	Moderate

Table 20.--Soil Features--Continued

Map symbol and component name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
2004:									
Mitchellbay	Dense material	20-40	---	Noncemented	0	---	None	Moderate	Low
3000:									
Pilepoint	Dense material	20-40	---	Noncemented	0	---	None	Moderate	Low
3001:									
Hoypus	---	---	---	---	0	---	None	Moderate	High
3005:									
San Juan	---	---	---	---	0	---	None	Moderate	Moderate
3006:									
San Juan	---	---	---	---	0	---	None	Moderate	Moderate
3007:									
San Juan	---	---	---	---	0	---	None	Moderate	Moderate
3008:									
Xerorthents	---	---	---	---	0	---	None	Moderate	Moderate
Endoaquents, tidal	---	---	---	---	0	---	None	High	Low
3010:									
San Juan	---	---	---	---	0	---	None	Moderate	Moderate
Dune land	---	---	---	---	0	---	None	---	---
3012:									
Hoypus	---	---	---	---	0	---	None	Moderate	High
3013:									
Everett	---	---	---	---	0	---	None	Moderate	Low
3014:									
Everett	---	---	---	---	0	---	None	Moderate	Low
5000:									
Cady	Bedrock (lithic)	10-20	---	Indurated	0	---	None	Moderate	Moderate
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	---	---	---
Roche	Dense material	20-40	---	---	---	---	None	Low	Low
5006:									
Cady	Bedrock (lithic)	10-20	---	Indurated	0	---	None	Moderate	Moderate
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	---	---	---
Doebay	Bedrock (lithic)	20-40	---	Indurated	0	---	None	Moderate	Moderate

Table 20.--Soil Features--Continued

Map symbol and component name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
5007:									
Haro	Bedrock (lithic)	10-20	---	Indurated	0	---	None	Moderate	Moderate
Hiddenridge	Bedrock (lithic)	40-60	---	Indurated	0	---	None	Moderate	Moderate
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	---	---	---
5008:									
Doebay	Bedrock (lithic)	20-40	---	Indurated	0	---	None	Moderate	Moderate
Cady	Bedrock (lithic)	10-20	---	Indurated	0	---	None	Moderate	Moderate
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	---	---	---
5009:									
Haro	Bedrock (lithic)	10-20	---	Indurated	0	---	None	Moderate	Moderate
Hiddenridge	Bedrock (lithic)	40-60	---	Indurated	0	---	None	Moderate	Moderate
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	---	---	---

Table 21.--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
Bazal	Fine-loamy, mixed, superactive, mesic Typic Argialbolls
Cady	Loamy, isotic, mesic Lithic Dystroxerepts
Coveland	Fine-loamy, isotic, mesic Aquic Haploxeralfs
Doebay	Loamy-skeletal, isotic, mesic Typic Dystroxerepts
Endoaquents	Endoaquents
*Everett	Sandy-skeletal, mixed, mesic Typic Dystroxerepts
Haro	Loamy, isotic, mesic Lithic Ultic Haploxerolls
Hiddenridge	Loamy-skeletal, isotic, mesic Humic Dystroxerepts
Hoypus	Sandy-skeletal, isotic, mesic Typic Xerorthents
Limepoint	Coarse-loamy, mixed, superactive, mesic Typic Epiaquolls
Mitchellbay	Fine-loamy, mixed, superactive, mesic Aquultic Haploxeralfs
Pilepoint	Fine-loamy, mixed, superactive, mesic Xeric Argialbolls
Roche	Coarse-loamy, isotic, mesic Aquic Dystroxerepts
San Juan	Sandy, isotic, mesic Pachic Ultic Haploxerolls
Shalcar	Loamy, mixed, euic, mesic Terric Haplosaprists
Sholander	Sandy, isotic, mesic Aquic Dystroxerepts
Spieden	Sandy, mixed, mesic Typic Endoaquolls
Sucia	Sandy, isotic, mesic Aquic Xerorthents
Xerorthents	Xerorthents

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