SOIL SURVEY OF

Canyon Area, Idaho

United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of Idaho College of Agriculture
Idaho Agricultural Experiment Station

Issued July 1972

Major fieldwork for this soil survey was completed in 1965. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in this publication refer to conditions in the Area in 1965. This survey was made cooperatively by the Soil Conservation Service, the University of Idaho College of Agriculture, and the Idaho Agricultural Experiment Station. It is part of the technical assistance furnished to the Canyon, South Canyon, and Owyhee Soil and Water Conservation Districts.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, range, and woodland; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of the Canyon Area are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the Area in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the windbreak group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and the windbreak groups.

Foresters and others can refer to the section "Windbreaks" where the soils of the Area are grouped according to their suitability for trees and shrubs.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in the Canyon Area may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the Area given at the beginning of the publication.

Cover: Irrigating potatoes on a Scism silt loam in the Dry Lake area southwest of Nampa. Crops cannot be grown in the Canyon Area without irrigation.

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH UNIVERSITY OF IDAHO COLLEGE OF AGRICULTURE AND IDAHO AGRICULTURAL EXPERIMENT STATION

THE CANYON AREA, in southwestern Idaho, covers 436,160 acres, or 681.5 square miles. It comprises all of Canyon County, an area of 371,200 acres, and 64,960 acres in Owyhee County. Figure 1 shows the location of the Canyon Area in Idaho and gives distances from Caldwell, the county seat of Canyon County, to major towns and cities in the State. Caldwell has a population of about 14,000. Other important towns in Canyon County are Nampa, Middleton, Parma, and Melba. The principal towns in Owyhee County included in the Canyon Area are Marsing and Homedale.

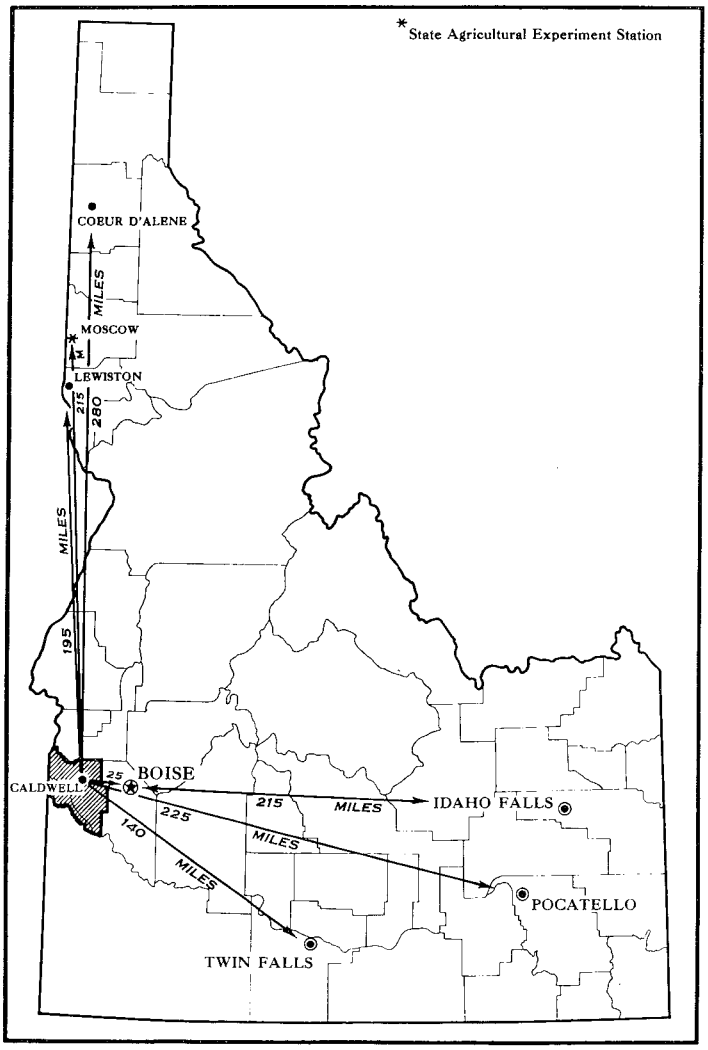

Figure 1.—Location of the Canyon Area in Idaho.

The Canyon Area is in the Payette section of the Columbia Plateaus Province (*3*).[1] It consists of an upland plain of unconsolidated lacustrine and fluviatile materials that has been dissected by the Snake and Boise Rivers. In the Dry Lake area of Canyon County, a few buttelike hills rise above the plain, and the plain is bordered by escarpments 400 to 500 feet high that extend along the Snake River for several miles.

The flood plains of the Snake and Boise Rivers are 1 to 2 miles wide. Terraces that consist of stream-laid and lacustrine deposits rise stepwise above the rivers. Most terraces at low and moderate elevation are not dissected. Bottom lands occur only in small areas along the southern part of the Snake River.

The Area has a semiarid to arid continental climate. Elevation ranges from about 2,200 feet near where the Boise River flows into the Snake River to 3,083 feet at Pickles Butte. Most cultivated soils are at an elevation of 2,200 to 2,700 feet. Annual precipitation is dominantly 8 to 11 inches. It is slightly higher in the northeastern part of the Area, and it is as low as 6 inches in the southwestern part. The average annual temperature is 50° to 52° F., and the frost-free season ranges from 140 to 165 days. The vegetation in most of the Area is mainly big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, giant wildrye, and cheatgrass.

About 85 percent of the Canyon Area is used for irrigated crops or improved pasture. Broad areas of nearly level and gently sloping sandy loams and silt loams are well suited to intensive cultivation. The soils cannot be cultivated without irrigation, but water of excellent quality is available in adequate amounts.

The principal crops are alfalfa and clover for seed and hay, winter and spring wheat, field corn, sweet corn, hybrid sweet corn seed, sugar beets, potatoes, hops, onions, beans, and barley. Specialty crops include lettuce, vegetable seed, and peas. Soils on south-facing slopes near the Snake River are used for cherry, plum, peach, and apple orchards.

[1] Italicized numbers in parentheses refer to Literature Cited, page 114.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Canyon Area, where they are located, and how they can be used. The soil scientists went into the Area knowing they likely would find many soils they had already seen, and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots (*8*).

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Baldock and Bram, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Baldock loam, high water table, 0 to 1 percent slopes, is one of several phases within the Baldock series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Canyon Area: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size, that it is impractical to show them separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. An example is the Feltham-Quincy complex, 0 to 12 percent slopes.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Vanderhoff soils and Badland, 20 to 80 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Very stony land is a land type in Canyon Area.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all of the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Canyon Area, Idaho. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for

selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soils of the Area have been grouped into eight soil associations, each of which has a distinctive proportional pattern of soils. The terms for texture used in the title for the associations apply to the surface layer of the soils. For example, in the title for association 1, the words "silt loams to sandy loams" refer to texture of the surface layer.

The soil associations in the Canyon Area are described in the following pages.

1. Elijah-Lankbush-Vickery Association

Well-drained silt loams to sandy loams on high uplands

This association is in the Black Canyon area in the northern and northeastern parts of Canyon County. Most of this association is hilly or rolling. Long ridges one-sixteenth to a quarter of a mile wide are separated by narrow alluvial bottoms of small intermittent drainageways. Slopes range from about 1 percent on the bottoms to more than 40 percent on the ridges. Willow Creek and Sand Hollow Creek flow through this association. Both creeks flow intermittently in areas of highest elevation. Soils in these higher areas generally are not cultivated.

The annual precipitation is 10 to 12 inches, the mean annual temperature is 50° to 52° F., and 145 to 160 days are frost free. Elevation ranges from 2,200 to 2,700 feet. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, and big sagebrush. Now the dominant vegetation in uncultivated areas is cheatgrass, medusahead wildrye, and big sagebrush.

This association makes up about 13 percent of the survey area. Of this, 60 percent is Elijah soils, 20 percent is Lankbush soils, 10 percent is Vickery soils, and the rest is Sebree, Chilcott, Lolalita, and Jenness soils.

The soils in this association formed in stratified sandy and loamy alluvium derived from acid igneous rock. On hilltops and on broad ridges this parent alluvium had a thin mantle of silt.

Typically the major soils have a silt loam or sandy loam surface layer about 6 inches thick that is light brownish gray when dry and dark grayish brown when moist. The organic-matter content is low. A layer in which lime has accumulated commonly occurs at a depth of 12 to 20 inches.

Elijah and Vickery soils are gently sloping and occur on ridges. The subsoil of Elijah soils is finer textured than that of Vickery soils, and Elijah soils have an indurated hardpan at a depth of about 2 to 3 feet. Lankbush soils are sloping to strongly sloping and do not have an indurated hardpan.

Among the minor soils are Sebree soils that occur as slick spots on ridges, and Jenness soils that occur in deep, alluvial drainageways and on bottoms between the ridges. Lolalita soils are steep and very steep soils of limited acreage that occur on south-facing slopes.

Most of this association is irrigated for crops, mainly corn, small grains, and alfalfa. Sugar beets and other crops also are grown. Most farms have some livestock, and many small dairy herds are in the association. Several thousand acres of soils that are steep and soils that are remote from the irrigation canals are used for range. This association has the largest area of uncultivated soils in the Canyon Area.

Where cultivated, the soils require management that increases organic-matter content and intake of irrigation water. Deep plowing and mixing of the soil layers to a depth of 2 to 3 feet improves the physical characteristics of Sebree and Chilcott soils (fig. 2).

Farms in this association are 120 to 320 acres in size, and most of them are diversified. The trend is toward larger farms. The area under irrigation is being increased through the use of water pumped from deep wells and from canals. The development of irrigation systems that can deliver adequate amounts of water during the peak irrigation season is a concern to all farmers in this association.

2. Moulton-Bram-Baldock Association

Somewhat poorly drained and moderately well drained fine sandy loams to silt loams on lowlands

This association occurs on bottom lands, mainly along the Boise River. Large tracts occur near Middleton, south of Notus, near Parma, and in the area where the Boise River joins the Snake River. The soils are mainly level to gently sloping, and in most places they are cut by old stream channels. Formerly, the soils in this association were flooded every year and natural drainage was poor. Now, storage reservoirs on the rivers prevent floods in most areas. Some soils have been drained by open ditches or tile drains, but the low gradient of the Boise River has hampered the development of good drainage systems, especially in areas south of Notus and near Parma.

The annual precipitation is 10 to 12 inches, the mean annual temperature is 50° to 52° F., and about 145 to 160 days are frost free. The native vegetation on saline-alkali soils was mostly alkali bluegrass, foxtail, barley, greasewood, and saltgrass. On wet soils it was wiregrass, redtop, and sedges, and on better drained, less alkaline soils it was giant wildrye, other bunch grasses, rabbitbrush, and big sagebrush. In swales and basins where the water table was higher, the vegetation was mostly rushes, sedges, and cattails.

This association makes up about 15 percent of the survey area. Of this, 27 percent is Moulton soils, 18 percent is Bram soils, 14 percent is Baldock soils, and the rest is Notus, Falk, Chance, and Letha soils.

The soils in this association formed in alluvium. In most areas they are underlain by gravel and sand at a depth of less than 4 feet.

Moulton soils are somewhat poorly drained and noncalcareous. The surface layer is fine sandy loam or sandy loam, and the subsoil is fine sandy loam. These soils are mottled in the uppermost 20 inches. They occur at low elevations in areas where drainage is poor.

Bram soils are moderately well drained, deep to very deep, and saline-alkali. Both the surface layer and the subsoil are silt loam.

Baldock soils are somewhat poorly drained. The surface layer and subsoil are loam to silt loam over a gravelly substratum.

Chance soils are minor soils in this association. They are poorly drained to very poorly drained and occur in long, narrow strips along old drainageways. Notus soils, also of limited acreage, are somewhat poorly drained and are

Figure 2.—**Deep plowing Chilcott and Sebree soils mixes layers in the profile and eliminates slick spots.**

shallow over gravel. Letha soils are moderately well drained and generally are strongly saline and alkali. Small areas of Riverwash occur along the Boise River and along old stream and river channels.

Where adequately drained, the soils in this association are suited to pasture, grain, and row crops. Moulton, Baldock, and Falk soils are suited to field corn and to clover and grasses for pasture. Because Chance soils are difficult to drain, they are used mostly for pasture. Deep-rooted plants, such as alfalfa or fruit trees, generally do not grow well unless drainage is provided. The very wet areas and Riverwash are not suited to crops, but they are used as wildlife habitat. Where saline-alkali Bram, Letha, or Baldock soils are being reclaimed, tall wheatgrass can be grown. Where the soils of this association are cultivated, leveling and drainage systems are required for good crop growth.

Farms are 80 to 200 acres in size. Many small dairy herds and livestock feeding operations also are in this association.

3. Power-Purdam Association

Well-drained silt loams and loams on high river terraces

This association occurs mostly on high river terraces south of the Boise River near Caldwell, north of Nampa, and near Huston. Slopes are mostly level to very gentle. The terraces are dissected in places by small streams. Soils on the higher parts of the terraces are well drained. Soils on the narrow bottom lands of the streams and in some drainageways are poorly drained in places. Artesian water has made soils seepy in areas near Nampa.

The annual precipitation is 10 to 12 inches, the mean annual temperature is 50° to 52° F., and about 145 to 160 days are frost free. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, and big sagebrush.

This association makes up about 14 percent of the survey area. Of this, 55 percent is Power soils, 32 percent is Purdam soils, and the rest is minor soils.

The Power and Purdam soils have a silt loam or loam surface layer and a silty clay loam and silt loam subsoil. They are underlain by sandy, loamy, or gravelly material at a depth of 2 to 6 feet. The Purdam soils have a hardpan below the subsoil.

Among the minor soils are the somewhat poorly drained Baldock and Draper soils that occur in drainageways throughout the association.

The soils of this association are well suited to sugar beets, field corn, sweet corn, alfalfa, small grains, and pasture. Deep-rooted, long-lived crops grow well. In areas of Purdam soils where the hardpan occurs close to the surface and in areas of low-lying soils where excess water or

poor natural drainage causes a perched water table, crops grow less well.

Management is needed to level the soils for even distribution of irrigaton water. Low-lying soils and soils that have a hardpan require drainage to remove excess water.

4. Greenleaf-Nyssaton-Garbutt Association

Well-drained silt loams on lake terraces and alluvial fans

This association occurs mostly in three areas separated by the Boise and Snake Rivers. The soils are on high lake terraces and alluvial fans. One area is north of the Boise River extending from Caldwell to north of Notus and Parma. Another area is south of the Boise River near Greenleaf and Wilder. A large area also occurs on the higher terraces and fans in Owyhee County south and west of Marsing and Homedale.

The mean annual temperature is 50° to 52° F., and about 145 to 165 days are frost free. The annual precipitation is about 8 to 11 inches; it is lower near the Snake River, and it is very low south of the Snake River.

The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, and big sagebrush. In areas where rainfall is low, the dominant vegetation was big sagebrush, wild barley, squirreltail, shadscale, and greasewood. Practically all of this association is now used for irrigated crops.

This association makes up 21 percent of the survey area. Of this, 20 percent is Greenleaf soils, 20 percent is Nyssaton soils, 20 percent is Garbutt soils, and the rest is minor soils.

Most of the soils are level to gently sloping, and slopes are uniform over wide areas. The soils in this association formed in alluvium or deep lacustrine deposits of silt loam to loam material. In most places, a thin mantle of silt covered the parent material.

Greenleaf soils have a surface layer of light brownish-gray, neutral silt loam and a subsoil of silt loam to silty clay loam. Calcium carbonate has accumulated commonly at a depth of 14 to 22 inches. Depth to underlying stratified sediments ranges from 17 to 40 inches.

Nyssaton soils are calcareous and moderately alkaline in the plow layer. They are underlain by strongly calcareous, nodular silt loam.

Garbutt soils are nearly level to sloping. They occur on alluvial fans and terraces. The surface layer is light brownish-gray, moderately alkaline silt loam. These soils are underlain by moderately calcareous silt loam.

Among the minor soils are Bahem and Vanderhoff soils. The Vanderhoff soils have steep slopes, occur on terraces, and are underlain by siltstone.

The soils in this association are well suited to sugar beets, potatoes, onions, field corn, sweet corn, small grains, alfalfa seed, and hay. The soils are generally fertile, respond well to good management and fertilizer, and are suited to intensive cultivation. Large areas of Greenleaf soils are used to grow hops or vegetables for seed. Alfalfa seed is grown most extensively on Bahem, Garbutt, and Nyssaton soils.

Management is needed to level the soils for uniform distribution and control of irrigation water. Practices that increase or maintain organic-matter content also are important.

Farms in this association generally are about 120 to 200 acres in size. Many farmers work additional acreage of absentee owners. About 10 percent of the farms are 400 to 1,000 acres in size. Most farms are diversified, but some are used for specialty crops, such as hops and seed plants. The trend in land use is toward more intensive farming and the cultivation of specialty crops, such as hops, vegetables, and vegetable seed.

5. Turbyfill-Cencove-Feltham Association

Well-drained and somewhat excessively drained fine sandy loams and loamy fine sands on fans and terraces

This association occurs mostly on terraces near Sunnyslope, Central Cove, and Apple Valley in Canyon County and on low terraces of the Snake River near Marsing and Homedale in Owyhee County. Soils on low terraces and fans are nearly level to gently sloping. Moderately steep soils occur in drainageways, in areas where streams enter the river, and on banks near high terraces.

The mean annual temperature is 50° to 52° F., the annual precipitation is 7 to 10 inches, and about 145 to 165 days are frost free. The native vegetation is mainly big sagebrush, cheatgrass, and other grasses and weeds. In some areas it is mainly wiregrass, saltgrass, and sedges.

This association makes up about 18 percent of the survey area. Of this, 30 percent is Turbyfill soils, 19 percent is Cencove soils, 15 percent is Feltham soils, and the rest is minor soils.

The major soils have a surface layer of light brownish-gray fine sandy loam to loamy fine sand that is neutral to moderately alkaline and is noncalcareous. They are deep, and their permeability is generally moderate. The Turbyfill soils are well drained, and the Feltham soils are somewhat excessively drained. Cencove soils are similar to Turbyfill soils, but they are moderately deep over sand and gravel and are more porous and droughty.

Among the minor soils are Truesdale, Cruickshank, Marsing, and Quincy soils. Truesdale soils are similar to Turbyfill soils but have a cemented hardpan. Cruickshank soils occur in low, wet areas affected by water tables and seepage. Quincy soils were originally sand dunes, but in many places the dunes have been leveled and the soils are used for crops.

The dominant soils in this association are suited to corn, small grains, vegetables and vegetable seed, sugar beets, potatoes, alfalfa seed, alfalfa hay, and pasture grasses. Where air drainage is good and the frost hazard is reduced, fruit trees grow well. Large orchards of cherry, apple, peach, and plum trees are on south-facing slopes near Sunnyslope and Central Cove and also in other areas. The more sandy soils are best suited to pasture grasses, hay, or small grains.

Erosion is a hazard where the soils are cultivated and irrigated. The more sandy and shallow soils have low available water capacity and require more frequent irrigation. The soils generally are low to very low in organic-matter content.

Farms vary greatly in size. Most are 120 to 400 acres. The trend is toward increased acreage in orchards and more intensive cultivation of vegetables and vegetable seed.

6. Scism-Bahem-Trevino Association

Deep and shallow, well-drained silt loams on high plateaus and terraces

This association occurs on high plateaus and terraces south of Lake Lowell in an area extending from Dry Lake and Lakeview to Bowmont and Melba. The soils are shallow to deep over alluvial sediments or basaltic bedrock. The mean annual temperature is 50° to 52° F., mean annual precipitation is 7 to 10 inches, and about 145 to 165 days are frost free. The native vegetation was mainly Sandberg bluegrass, western wheatgrass, big sagebrush, and winterfat.

This association makes up about 9 percent of the survey area. Of this, 54 percent is Scism soils, 21 percent is Bahem soils, 12 percent is Trevino soils, and the rest is minor soils.

Scism soils typically have a surface layer of light brownish-gray, calcareous silt loam. They have wind-laid silty deposits in the upper part and strongly calcareous, compact or very weakly cemented layers of silt loam below a depth of about 16 to 18 inches. They are generally deep to very deep over alluvial sediment or basaltic bedrock.

Bahem soils are underlain by strongly calcareous silt loam that contains a few hard nodules. Depth to alluvial sediments or bedrock is more than 5 feet.

Trevino soils are shallow over bedrock.

Among the minor soils in this association are Turbyfill and Minidoka soils. Small areas of soils that have a sandy loam surface layer or that are shallow over bedrock occur throughout this association, especially in the eastern part.

The soils of this association are well suited to sugar beets, potatoes, field corn, sweet corn, hybrid sweet corn seed, onions, onion seed, alfalfa, and alfalfa seed (fig. 3). They are generally fertile, respond well to good management, and are suited to intensive cultivation. Management is needed to maintain the organic-matter content and reduce soil blowing.

The soils are irrigated with water supplied from canals in the eastern and northern parts of the association, and with water pumped from deep wells and from the Snake River in the western and southern parts. Farms tend to be smaller and more diversified in areas irrigated with water from canals. In the areas where water is pumped, the farms are larger and more extensive farming operations are practiced.

The trend in land use is toward intensive cultivation of vegetables and vegetable seed crops, such as spinach, onions, carrots, lettuce, and radishes. The acreage used for potatoes, sugar beets, hybrid sweet corn seed, and alfalfa and clover seed will probably remain high. Farms in the eastern and northern parts of this association generally are 120 to 320 acres in size; farms 500 to 1,500 acres in size are common elsewhere.

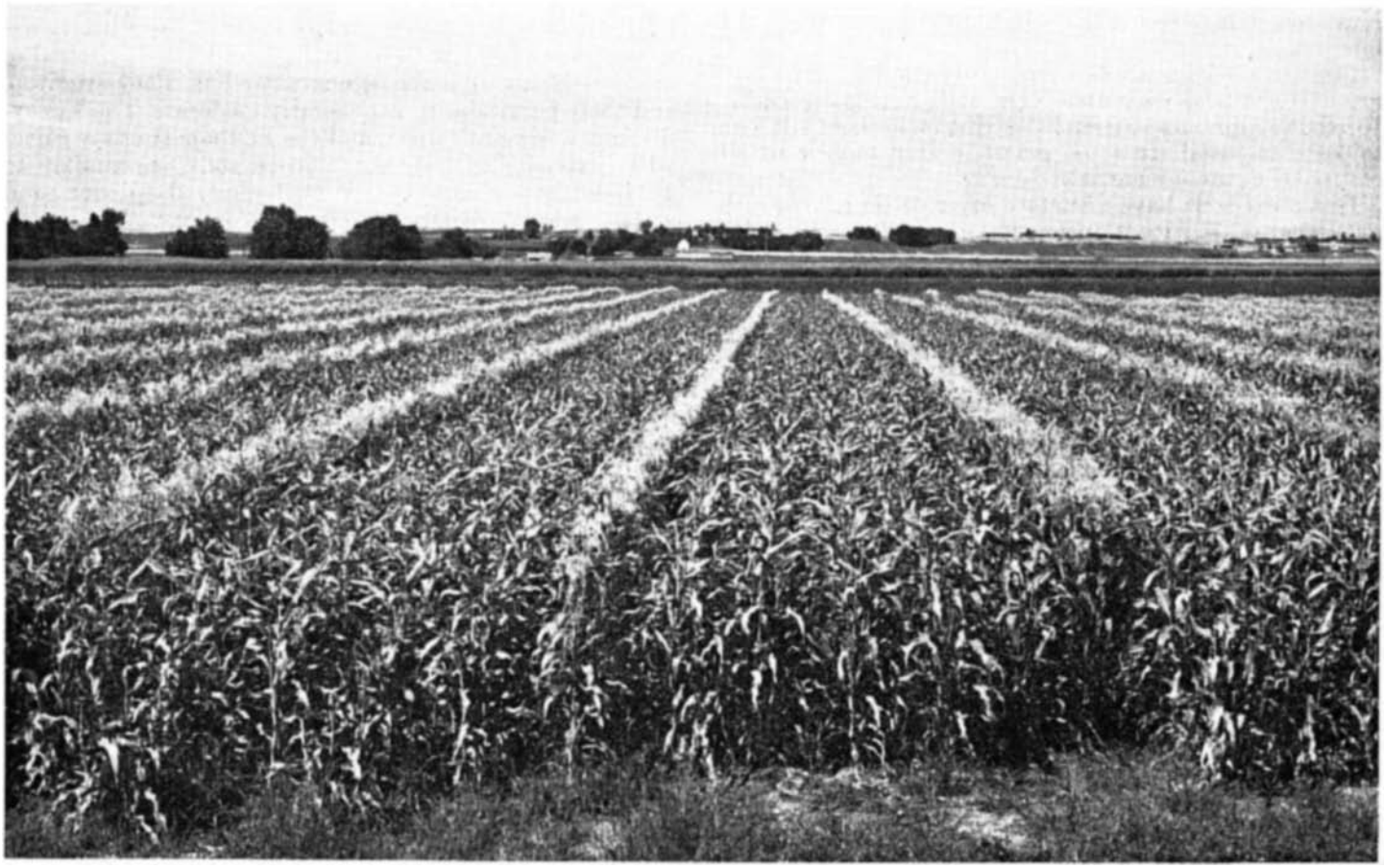

Figure 3.—Seed crop of hybrid sweet corn on Scism and Bahem soils.

7. Minidoka-Marsing-Vickery Association

Well-drained silt loams and loams over hardpan or gravel on high terraces

This association occurs on high ridges and terraces that are north and south of Lake Lowell. The soils are mostly gently sloping to strongly sloping. Slopes are relatively short, but rather intricate in pattern.

The mean annual temperature is 50° to 52° F., the annual precipitation is 8 to 10 inches, and about 145 to 160 days are frost free. The native vegetation was mainly Sandberg bluegrass, needlegrass, western wheatgrass, and big sagebrush.

This association makes up 6 percent of the survey area. Of this, 38 percent is Minidoka soils, 32 percent is Marsing soils, 20 percent is Vickery soils, and the rest is minor soils.

The soils in this association formed in alluvium underlain by gravel beds. Deposits of silty windblown soil material covered the alluvium in most areas. The surface layer in most areas is light brownish-gray to light-gray, calcareous silt loam. A cemented hardpan of lime and silica commonly occurs just above the underlying gravel and sand at a depth of less than 40 inches.

Minidoka soils typically have a thin surface layer of light brownish-gray silt loam, a subsoil of light brownish-gray and pale-brown silt loam, and a strongly calcareous layer over a cemented hardpan. Vickery soils typically have a surface layer of light brownish-gray silt loam, a subsoil of light brownish-gray and pale-brown silt loam, and a moderately to strongly calcareous layer over a cemented hardpan.

Marsing soils have a loam to silt loam surface layer and are underlain by sand and gravel at a depth of about 2 to 3 feet. Marsing soils lack the strongly cemented hardpan of the Minidoka soils, and the calcareous layer is less strongly developed.

Among the minor soils are Bahem and Scism soils.

In several areas, especially north of Lake Lowell, Vickery and Marsing soils occur in a complex on the top and sides of ridges and terraces. South of Lake Lowell on short, north-facing slopes are steep Bahem soils where the amount of available moisture is greater and more natural vegetation grows.

The soils in this association are well suited to pasture, small grains, alfalfa, and row crops. Gently sloping soils are well suited to vegetable and seed crops. Shallow and steep soils are well suited to pasture or hay. Deep-rooted crops, such as alfalfa and sugar beets, grow well on deep soils that have gentle slopes. The longevity of alfalfa grown on shallow soils is reduced. Fruit trees do not grow well where soils are shallow or where damaging frosts occur.

Careful design of an irrigation system is necessary to control erosion and to insure good crop growth on these soils.

8. Power-Potratz Association

Deep and moderately deep, well-drained silt loams on high basalt bedrock terraces

This association occurs on high terraces and uplands east and southeast of Nampa. The area is dissected by Indian Creek and several small drainageways. Soils on the narrow bottoms of these drainageways and of Indian Creek have poor drainage in places. Soils on the higher parts of terraces are well drained. Most of the soils are underlain by basalt bedrock at varying depths, but some soils in the northern part of the association are underlain by gravel. Bedrock crops out in the southern part of the association.

The mean annual temperature is 50° to 52° F., annual precipitation is 8 to 11 inches, and about 145 to 160 days are frost free. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, big sagebrush, and associated plants.

This association makes up about 4 percent of the survey area. Of this, 38 percent is Power soils, 16 percent is Potratz soils, and the rest is minor soils.

Potratz soils typically have a surface layer of light brownish-gray silt loam and are moderately deep over basalt bedrock.

Power soils have a silt loam to silty clay loam surface layer and a silty clay loam and silt loam subsoil. They are deep over basalt bedrock.

Among the minor soils are Elijah, Purdam, and Trevino soils. Also included are somewhat poorly drained Baldock and Draper soils in drainageways that traverse the association.

The soils in this association are well suited to corn, small grains, sugar beets, alfalfa hay, and pasture grasses. Deep-rooted, long-lived crops grow well on most soils. Crops grow less well on Elijah soils, which have a hardpan, and on shallow Trevino soils. Crops also grow poorly in low-lying or depressional areas where excess water or poor drainage causes perched water tables.

Management is needed to level uneven land surfaces for irrigation.

Diversified farms that grow cash crops and feed or forage crops for livestock are common in this association. Many small dairy herds and also a few livestock feeding operations are maintained. Most farms have some livestock.

Descriptions of the Soils

In this section the soils of the Canyon Area are listed in alphabetical order and are described. Their approximate acreage and proportionate extent are shown in table 1, and their location and distribution are given in the detailed map at the back of this survey. The "Guide to Mapping Units," also at the back of this survey, shows the map symbol of each soil and the capability unit and windbreak suitability group in which each soil has been placed.

In this section the soil series is described first, then each mapping unit in that series. An important part of the series description is the soil profile, or the sequence of layers within the soil. A detailed description of the profile of a typical mapping unit in each series is given. It is assumed that all the soils in a series have essentially the same kind of profile. The differences, if any, are explained in the description of the soil or are indicated in the soil name. Colors given are for dry soil unless stated otherwise.

The name of the soil in each mapping unit is followed by a symbol in parentheses. This symbol identifies the

413-253—72——2

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Bahem silt loam, 0 to 1 percent slopes	4,008	0.9	Greenleaf-Owyhee silt loams, 12 to 20 percent slopes	233	0.1
Bahem silt loam, 1 to 3 percent slopes	3,972	.9	Harpt loam	1,444	.3
Bahem silt loam, 3 to 7 percent slopes	2,197	.5	Jacquith loamy fine sand, 1 to 3 percent slopes	793	.2
Bahem silt loam, 7 to 12 percent slopes	713	.2	Jacquith loamy fine sand, 3 to 7 percent slopes	781	.2
Bahem silt loam, 12 to 30 percent slopes	811	.2	Jenness loam, 0 to 1 percent slopes	2,564	.6
Bahem silt loam, 30 to 50 percent slopes	236	.1	Jenness loam, 1 to 3 percent slopes	1,553	.4
Baldock loam, 0 to 1 percent slopes	8,351	1.9	Jenness loam, 3 to 7 percent slopes	253	.1
Baldock loam, 1 to 3 percent slopes	1,692	.4	Lankbush sandy loam, 3 to 7 percent slopes	551	.1
Baldock loam, high water table, 0 to 1 percent slopes	349	.1	Lankbush sandy loam, 7 to 12 percent slopes	227	.1
Bram silt loam, 0 to 1 percent slopes	3,130	.7	Lankbush sandy loam, 12 to 30 percent slopes	2,049	.5
Bram silt loam, 1 to 3 percent slopes	1,110	.3	Lankbush sandy loam, 30 to 50 percent slopes	505	.1
Bram silt loam, saline-alkali, 0 to 1 percent slopes	5,005	1.1	Lankbush-Elijah silt loams, 12 to 30 percent slopes	1,162	.3
Bram silt loam, saline-alkali, 1 to 3 percent slopes	2,483	.6	Lankbush-Power complex, 12 to 30 percent slopes	2,701	.6
Catherine silt loam	1,036	.2	Lankbush-Vickery silt loams, 3 to 7 percent slopes	3,934	.9
Cencove fine sandy loam, 0 to 1 percent slopes	4,548	1.0	Lankbush-Vickery silt loams, 7 to 12 percent slopes	4,213	1.0
Cencove fine sandy loam, 1 to 3 percent slopes	6,616	1.5	Lankbush loam, dark variant, 0 to 1 percent slopes	425	.1
Cencove fine sandy loam, 3 to 7 percent slopes	3,263	.7	Letha fine sandy loam, 0 to 1 percent slopes	1,703	.4
Cencove fine sandy loam, 7 to 12 percent slopes	1,107	.3	Letha fine sandy loam, 1 to 3 percent slopes	331	.1
Chance fine sandy loam	1,942	.4	Letha fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes	3,212	.7
Cruickshank loamy fine sand	403	.1	Lolalita coarse sandy loam, 30 to 55 percent slopes	525	.1
Cruickshank fine sandy loam	1,203	.3	Lolalita sandy loam, 1 to 3 percent slopes	714	.2
Draper loam, 0 to 1 percent slopes	2,256	.5	Lolalita sandy loam, 3 to 7 percent slopes	547	.1
Draper loam, 1 to 3 percent slopes	423	.1	Lolalita sandy loam, 12 to 30 percent slopes	569	.1
Durargidic Arents, 1 to 3 percent slopes	588	.1	Marsh	1,343	.3
Durargidic Arents, 3 to 7 percent slopes	244	.1	Marsing loam, 0 to 1 percent slopes	2,966	.7
Elijah silt loam, 0 to 1 percent slopes	2,378	.5	Marsing loam, 1 to 3 percent slopes	4,206	1.0
Elijah silt loam, 1 to 3 percent slopes	2,146	.5	Marsing loam, 3 to 7 percent slopes	1,882	.4
Elijah silt loam, shallow, 0 to 1 percent slopes	559	.1	Marsing loam, 7 to 12 percent slopes	1,089	.2
Elijah silt loam, shallow, 1 to 3 percent slopes	801	.2	Marsing loam, 12 to 20 percent slopes	831	.2
Elijah silt loam, shallow, 3 to 7 percent slopes	407	.1	Minidoka silt loam, 0 to 1 percent slopes	5,192	1.2
Elijah-Sebree silt loams, 0 to 1 percent slopes	980	.2	Minidoka silt loam, 1 to 3 percent slopes	6,102	1.4
Elijah-Sebree silt loams, 1 to 3 percent slopes	11,403	2.6	Minidoka-Scism silt loams, 3 to 7 percent slopes	6,468	1.5
Elijah-Vickery silt loams, 3 to 7 percent slopes	13,564	3.1	Minidoka-Scism silt loams, 7 to 12 percent slopes	1,200	.3
Elijah-Vickery silt loams, 7 to 12 percent slopes	3,011	.7	Moulton loamy sand, 0 to 1 percent slopes	251	.1
Falk fine sandy loam, 0 to 2 percent slopes	3,352	.8	Moulton fine sandy loam, 0 to 1 percent slopes	6,562	1.5
Feltham loamy fine sand, 0 to 3 percent slopes	6,691	1.5	Moulton fine sandy loam, 1 to 3 percent slopes	554	.1
Feltham loamy fine sand, 3 to 7 percent slopes	3,568	.8	Moulton fine sandy loam, saline, 0 to 1 percent slopes	5,197	1.2
Feltham loamy fine sand, 7 to 12 percent slopes	1,056	.2	Moulton loam, 0 to 1 percent slopes	2,615	.6
Feltham loamy fine sand, 12 to 25 percent slopes	509	.1	Moulton loam, saline, 0 to 1 percent slopes	2,795	.6
Feltham-Quincy complex, 0 to 12 percent slopes	1,906	.4	Nannyton loam, 1 to 3 percent slopes	2,212	.5
Garbutt silt loam, 0 to 1 percent slopes	8,330	1.9	Nannyton loam, 3 to 7 percent slopes	974	.2
Garbutt silt loam, 1 to 3 percent slopes	5,452	1.2	Notus soils	5,699	1.3
Garbutt silt loam, 3 to 7 percent slopes	1,994	.5	Nyssaton silt loam, 0 to 1 percent slopes	7,923	1.8
Garbutt silt loam, 7 to 12 percent slopes	688	.2	Nyssaton silt loam, 1 to 3 percent slopes	6,784	1.5
Garbutt silt loam, deep over basalt, 1 to 3 percent slopes	750	.2	Nyssaton silt loam, 3 to 7 percent slopes	3,317	.8
Garbutt silt loam, deep over basalt, 3 to 7 percent slopes	580	.1	Nyssaton silt loam, 7 to 12 percent slopes, eroded	898	.2
Grandview loam	973	.2	Nyssaton silt loam, 12 to 20 percent slopes, eroded	526	.1
Gravel pit	736	.2	Oliaga loam, 0 to 1 percent slopes	2,108	.5
Greenleaf silty clay loam, 0 to 1 percent slopes	437	.1	Oliaga loam, 1 to 3 percent slopes	443	.1
Greenleaf silt loam, 0 to 1 percent slopes	283	.1	Oliaga loam, saline-alkali, 0 to 1 percent slopes	336	.1
Greenleaf silt loam, 1 to 3 percent slopes	230	.1	Owyhee silt loam, 0 to 1 percent slopes	1,022	.2
Greenleaf-Owyhee silt loams, 0 to 1 percent slopes	18,129	4.1	Owyhee silt loam, 1 to 3 percent slopes	836	.2
Greenleaf-Owyhee silt loams, 1 to 3 percent slopes	6,635	1.5	Owyhee silt loam, 3 to 7 percent slopes	301	.1
Greenleaf-Owyhee silt loams, 3 to 7 percent slopes	1,780	.4			
Greenleaf-Owyhee silt loams, 7 to 12 percent slopes	368	.1			

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Potratz silt loam, 1 to 3 percent slopes	420	0. 1
Potratz-Power silt loams, 3 to 7 percent slopes	949	. 2
Potratz-Power rocky silt loams, 1 to 3 percent slopes	333	. 1
Potratz-Power rocky silt loams, 3 to 7 percent slopes	296	. 1
Power silt loam, 0 to 1 percent slopes	13, 072	3. 0
Power silt loam, 1 to 3 percent slopes	5, 720	1. 3
Power silt loam, 3 to 7 percent slopes	2, 070	. 5
Power silt loam, 7 to 12 percent slopes	441	. 1
Power-Lankbush silt loams, 7 to 12 percent slopes	1, 026	. 2
Power-Potratz silt loams, 0 to 1 percent slopes	1, 858	. 4
Power-Potratz silt loams, 1 to 3 percent slopes	3, 782	. 9
Power-Purdam silt loams, 0 to 1 percent slopes	16, 441	3. 8
Power-Purdam silt loams, 1 to 3 percent slopes	5, 198	1. 2
Power-Purdam silt loams, 3 to 7 percent slopes	1, 018	. 2
Power-Purdam silt loams, 7 to 12 percent slopes	254	. 1
Purdam silt loam, 0 to 1 percent slopes	3, 904	. 9
Purdam silt loam, 1 to 3 percent slopes	2, 994	. 7
Purdam silt loam, 3 to 7 percent slopes	1, 013	. 2
Purdam silt loam, water table, 0 to 1 percent slopes	1, 326	. 3
Purdam-Sebree silt loams, 0 to 1 percent slopes	4, 996	1. 1
Purdam-Sebree silt loams, 1 to 3 percent slopes	2, 200	. 5
Quincy fine sand, 0 to 3 percent slopes	1, 359	. 3
Quincy fine sand, 3 to 12 percent slopes	1, 141	. 3
Quincy fine sand, 12 to 30 percent slopes	345	. 1
Quincy-Feltham loamy sands, 1 to 3 percent slopes	270	. 1
Quincy-Feltham loamy sands, 3 to 12 percent slopes	879	. 2
Riverwash	1, 907	. 4
Rock outcrop	344	. 1
Scism silt loam, 0 to 1 percent slopes	10, 026	2. 3
Scism silt loam, 1 to 3 percent slopes	7, 052	1. 6
Scism silt loam, 3 to 7 percent slopes	5, 107	1. 2
Scism silt loam, 7 to 12 percent slopes	838	. 2
Scism silt loam, deep over basalt, 0 to 1 percent slopes	418	. 1
Scism silt loam, deep over basalt, 1 to 3 percent slopes	3, 735	. 8
Scism silt loam, deep over basalt, 3 to 7 percent slopes	3, 992	. 9
Scism silt loam, deep over basalt, 7 to 12 percent slopes	429	0. 1
Terrace escarpment	2, 216	. 5
Timmerman coarse sandy loam, 1 to 3 percent slopes	620	. 1
Timmerman coarse sandy loam, 3 to 7 percent slopes	270	. 1
Timmerman gravelly coarse sandy loam, 1 to 3 percent slopes	274	. 1
Timmerman gravelly coarse sandy loam, 3 to 12 percent slopes	1, 029	. 2
Trevino very rocky loam, 0 to 20 percent slopes	2, 786	. 6
Trevino silt loam, 1 to 3 percent slopes	640	. 1
Trevino silt loam, 3 to 12 percent slopes	1, 612	. 4
Truesdale fine sandy loam, 0 to 1 percent slopes	433	. 1
Truesdale fine sandy loam, 1 to 3 percent slopes	1, 308	. 3
Truesdale fine sandy loam, 3 to 7 percent slopes	1, 059	. 2
Truesdale fine sandy loam, 7 to 12 percent slopes	788	. 2
Turbyfill fine sandy loam, 0 to 1 percent slopes	5, 622	1. 3
Turbyfill fine sandy loam, 1 to 3 percent slopes	7, 736	1. 8
Turbyfill fine sandy loam, 3 to 7 percent slopes	4, 749	1. 1
Turbyfill fine sandy loam, 7 to 12 percent slopes	1, 602	. 4
Turbyfill fine sandy loam, 12 to 30 percent slopes	2, 602	. 6
Turbyfill fine sandy loam, deep over hardpan, 0 to 1 percent slopes	775	. 2
Turbyfill fine sandy loam, deep over hardpan, 1 to 3 percent slopes	1, 212	. 3
Turbyfill fine sandy loam, deep over hardpan, 3 to 7 percent slopes	731	. 2
Vanderhoff loam, 1 to 3 percent slopes	702	. 2
Vanderhoff loam, 3 to 7 percent slopes	1, 053	. 2
Vanderhoff loam, 7 to 12 percent slopes	1, 040	. 2
Vanderhoff loam, 12 to 30 percent slopes	2, 229	. 5
Vanderhoff soils and Badland, 20 to 80 percent slopes	2, 554	. 6
Very stony land	5, 338	1. 2
Vickery-Marsing silt loams, 1 to 3 percent slopes	3, 354	. 8
Vickery-Marsing silt loams, 3 to 7 percent slopes	3, 226	. 7
Vickery-Marsing silt loams, 7 to 12 percent slopes	417	. 1
Total	436, 160	100. 0

mapping unit on the detailed soil map. At the end of the description of each soil, the capability unit and windbreak suitability group for that soil also are given in parentheses.

Many terms used in the soil descriptions are defined in the Glossary.

Badland

Badland consists of steep or very steep, barren or nearly barren, severely eroded land that is broken by numerous intermittent drainage channels. Slopes range from 20 to 80 percent, and runoff is very rapid. Badland occurs mainly on remnants of old terraces near the Snake River and on the Payette Formation. In the Canyon Area, Badland is mapped only with Vanderhoff soils.

Areas of Badland are not suited to crops or pasture. They do provide some wildlife habitat. (Capability unit VIIIs-1)

Bahem Series

The Bahem series consists of well-drained, nearly level to steep, medium-textured soils. These soils formed in wind-laid, calcareous silts or silty alluvium consisting of mixed mineral material. They occur on medium and high terraces, fans, and uplands. Most areas are on high terraces near the Snake River in the Dry Lake area of Canyon County and west of Marsing in Owyhee County. The vegetation in uncultivated areas consists mainly of big sagebrush, cheatgrass, wild mustard, and winterfat. Bahem soils are associated with Scism, Minidoka, and Turbyfill soils.

Elevation ranges from 2,200 to 3,000 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 69° to 74°. The frost-free season is 145 to 160 days. Annual precipitation is 7 to 11 inches, including 5 to 15 inches of snowfall. Summers are dry.

Bahem soils are used mostly for irrigated alfalfa, clover, corn, sugar beets, potatoes, onions, and small grains.

Bahem silt loam, 0 to 1 percent slopes (BaA).—This soil occurs on medium and high terraces, fans, and uplands.

In a typical profile the surface layer is light-gray silt loam about 7 inches thick. The next layer is about 53 inches thick. In sequence from the top, the upper 27 inches is light-gray silt loam; the next 14 inches is light brownish-gray very fine sandy loam; and the lower 12 inches is light brownish-gray fine sandy loam.

Representative profile, 300 feet east and 400 feet north of the southwest corner of the SE¼ sec. 14, T. 3 N., R. 6 W., about 4 miles southwest of Homedale in Owyhee County, in a cultivated area on a terrace:

Ap—0 to 7 inches, light-gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, thin, platy structure in upper 3 inches; weak, very fine, granular structure in lower part; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; many very fine and fine tubular pores; slightly calcareous; mildly alkaline; clear, smooth boundary.

C1ca—7 to 15 inches, light-gray (10YR 7/2) light silt loam, dark grayish brown (10YR 4/2) when moist; weak, very fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine and fine tubular pores; strongly calcareous; moderately alkaline; gradual, wavy boundary.

C2ca—15 to 34 inches, light-gray (10YR 7/2) light silt loam, grayish brown (10YR 5/2) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; few firm nodules of soil material or cicada krotovinas; strongly calcareous; moderately alkaline; gradual, wavy boundary.

IIC3—34 to 48 inches, light brownish-gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, slightly sticky and nonplastic; very few very fine and fine roots; common very fine tubular pores; few soft nodules or cicada krotovinas; moderately calcareous; moderately alkaline; gradual, smooth boundary.

IIIC4—48 to 60 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; very few very fine roots; many micropores; moderately calcareous; moderately alkaline.

The A horizon is dominantly silt loam, but in small areas it is very fine sandy loam. The A1 horizon, or the upper horizons where mixed, is pale brown to light gray to a depth of 7 inches. Between depths of 7 and 40 inches the soil material is dominantly silt loam, but in places it ranges from silt loam to very fine sandy loam and contains thin layers of sandy loam. The hue of the C horizon is dominantly 10YR, but it ranges from 10YR to 2.5Y.

At a depth of 8 to 20 inches the soil is strongly calcareous. Weakly cemented nodules generally occur at a depth of about 2 feet; they make up 3 to 10 percent of the horizon in which they are concentrated. In places, basalt, basaltic cinders, or both underlie the soil below a depth of 40 inches. In a few places, fragments of caliche are in the underlying alluvial material below a depth of about 50 inches.

This Bahem soil is deep to very deep and is moderately permeable. The available water capacity is more than 7.5 inches. The organic-matter content is low to moderately low, and the fertility is high. Runoff is slow, and there is little or no erosion hazard.

Included with this soil in mapping are small areas of Minidoka soils that make up as much as 10 percent of some mapped areas, and areas of Scism or Turbyfill soils make up as much as 15 to 20 percent.

This soil is used mainly for alfalfa, corn, sugar beets, potatoes, onions, and small grains. (Capability unit I–1, irrigated; windbreak suitability group 1)

Bahem silt loam, 1 to 3 percent slopes (BaB).—This soil occurs on terraces and fans. Runoff is medium, and erosion is a slight to moderate hazard in irrigated areas. Included in mapping are areas of Scism, Turbyfill, and Minidoka soils.

This Bahem soil is used for irrigated alfalfa, corn, sugar beets, potatoes, onions, and small grains. (Capability unit IIe–2, irrigated; windbreak suitability group 1)

Bahem silt loam, 3 to 7 percent slopes (BaC).—This soil is similar to Bahem silt loam, 0 to 1 percent slopes, except that cemented nodules occur at a shallower depth. It occurs on smooth slopes and ridges and on footslopes and alluvial fans adjacent to terraces. Runoff is medium to rapid, and erosion is a severe hazard in irrigated areas. Included in mapping are areas of Scism and Turbyfill soils that make up 5 to 10 percent of some mapped areas.

Nearly all the acreage is used for irrigated crops, mainly alfalfa, corn, small grains, and pasture. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Bahem silt loam, 7 to 12 percent slopes (BaD).—This soil is similar to Bahem silt loam, 0 to 1 percent slopes, except that the strongly calcareous, nodular horizon occurs at a shallower depth. It occurs on fans. Runoff is rapid, and erosion is a very severe hazard in irrigated areas. Areas where this soil is eroded make up about 15 percent of the acreage.

This soil is suited to sugar beets, potatoes, and corn. Irrigated small grains and alfalfa also are grown. (Capability unit IVe–1, irrigated; windbreak suitablity group 2)

Bahem silt loam, 12 to 30 percent slopes (BaE).—This soil occurs in long narrow strips below outcrops of basalt bedrock in the Dry Lake area. A few stones are on and in the soil in places. Runoff is rapid to very rapid, and erosion is a severe hazard. Erosion is an extremely severe hazard where this soil is irrigated.

Included on north-facing slopes are soils that are grayish brown and noncalcareous in the upper part. These included soils make up as much as 25 percent of some mapped areas. Also included are areas where slopes are more than 30 percent. These areas make up less than 10 percent of the acreage.

Where irrigated, this Bahem soil is suited to fruit trees, pasture, and hay. Nonirrigated areas are used for pasture or range. (Capability unit VIe–1, irrigated; VIe–2, dryland pasture or range)

Bahem silt loam, 30 to 50 percent slopes (BaF).—This soil occurs on north-facing slopes on uplands. Runoff is rapid to very rapid, and erosion is a severe hazard. Included in mapping are soils that are grayish brown and noncalcareous in the upper part. These included soils make up as much as 45 percent of some mapped areas.

This soil is used for dryland pasture or range. (Capability unit VIe–2, dryland pasture or range)

Baldock Series

The Baldock series consists of light-colored, medium-textured, somewhat poorly drained, calcareous soils. These soils formed in micaceous alluvium derived mostly from granite, basalt, quartz diorite, and old sediments. The Baldock soils are on bottom lands, lake basins, and alluvial fans, and on very low terraces near the Boise and Snake Rivers and along drainageways. Drainage is restricted on the low terraces. Vegetation in uncultivated areas is mainly saltgrass, greasewood, and bunchgrass. Baldock soils are associated with Chance and Moulton soils.

Elevation ranges from 2,200 to 2,600 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 165 days. Annual precipitation is 9 to 12 inches.

Baldock soils are used mostly for irrigated sugar beets, small grains, corn for silage, hay, and pasture. Uncultivated areas are used for pasture.

Baldock loam, 0 to 1 percent slopes (BdA).—This soil occurs on alluvial plains and bottom lands.

In a typical profile the surface layer is gray loam about 16 inches thick. Below the surface layer is mottled, moderately calcareous, very friable, light brownish-gray loam about 11 inches thick. The next layer is noncalcareous, light brownish-gray loam about 29 inches thick. The underlying material consists of light brownish-gray fine sandy loam.

Representative profile, 245 feet north of road and 285 feet east of the Snake River in the SE¼ sec. 26, T. 6 N., R. 6 W., about 5 miles northwest of Parma in Canyon County, in a pasture:

A11ca—0 to 2.5 inches, light brownish-gray (2.5Y 6/2) loam, very dark gray (10YR 3/1) when moist; moderate, very thin, platy structure, parting to weak, very fine, granular; slightly plastic; abundant very fine and fine roots and plentiful medium and coarse roots; few fine pores; slightly or moderately calcareous; mildly alkaline; clear, smooth boundary.

A12ca—2.5 to 8 inches, gray (2.5Y 5/1) loam, very dark gray (10YR 3/1) when moist; weak, medium, subangular blocky structure, parting to weak, very fine, granular; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots and plentiful medium and coarse roots; many fine tubular pores; moderately calcareous; few lime veins in channels; moderately alkaline; gradual, smooth boundary.

A3ca—8 to 16 inches, gray (2.5Y 6/1) loam, very dark gray (10YR 3/1) when moist; very weak, coarse and medium, subangular blocky structure parting to weak, very fine, granular; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots and few medium and coarse roots; many fine tubular pores and few fine and medium pores; moderately calcareous; very few lime veins; strongly alkaline; clear, smooth boundary.

B21ca—16 to 22 inches, light brownish-gray (2.5Y 6/2) light loam, very dark grayish brown (2.5Y 3/2) when moist; few, fine, faint, brown (10YR 5/3) mottles that are olive brown (2.5Y 4/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; plentiful very fine and fine roots; many very fine tubular pores and few fine and medium pores; moderately calcareous; common lime veins; strongly alkaline; gradual, smooth boundary.

B22ca—22 to 27 inches, light brownish-gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) when moist; few, fine, faint, brown (10YR 5/3) mottles that are dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; many very fine tubular pores; moderately calcareous; few to common fine lime veins; moderately alkaline; gradual, smooth boundary.

C1—27 to 56 inches, light brownish-gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) when moist; few, fine, distinct, brown (10YR 4/3) mottles that are dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores and few fine pores; slightly calcareous in upper 6 inches, noncalcareous below; moderately alkaline; gradual, smooth boundary.

IIC2—56 to 65 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; common, fine, distinct, brown (10YR 4/3) mottles that are dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; noncalcareous; moderately alkaline.

The A horizon is dominantly loam or silt loam, but in a few places it is clay loam or silty clay loam. The surface layer is mildly to strongly alkaline and slightly to moderately calcareous. This soil is nonsaline to slightly saline. Alkali spots make up less than 5 percent of the areas mapped. The surface layer in these spots generally is strongly alkaline. Included in mapping are small areas where gravel is on the surface and throughout the profile. Mottles occur between depths of 16 and 40 inches. Stratified sandy loam, loamy sand, and gravelly sand occur below a depth of 3 feet in places, but loose gravel and gravelly sand generally do not occur at a depth of less than 40 inches. Depth to the water table generally is 30 to 50 inches. In wet areas, the layers below a depth of 40 inches have a bluish gray color.

This soil is deep to very deep and somewhat poorly drained. Permeability is moderate in the upper layers and very rapid in the underlying sand and gravel. The available water capacity is more than 7.5 inches. Runoff is slow, and there is little or no erosion hazard.

Included in mapping are small areas of gravelly soils and of Oliaga or Moulton soils that make up as much as 10 or 15 percent of some mapped areas.

This soil is used for irrigated sugar beets, small grains, corn for silage, hay, and pasture. (Capability unit IIIw–6, irrigated; windbreak suitability group 3)

Baldock loam, 1 to 3 percent slopes (BdB).—This soil occupies narrow strips along drainageways and on the edges of low terraces. Runoff is slow over most of the acreage, and the erosion hazard is slight.

Short slopes of more than 3 percent occur in areas at the edge of low terraces. These areas make up less than 8 percent of the acreage. Included in mapping are small spots of gravelly soils and of Oliaga and Moulton soils that make up less than 5 percent of some mapped areas.

This soil is used for sugar beets, small grains, and corn for silage. Tall wheatgrass and alta fescue are grown for hay and for pasture, especially in the more saline-alkali areas. (Capability unit IIIw–6, irrigated; windbreak suitability group 3)

Baldock loam, high water table, 0 to 1 percent slopes (BhA).—This soil is in old river and stream channels and in filled lake basins. It is similar to Baldock loam, 0 to 1 percent slopes, except that the water table is commonly at a depth of about 10 inches. The uppermost 5 to 10 inches of the soil is nonsaline-alkali, except in a few places where salt crusts or concentrations of salt are on the surface. Runoff is very slow. Drainage is very difficult to improve because the soils are in low-lying areas and suitable outlets are not available.

This soil is used for pasture. Vegetation is mainly sedges and saltgrass. Included in mapping are small areas of

Marsh and a few ponds. (Capability unit Vw–1; dryland pasture or range)

Bram Series

The Bram series consists of moderately well drained, light-colored, medium-textured, calcareous soils. These soils formed in loessal and lacustrine alluvium derived from granitic, rhyolitic, and basaltic materials. They are on bottom lands, in old lake or river basins, and on very low terraces along the Boise and Snake Rivers and along drainageways. Drainage is restricted on the low terraces. The vegetation in uncultivated areas is mainly saltgrass, cheatgrass, foxtail barley, greasewood, rabbitbrush, giant wildrye, and alkali weed. Bram soils are associated with Baldock and Garbutt soils.

Elevation ranges from 2,200 to 2,700 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 160 days. The annual precipitation is 8 to 11 inches. Summers are dry.

Bram soils are used for irrigated pasture, small grains, corn, sugar beets, and hay crops. They also are used for dryland pasture or range.

Bram silt loam, saline-alkali, 0 to 1 percent slopes (BsA).—This soil is on alluvial fans, bottom lands, and in old lake or river basins.

In a typical profile the surface layer is pale-brown silt loam about 8 inches thick. The subsoil is about 9 inches thick. It is very pale brown silt loam that has a few faint mottles. Below this layer, extending to a depth of about 32 inches, is light-gray, strongly calcareous loam. The next layer is very pale brown silt loam that extends to a depth of about 52 inches. The underlying material consists of very pale brown fine sandy loam.

Representative profile, 2,450 feet west and 300 feet north of the southeast corner of sec. 36, T. 4 N., R. 3 W., about 2 miles southeast of Caldwell in Canyon County, in a pasture:

A1—0 to 8 inches, pale-brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) when moist; moderate, thin, platy structure parting to weak, fine and very fine, granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium and coarse roots; common very fine tubular pores; moderately calcareous; very strongly alkaline; clear, smooth boundary.

B—8 to 17 inches, very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) when moist; few, fine, faint mottles that are dark yellowish brown (10YR 4/4) when moist; moderate, fine and medium, subangular blocky structure; few nodules or insect krotovinas; slightly hard, very friable, slightly sticky and slightly plastic; abundant very fine and fine roots and plentiful medium and coarse roots; common very fine tubular pores and few fine pores; moderately calcareous; strongly alkaline; clear, wavy boundary.

C1ca—17 to 24 inches, light-gray (10YR 7/2) loam, brown (10YR 5/3) when moist; few, fine, faint mottles that are dark yellowish brown (10YR 4/4) when moist; massive; common, firm nodules or insect krotovinas 0.5 to 0.8 inch in diameter; matrix slightly hard, very friable, slightly sticky and slightly plastic; few, fine, medium, and coarse roots; many very fine tubular pores; strongly calcareous; little segregated calcium carbonate; strongly alkaline; clear, wavy boundary.

C2ca—24 to 32 inches, light-gray (10YR 7/2) loam, brown (10YR 5/3) when moist; few, fine, faint mottles that are dark yellowish brown (10YR 4/4) when moist; massive; matrix slightly hard, very friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; many very fine tubular pores; strongly calcareous; little segregated calcium carbonate; moderately alkaline; clear, wavy boundary.

C3—32 to 42 inches, very pale brown (10YR 7/3) light silt loam, brown (10YR 4/3) when moist; massive; few firm nodules or insect krotovinas 0.5 to 0.8 inch in diameter; matrix slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine tubular pores; moderately calcareous; very few veins of calcium carbonate; moderately alkaline; clear, smooth boundary.

C4—42 to 52 inches, very pale brown (10YR 7/3) silt loam, brown (10YR 4/3) when moist; few, fine, faint mottles that are dark brown (10YR 3/3) when moist; weak or moderate, medium, laminated structure; common firm nodules or insect krotovinas 0.5 to 0.8 inch in diameter; matrix hard, friable, slightly sticky and slightly plastic; not cemented or very weakly cemented; few fine and medium roots; many very fine tubular pores and few fine; moderately or slightly calcareous; common veins of calcium carbonate; moderately alkaline; abrupt, smooth boundary.

IIC5—52 to 65 inches, very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) when moist; massive; slightly hard, very friable; very few fine roots; common very fine tubular pores; slightly calcareous; moderately alkaline.

The A horizon is dominantly silt loam, but in places it is loam. In small areas, gravel is on or in the surface layer. Where mixed to a depth of 7 inches, the surface layer ranges in color from grayish brown to light gray or very pale brown when dry and dark grayish brown to grayish brown or brown when moist. Where undisturbed, the uppermost 1 to 5 inches commonly has weak to strong, very thin to medium, platy structure and is vesicular. Where disturbed, the surface layer has weak, very fine or fine, granular structure or it is nearly massive. The A and B horizons are strongly to very strongly alkaline.

The B horizon is pale brown to very pale brown when dry and is brown when moist. It ranges from very weak to moderate, fine or medium, subangular blocky to weak, medium or coarse, prismatic in structure. In places the B and Cca horizons are as much as 20 percent hard, firm, rounded nodules.

The Cca horizon has its upper boundary at a depth of 12 to 22 inches and is 15 to 25 percent carbonates. The C horizon below the Cca horizon is moderately or slightly calcareous and moderately to very strongly alkaline. Depth to the water table is 3 to 5 feet.

The soil is deep to very deep and is moderately well drained. Permeability is slow, the available water capacity is more than 3.75 inches, the organic-matter content is low, and the fertility is moderate. Runoff is slow or very slow, and there is little or no erosion hazard. Included in mapping are small areas of Baldock soils that make up as much as 10 to 15 percent of some mapped areas.

Where excess salts and alkali are removed, this soil can be used for barley, sugar beets, and irrigated pasture consisting mainly of tall wheatgrass. In noncultivated areas the vegetation is alkali weed, saltgrass, and greasewood. These areas are used for pasture. (Capability unit IVw–3 irrigated.)

Bram silt loam, saline-alkali, 1 to 3 percent slopes (BsB).—This soil occurs in narrow strips along drainageways and on the edges of low terraces. Depth to the water table is 3 to 6 feet. Short slopes of slightly more than 3 percent occur on the edges of low terraces. These areas make up as much as 10 to 15 percent of some mapped areas.

Where reclaimed, this soil can be used for irrigated pasture, barley, and sugar beets. Where this soil is irrigated, short runs and small streams are needed to control erosion. (Capability unit IVw–3, irrigated)

Bram silt loam, 0 to 1 percent slopes (BrA).—This soil is less strongly saline-alkali than Bram silt loam, saline-alkali, 0 to 1 percent slopes. Saline-alkali spots, on which plant growth is poor, make up about 5 to 15 percent of some mapped areas. The water table commonly is at a depth of 3 to 5 feet and generally does not impair the growth of crops except for deep-rooted crops. Runoff is slow over most of the acreage, and there is little erosion hazard.

Where this soil has received overwash from adjoining soils, fewer alkali spots occur, and the surface layer is loam. In places, depth to the water table is more than 5 feet. In a few small overirrigated areas, the water table is at a depth of less than 3 feet for considerable periods of time.

This soil is used for sugar beets, small grains, corn for silage, hay, and improved pasture. Tall wheatgrass and alta fescue are grown for hay or for pasture, especially in the most saline-alkali areas. (Capability unit IIIw–6, irrigated; windbreak suitability group 3)

Bram silt loam, 1 to 3 percent slopes (BrB).—This soil occurs in narrow strips along drainageways and at the edges of low terraces. It is less strongly saline-alkali than Bram silt loam, saline-alkali, 0 to 1 percent slopes. Saline-alkali spots, on which plant growth is poor, make up about 5 to 15 percent of some mapped areas. The water table commonly is at a depth of 3 to 6 feet. Where this soil has received overwash from adjoining soils, the surface layer is loam.

This soil is used for sugar beets, small grains, corn for silage, hay, and improved pasture. Where this soil is irrigated, short runs and small streams are needed to reduce erosion. (Capability unit IIIw–6, irrigated; windbreak suitability group 3)

Catherine Series

The Catherine series consists of somewhat poorly drained to poorly drained, noncalcareous, medium-textured soils. These soils formed in mixed alluvium derived mostly from basalt and granite. The alluvium is high in content of silt, organic matter, diatomaceous earth, and volcanic glass. Catherine soils occur in the basin of the river terrace west of Caldwell and in small areas near small streams and drainageways. The vegetation in uncultivated areas is water-tolerant grasses, sedges, and rushes, and wild iris, giant wildrye, and scattered shrubs. A few willow, cottonwood, and alder trees grow along streams. Catherine soils are associated with Baldock soils.

Elevation ranges from 2,200 to 2,400 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 155 days. Annual precipitation is 8 to 11 inches.

Catherine soils are used mostly for irrigated corn, sugar beets, small grains, hay, and pasture. Uncultivated areas are used for pasture.

Catherine silt loam (Ca).—This is a level to very gently sloping soil on lowlands.

In a typical profile the surface layer is gray silt loam 23 inches thick. Below the surface layer is firm silty clay loam about 20 inches thick. This is underlain by stratified layers of mixed alluvium.

Representative profile, 95 feet south and 385 feet west of the northeast corner of sec. 30, T. 4 N., R. 3 W., 2.5 miles west of Caldwell in Canyon County, in a cultivated field:

Ap—0 to 11 inches, gray (10YR 5/1) silt loam, black (10YR 2/1) when moist; moderate, very fine, granular structure; hard, friable, slightly sticky and slighty plastic; plentiful very fine and fine roots; many interstitial micropores; moderately calcareous; moderately alkaline; abrupt, smooth boundary.

A11—11 to 23 inches, gray (10YR 5/1) heavy silt loam, black (10YR 2/1) when moist; moderate and weak, fine and very fine, subangular and angular blocky structure parting to moderate, medium and fine, granular; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; noncalcareous; moderately alkaline; gradual, smooth boundary.

IIA12—23 to 30 inches, gray (10YR 5/1) silty clay loam, black (10YR 2/1) when moist; moderate, medium, prismatic structure parting to weak, fine and very fine, angular blocky; very hard, firm, sticky and plastic; thin patchy spots on vertical ped surfaces that are gray (N 5/0) when dry and very dark gray (N 3/0) when moist; few very fine roots; common very fine tubular pores; noncalcareous; moderately alkaline; clear, smooth boundary.

IIC1g—30 to 36 inches, light-gray (5Y 7/2) and gray (5Y 6/1) silty clay loam, very dark grayish brown (2.5Y 4/1) when moist; weak, coarse and medium, subangular blocky structure; very hard, firm, sticky and plastic; many coarse faint olive-gray (5Y 4/2) mottles; very few very fine roots; few very fine tubular pores; noncalcareous; moderately alkaline; clear, smooth boundary.

IIC2g—36 to 42 inches, light-gray (N 7/0 and 5Y 7/1) silty clay loam, very dark grayish brown (2.5Y 4/1) when moist; weak, medium, subangular blocky structure; very hard, firm, sticky and plastic; many coarse distinct olive (5Y 5/1) mottles; very few fine roots; few very fine tubular pores; noncalcareous; moderately alkaline; clear, smooth boundary.

IIIC3g—42 to 57 inches, pale-yellow (5Y 8/3) and white (5Y 8/2) loam, olive gray (5Y 5/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; many fine and medium, distinct, light olive-brown (2.5Y 5/4) mottles, and few, fine, prominent, yellowish-red (5YR 5/6) mottles that are olive yellow (2.5Y 6/6) when dry; much very fine sand; few very fine and fine roots; few very fine tubular pores; noncalcareous; mildly alkaline; clear, smooth boundary.

IVC4g—57 to 61 inches, light-gray (5Y 7/2) and white (5Y 8/2) fine sandy loam, olive (5Y 5/3) when moist; massive; hard, very firm, nonsticky and nonplastic; many medium and coarse prominent mottles of light olive brown (2.5Y 5/4), yellowish brown (10YR 5/4), and brown (7.5YR 5/4); few fine roots; few very fine tubular pores; noncalcareous; mildly alkaline; abrupt, smooth boundary.

The Ap horizon is dominantly silt loam, but in a few small areas it is loam. The A horizon is very dark gray to gray when dry, and very dark gray to black when moist. The soil has mottles immediately below the A1 horizon.

This soil is deep to very deep and somewhat poorly drained. Permeability is moderate, and the available water capacity is more than 7.5 inches. The water table is at a depth of 18 to 48 inches; it is highest in spring. Runoff is slow, and there is little erosion hazard. Included in mapping are areas of Baldock and Moulton soils that make up as much as 5 to 10 percent of some mapped areas.

This soil is used for irrigated corn, sugar beets, small grains, hay, and pasture. Uncultivated areas are used for pasture. (Capability unit IIIw–6, irrigated)

Cencove Series

The Cencove series consists of well-drained, moderately coarse textured soils that are moderately deep over sand and gravel. These soils formed in mixed alluvial sediments derived mostly from quartzitic, granitic, rhyolitic, and basaltic material. Slopes range from 0 to 12 percent, but in most places are less than 3 percent. The Cencove soils occur on alluvial fans and low terraces along the Snake River, mainly near Sunnyslope, Central Cove, and Apple Valley in Canyon County, and near Marsing and Homedale in Owyhee County. The vegetation in uncultivated areas is mainly big sagebrush, cheatgrass, and shadscale. Cencove soils are associated with Turbyfill, Marsing, and Feltham soils.

Elevation ranges from 2,200 to 2,600 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 69° to 76°. The frost-free season is about 145 to 160 days. Annual precipitation is 6 to 10 inches, including 5 to 15 inches of snowfall. Summers are dry.

Cencove soils are used mostly for irrigated small grains, vegetables, vegetable seed, corn, hay, and improved pasture.

Cencove fine sandy loam, 0 to 1 percent slopes (CcA).—This soil occurs on alluvial fans and terraces.

In a typical profile the surface layer is light brownish-gray, slightly calcareous fine sandy loam about 9 inches thick. Below the surface layer is light-gray, moderately calcareous fine sandy loam and sandy loam about 23 inches thick. Gravel and sand occur at a depth of about 32 inches.

Representative profile, 500 feet north and 40 feet east of the southwest corner of sec. 34, T. 4 N., R. 5 W., in Canyon County in a cultivated area:

Ap—0 to 9 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; weak, very fine, granular structure; slightly hard, very friable, slightly sticky and nonplastic; abundant fine and medium roots; slightly calcareous; moderately alkaline; abrupt, smooth boundary.

C1ca—9 to 20 inches, light-gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; abundant fine and medium roots; many very fine tubular pores; moderately alkaline; moderately calcareous; clear, smooth boundary.

C2ca—20 to 32 inches, light-gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) when moist; massive; slightly hard, friable, slightly sticky and nonplastic; plentiful fine and medium roots; common fine tubular pores; about 5 percent krotovinas, 1 inch in diameter and 1.2 to 1.5 inches long, that are dark grayish brown when moist and have few soft lime splotches on the surface; moderately calcareous; moderately alkaline; clear, smooth boundary.

IIC3—32 to 35 inches, light-gray (10YR 7/2) loamy sand, brown (10YR 5/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; slightly calcareous; moderately alkaline; gradual, smooth boundary.

IIIC4—35 to 60 inches, light-gray (10YR 7/2) gravelly sand, grayish brown (10YR 5/2) when moist; single grain; loose when dry and moist, nonsticky and nonplastic; slightly calcareous; moderately alkaline.

The A horizon is dominantly fine sandy loam, but in places it is sandy loam or gravelly sandy loam. The A horizon ranges in value from 5.5 to 7 when dry and from 3.5 to 5 when moist; chroma is 1.5 to 2.5, and hue is 10YR to 2.5Y. The A horizon is commonly slightly calcareous, but where undisturbed the uppermost 8 to 14 inches is noncalcareous in places.

The C horizon ranges from light gray to light brownish gray when dry and from grayish brown to dark grayish brown when moist. The C horizon is fine sandy loam, sandy loam, or gravelly sandy loam, and it ranges from massive to weak, subangular blocky in structure. The C horizon is less than 15 percent calcium carbonate. A layer of loose sand or sand and gravel is at a depth of 20 to 40 inches.

This soil is well drained. It has moderately rapid permeability, 3.75 to 5 inches available water capacity, low to moderately low organic-matter content, and low to moderate fertility. Runoff is slow, and normally there is little or no erosion hazard.

Included in mapping are areas of a soil that has layers of coarse sandy loam or gravelly coarse sandy loam at a depth of 30 to 50 inches. This included soil has moderately rapid permeability and low available water capacity. Also included are small areas of sandy Feltham soils and deep Turbyfill soils. These included soils make up 10 to 15 percent of some mapped areas.

This Cencove soil is used for irrigated small grains, vegetables and vegetable seed, corn, hay, and improved pasture. (Capability unit IIIs–1, irrigated; windbreak suitability group 5)

Cencove fine sandy loam, 1 to 3 percent slopes (CcB).—Runoff is slow to medium on this soil, and erosion is a moderate hazard.

Included in mapping is a soil that has layers of coarse sandy loam or gravelly coarse sandy loam at a depth of 30 to 50 inches. Also included are small areas of sandy Feltham soils and deep Turbyfill soils. These included soils make up as much as 15 percent of some mapped areas.

This Cencove soil is used for irrigated small grains, vegetables and vegetable seed, corn, hay, and improved pasture. (Capability unit IIIe–7, irrigated; windbreak suitability group 5)

Cencove fine sandy loam, 3 to 7 percent slopes (CcC).—This soil occurs on alluvial fans and terraces. Runoff is medium to rapid, and erosion is very severe hazard.

Included in mapping is a soil that has layers of sandy loam or loamy sand extending to a depth of about 50 inches. Also included are small areas of deep Turbyfill soils and sandy Feltham soils. These included soils make up as much as 15 percent of some mapped areas.

This Cencove soil is used for irrigated small grains, corn, hay, and pasture. Apple and peach trees grow well where air drainage is good. (Capability unit IVe–2, irrigated; windbreak suitability group 5)

Cencove fine sandy loam, 7 to 12 percent slopes (CcD).—This soil is similar to Cencove fine sandy loam, 0 to 1 percent slopes, except that it occurs on fans and on the edges of terraces. Runoff is rapid, and erosion is a very severe hazard.

Included in mapping is a soil that has layers of sandy loam or loamy sand that extend to a depth of about 50 inches. Also included are small areas of very deep Turbyfill soils and sandy Feltham soils. These included soils make up as much as 15 percent of some mapped areas.

This soil is used mostly for irrigated small grains, hay, pasture, and corn. Apple and peach trees grow well where air drainage is good. The vegetation in uncultivated areas is mainly cheatgrass and big sagebrush. (Capability unit IVe–2, irrigated; windbreak suitability group 5)

Chance Series

The Chance series consists of poorly drained and very poorly drained, moderately coarse textured soils that are moderately deep over gravel and sand. These soils formed in micaceous alluvium derived from acid igneous rock. Chance soils are in swales and in low areas on the flood plain of the Boise River. The vegetation is mainly cattails, rushes, sedges, redtop, and giant wildrye. Chance soils are associated with Moulton and Falk soils.

Elevation ranges from 2,200 to 2,600 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 165 days. Annual precipitation is 9 to 12 inches.

Chance soils are used for pasture and for wildlife habitat.

Chance fine sandy loam (Ch).—This soil occurs in swales and depressions on flood plains. Slopes are generally less than 1 percent.

In a typical profile the surface layer is gray fine sandy loam about 12 inches thick. It is mottled, micaceous, and noncalcareous. The upper 5 inches of the subsoil is gray, friable fine sandy loam. The lower part is gray, very friable sandy loam about 6 inches thick. The subsoil is underlain by sand and gravel at a depth of about 23 inches.

Representative profile, 410 feet south and 1,610 feet east of the northwest corner of sec. 24, T. 4 N., R. 2 W., about 5 miles southwest of Middleton in Canyon County, in a pasture:

O1—2.5 to 0 inches, grayish-brown (10YR 5/2) mixed roots, stems, leaves, decomposed organic matter and about 20 percent fine sandy loam, dark gray (10YR 4/1) when moist; massive, noncalcareous; slightly acid; clear, smooth boundary.

A1g—0 to 12 inches, gray (10YR 6/1) fine sandy loam, very dark gray (10YR 3/1) when moist; massive; common, medium, distinct, brown (7.5YR 4/4) mottles, dark reddish brown (5YR 3/3) when moist; hard, friable, slightly sticky and slightly plastic; abundant very fine roots; common very fine tubular pores; noncalcareous; slightly acid; clear, wavy boundary.

B21g—12 to 17 inches, gray (10YR 6/1) fine sandy loam, dark gray (10YR 4/1) when moist; massive; many, medium, distinct, strong-brown (7.5YR 5/6) mottles, dark brown (7.5YR 3/3) when moist; hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; few very fine tubular pores; noncalcareous; neutral; clear, wavy boundary.

B22g—17 to 23 inches, gray (10YR 6/1) sandy loam, dark gray (10YR 4/1) when moist; massive; common, medium, distinct, strong-brown (7.5YR 5/6) mottles, dark brown (7.5YR 5/3) when moist; hard, very friable, slightly sticky and nonplastic; few fine and very fine roots; few very fine tubular pores; noncalcareous; neutral; clear, wavy boundary.

Cg—23 to 60 inches, light-gray (2.5Y 7/2) gravel and coarse sand, grayish brown (2.5Y 5/2) when moist; single grain; loose; noncalcareous; neutral.

The A horizon is dominantly fine sandy loam, but in a few small areas it is loam or loamy sand. It is light gray or gray when dry and dark gray or very dark gray when moist. In places, an inch or two of peaty material covers the A1 horizon. In small areas gravel is on the surface and throughout the profile.

Depth to the water table ranges from 0 to 10 inches in undrained soil. In some areas drainage ditches have lowered the water table to a depth of 20 to 30 inches. The profile is typically noncalcareous and slightly to moderately alkaline, but in places the uppermost few inches are slightly calcareous.

This soil is poorly drained to very poorly drained. It has moderate available water capacity, moderately rapid permeability, and moderate fertility and organic-matter content. Runoff is very slow or slow, and there is little or no erosion hazard.

Included in mapping are a few places on oxbows and on channels of intermittent drainageways where the soil has slopes of 1 to 2 percent. Also included are small gravel bars, areas of Riverwash, and areas of somewhat poorly drained Moulton soils that make up as much as 10 percent of some mapped areas.

This soil is used for pasture and for wildlife habitat. (Capability unit Vw–1, dryland pasture or range)

Chilcott Series

The Chilcott series consists of well-drained soils that have a fine-textured and moderately fine textured subsoil. They have an indurated duripan, cemented with silica and calcium carbonate, at a depth of 20 to 40 inches. These soils formed in a thin layer of wind-laid silt over unconsolidated or very weakly consolidated sediments. The underlying sediments are sands or loamy sands that are feldspathic, micaceous, high in content of quartz, and mainly noncalcareous. The native vegetation was mostly bunch grasses, big sagebrush, and herbaceous plants.

Chilcott soils occur on uplands in the northern and northeastern parts of Canyon County, mainly in the Black Canyon irrigation project. Chilcott soils are not mapped separately in the Canyon Area. They are in the Elijah-Lankbush-Vickery soil association and are mapped only in association with these soils.

Elevation ranges from 2,650 to 3,000 feet. Annual precipitation is 9 to 11 inches. The average annual temperature is about 51° F., and the average summer temperature is about 71°. The frost-free season is 140 to 150 days.

Most of the acreage is used for irrigated small grains, corn, sugar beets, alfalfa, clover and improved pasture. Uncultivated areas of Chilcott soils are used for range or pasture. In these areas the dominant vegetation is cheatgrass, medusahead wildrye, and annual weeds.

In a typical profile the surface layer is light-gray silt loam about 6 inches thick. The next layer is very pale brown silt loam about 4 inches thick. The subsoil is firm, pale-brown silty clay loam about 16 inches thick. The next layer is very pale brown loam about 5 inches thick. Below this layer is a strongly cemented duripan about 15 inches thick.

Representative profile of Chilcott silt loam, 1,100 feet west and 2,660 feet north of the southeast corner of sec. 5, T. 5 N., R. 2 W., about 7 miles north of Middleton in Canyon County, in a pasture:

A21—0 to 6 inches, light-gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) when moist; moderate to strong, thin, platy structure parting to moderate, fine, granular; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots; many interstitial micropores; noncalcareous; neutral; abrupt, smooth boundary.

A22—6 to 10 inches, very pale brown (10YR 8/3) silt loam, brown (10YR 5/3) when moist; weak, coarse, platy structure parting to moderate, fine, granular; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many very fine tubular pores; noncalcareous; neutral; abrupt, smooth boundary.

B21t—10 to 17 inches, pale-brown (10YR 6/3) silty clay loam, brown (10YR 5/3) when moist; strong, medium and fine, prismatic structure parting to strong, medium

and fine, subangular blocky; very hard, firm, sticky and plastic; medium continuous films of dark grayish-brown (10YR 4/2) clay on ped and pore surfaces; plentiful very fine and fine roots; many very fine tubular pores; few uncoated sand grains on the top and down the side of peds; noncalcareous; mildly alkaline; clear, smooth boundary.

B22t—17 to 22 inches, pale-brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) when moist; moderate, medium and fine, subangular blocky structure; very hard, firm, sticky and plastic; medium, nearly continuous films of brown (10YR 5/3) clay on ped and pore surfaces; films are dark grayish brown (10YR 4/2) when moist; few very fine roots; many very fine tubular pores; noncalcareous, mildly alkaline; clear, wavy boundary.

B3tca—22 to 26 inches, pale-brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) when moist; moderate, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; medium patchy films of brown (10YR 5/3) clay on ped and pore surfaces; films are dark brown (7.5YR 4/2) when moist; few very fine roots; many very fine tubular pores; moderately calcareous; moderately alkaline; abrupt, smooth boundary.

IIC1ca—26 to 31 inches, very pale brown (10YR 8/3) loam, pale brown (10YR 6/3) when moist; massive that breaks to moderate, thick, platy structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; many very fine tubular pores; moderately calcareous; common fine splotches of lime; moderately alkaline; abrupt, wavy boundary.

IICsicam—31 to 46 inches, very pale brown (10YR 8/3) duripan, pale brown (10YR 6/3) when moist; indurated plates that are cemented with silica and calcium carbonate; less cemented material between plates; strongly calcareous; moderately alkaline; top of hardpan is glazed and pinkish; underlain by sand and gravel.

The surface layer is dominantly silt loam, but in places it is loam or sandy loam. A thin grayish-brown A1 horizon is present beneath sagebrush and clumps of grass; in bare spots and between sagebrush the A1 horizon is commonly lacking. In eroded areas the surface layer is slightly browner and contains more clay than typical. In places the B2t horizon is silty clay or sandy clay but in most areas it is heavy silty clay loam or clay loam.

The depth to calcareous material ranges from about 15 to 25 inches. Depth to the duripan ranges from 20 to 40 inches. The duripan has cracks or spots of weaker cementation through which some water can pass.

Chilcott soils are moderately deep over a duripan. They have 3.75 to 7.5 inches available water capacity. The subsoil is slowly permeable. These soils are well drained and free or nearly free of salts and alkali. The duripan is impermeable except through cracks or other openings. The organic-matter content and fertility are low to medium.

Cruickshank Series

The Cruickshank series consists of level to very gently sloping, light-colored soils that are somewhat poorly drained, moderately coarse textured, and calcareous. These soils formed in moderately coarse textured alluvium and lacustrine sediments that are modified by wind in places. The parent material consists mainly of acid igneous rock material, but it contains some basaltic material. The Cruickshank soils are on lower terraces and bottom lands, mostly in swales or near the base of slopes. Vegetation in uncultivated areas is mainly big sagebrush, rabbitbrush, giant wildrye, cheatgrass, sedges, and saltgrass. Cruickshank soils are associated with Turbyfill, Feltham, and Baldock soils.

Elevation ranges from 2,200 to 2,400 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 75°. The frost-free season is 150 to 160 days. Annual precipitation is 7 to 11 inches.

Cruickshank soils are used mostly for irrigated small grains, improved pasture, corn, clover, and hay.

Cruickshank fine sandy loam (Cu).—This is a nearly level to very gently sloping soil on low river terraces and bottom lands. Slopes range from 0 to 3 percent, but are mostly less than 1 percent.

In a typical profile the surface layer is light-gray fine sandy loam about 9 inches thick. Below the surface layer is very friable, mottled, light-gray fine sandy loam about 18 inches thick. The underlying material is light brownish-gray and white fine sandy loam. Between depths of 6 and 30 inches, the soil is calcareous and moderately alkaline.

Representative profile, 360 feet east of center of road at a point 3,600 feet west and 2,000 feet south of the northeast corner of sec. 35, T. 5 N., R. 6 W., 5 miles southwest of Parma in Canyon County, in an irrigated pasture:

Ap—0 to 9 inches, light-gray (2.5Y 6/1) fine sandy loam, dark brownish gray (2.5Y 4/2) when moist; very weak, medium and thin, platy structure; soft, very friable, slightly sticky and nonplastic; few, fine, very faint brown (10YR 4/3 and 4/4) mottles; abundant very fine and fine roots and few coarse roots; common very fine interstitial pores; slightly calcareous; very strongly alkaline; clear, smooth boundary.

B21ca—9 to 16 inches, light-gray (2.5Y 7/1) fine sandy loam, grayish brown (2.5Y 5/2) when moist; common, fine, faint mottles of dark brown (10YR 4/3); massive; soft, very friable, nonsticky and nonplastic; about 5 to 15 percent very weakly cemented nodules formed by filling holes occupied by cicada or other insects; nodules are rounded, ¼ to ¾ inch in diameter, and ½ to 1¼ inches long; interior of nodules is slightly calcareous and dark grayish brown (2.5Y 4/2) when moist; plentiful very fine and fine roots; common fine tubular pores; moderately calcareous; strongly alkaline; clear, wavy boundary.

B22ca—16 to 27 inches, light-gray (2.5Y 6/1) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; common, medium, faint, brown (10YR 5/3) mottles that are dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; about 20 to 40 percent hard firm nodules similar to those in the B21ca horizon; plentiful very fine and fine roots; common fine tubular pores; moderately calcareous; moderately alkaline; clear, wavy boundary.

IIC1—27 to 39 inches, light brownish-gray (2.5Y 6/2) light fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; common, medium, faint, brown (10YR 5/3) mottles that are dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; very few nodules similar to those in the B21ca horizon; few very fine and fine roots; few fine tubular pores; slightly calcareous; moderately alkaline; clear, wavy boundary.

IIIC2—39 to 47 inches, light brownish-gray (10YR 6/2) light sandy loam, dark grayish brown (10YR 4/2) when moist; few, fine, faint, dark-brown (10YR 4/3) mottles; massive; loose, very friable, nonsticky and nonplastic; few very fine roots; moderately calcareous; moderately alkaline; clear, smooth boundary.

IVC3ca—47 to 60 inches, white (10YR 8/2) fine sandy loam, light gray (10YR 7/2) when moist; few, fine, faint, brown (10YR 5/3) mottles; weak, medium and thin platy laminated sediments; slightly hard, firm, slightly sticky and slightly plastic; very weakly cemented or noncemented; few very fine roots; many fine tubular pores; few, fine faint rust mottles; strongly calcareous; moderately alkaline.

The A horizon is dominantly fine sandy loam, but in a few places it is sandy loam or loamy fine sand. A slightly dark and

thin A1 horizon is present in places. The A horizon ranges from 10YR to 2.5YR in hue and from 3 to 4 in moist value. It is noncalcareous to slightly calcareous and mildly to very strongly alkaline. Mottles occur below the Ap horizon.

The B horizon is 10YR or 2.5YR in hue and 2 or less in chroma. It ranges from nearly massive to weak, subangular blocky or weak, fine and very fine, granular in structure.

Below a depth of about 3 feet are layers of medium-textured lacustrine sediments or medium-textured to moderately coarse textured alluvium. Loose sand and gravel is below a depth of 4 to 5 feet in places.

This soil is deep to very deep and somewhat poorly drained. The water table generally is at a depth of 30 to 36 inches, but it is at a depth of 16 to 20 inches during the irrigation season. Permeability is moderately rapid to a depth of 30 inches, but it is variable below. The available water capacity is 5.0 to 7.5 inches. Runoff is slow, and there is little erosion hazard. The organic-matter content is moderately low or low, and fertility is moderate.

Included in mapping are slightly saline or saline-alkali spots that make up as much as 5 percent of some mapped areas. Also included are small areas of Moulton, Feltham, or Turbyfill soils that make up as much as 10 or 15 percent of some mapped areas.

This soil is used for irrigated small grains, corn, sugar beets, improved pasture, and clover or alfalfa hay. (Capability unit IIIw–1, irrigated; windbreak suitability group 4)

Cruickshank loamy fine sand (Cr).—This soil is level to very gently sloping. It occurs in swales on terraces, commonly at the base of steeper slopes. The surface layer ranges from about 7 to 20 inches in thickness. Mottles are common below this layer. Between depths of 10 and 40 inches, the texture is mainly fine sandy loam. In places a thin very weakly cemented layer that is underlain by laminated silt is below a depth of 40 inches.

This soil is deep to very deep and somewhat poorly drained. The water table generally is at a depth of 30 to 36 inches, but it is at a depth of 16 to 20 inches during the irrigation season. Permeability is rapid in the surface layer and moderately rapid below. The available water capacity is 3.75 to 5 inches. The organic-matter content and fertility are low. Runoff is slow or very slow, and there is little erosion hazard from irrigation water. Soil blowing is a slight hazard, especially on bare soil in spring.

Included in mapping are slightly saline or saline-alkali spots that make up as much as 5 percent of some mapped areas. Small areas of Feltham and Turbyfill soils make up as much as 10 to 15 percent of some mapped areas. Soils that have short slopes of 1 to 3 percent make up less than 20 percent of some mapped areas; these soils are at the edges of low terraces or at the base of steeper fans.

This soil is used mostly for hay, pasture, and small grains. Small areas are used for corn or vegetable crops. (Capability unit IVw–1, irrigated; windbreak suitability group 4)

Draper Series

The Draper series consists of dark-colored, medium-textured, somewhat poorly drained, noncalcareous soils. These soils formed in micaceous alluvium derived from acid igneous rock material. They occur on alluvial fans and bottom lands along Willow Creek near Middleton and along small streams north of the Boise River. The native vegetation was mainly bunchgrass, sagebrush, and herbaceous plants. Draper soils are associated with Baldock and Moulton soils.

Elevation ranges from about 2,200 to 2,400 feet. Annual precipitation is 9 to 11 inches. The soils receive additional moisture from runoff and seepage. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 160 days.

Draper soils are used mostly for alfalfa, clover, corn, sugar beets, and small grains. A small acreage is in pasture.

Draper loam, 0 to 1 percent slopes (DrA).—This soil is on alluvial fans and bottom lands.

In a typical profile the surface layer is gray loam about 8 inches thick. The next layer is gray fine gravelly loam about 12 inches thick. Below this layer is about 16 inches of grayish-brown loam and silt loam that has dark yellowish-brown mottles. The underlying material consists of layers of mixed alluvial deposits. Sand and gravel occur at a depth of about 55 inches.

Representative profile, 650 feet west and 100 feet south of the northeast corner of the SW¼ sec. 6, T. 4 N., R. 2 W., in Canyon County, in a cultivated field:

Ap—0 to 8 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots; common interstitial micropores; mildly alkaline; clear, smooth boundary.

A11—8 to 20 inches, gray (10YR 5/1) fine gravelly loam, very dark gray (10YR 3/1) when moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots; common very fine tubular pores; moderately alkaline; clear, smooth boundary.

A12—20 to 32 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; common, fine, faint mottles of dark yellowish brown (10YR 3/4); massive; hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots; many very fine tubular pores; mildly alkaline; clear, smooth boundary.

IIA13—32 to 36 inches, grayish-brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) when moist; common, medium, distinct mottles of dark yellowish brown (10YR 3/4); massive; hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots; common very fine tubular pores; mildly alkaline; clear, wavy boundary.

IIIC1—36 to 48 inches, light brownish-gray (2.5Y 6/2) loam, dark grayish brown (10YR 4/2) when moist; common, medium, distinct mottles of dark yellowish brown (10YR 3/4); massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; mildly alkaline; clear, wavy boundary.

IVC2—48 to 55 inches, light brownish-gray (2.5Y 6/2) gravelly sandy clay loam, dark grayish brown (10YR 4/2) when moist; common, medium, prominent mottles of dark gray (5Y 4/1) and dark yellowish brown (10YR 4/4); massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; mildly alkaline; clear, wavy boundary.

VC3—55 to 62 inches, pale-brown (10YR 6/3) sand and gravel, brown (10YR 5/3) when moist; single grain; loose, very friable, nonsticky and nonplastic.

The A horizon, to a depth of 6 to 10 inches, is dominantly loam, but it is clay loam in about 140 acres north of Middleton. The A horizon is very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2) when moist. It is slightly calcareous in places where the soil receives runoff and overwash

from calcareous soils. The organic-matter content decreases with depth. In places the C horizon is slightly calcareous and thin strata of loamy sand, clay loam, or fine gravelly loam occur in the lower A horizon and the C horizon. Undrained soils are saturated below a depth of 40 inches for more than 90 days every year.

This soil is deep to very deep and is somewhat poorly drained. Permeability is moderate, and the available water capacity is more than 7.5 inches. Runoff is slow, and there is little or no erosion hazard.

This soil is used for irrigated alfalfa, clover, corn, sugar beets, small grains, and improved pasture. (Capability unit IIw–1, irrigated; windbreak suitability group 3)

Draper loam, 1 to 3 percent slopes (DrB). This soil occurs in narrow strips along drainageways and on the edges of low fans. It is easier to drain than Draper loam, 0 to 1 percent slopes. Runoff is slow, and water erosion is a slight hazard. Included in mapping are small areas of Moulton and Baldock soils that make up less than 15 percent of the acreage.

This soil is used for crops. (Capability unit IIw–1, irrigated; windbreak suitability group 3)

Durargidic Arents

These are well-drained, medium-textured soils that have an indurated or strongly cemented, silica-calcium carbonate duripan at a depth of 20 to 40 inches. Where they have been plowed, the original horizons above the duripan and part of the duripan are mixed enough to destroy the normal sequence of layers, but not to the extent that the constituent materials can no longer be identified. These soils occur on uplands in the northern and northeastern parts of Canyon County, mainly in the Black Canyon irrigation project. Durargidic Arents soils are a mixture of Chilcott, Elijah, Sebree, and Vickery soils caused mainly by deep plowing. These latter soils occur naturally in complex associations. The native vegetation on these soils was mostly bunchgrass, big sagebrush, and herbaceous plants.

Elevation ranges from 2,650 to 3,000 feet. Annual precipitation is 9 to 11 inches. The average annual temperature is 50° to 52° F., and the average summer temperature is about 71°. The frost-free season is 140 to 150 days.

Durargidic Arents soils are used for irrigated small grains, alfalfa, corn, sugar beets, clover, and improved pasture.

Durargidic Arents, 1 to 3 percent slopes (DuB).—This soil occurs on upland terraces.

In a typical profile the upper part of the plow layer is light brownish-gray loam about 8 inches thick. The remainder of the deep-plowed layer is mixed sandy loam to silty clay. It is mostly noncalcareous but contains fragments of strongly calcareous soil material and fragments of subsoil and duripan layers. Remnants of a duripan occur at a depth of about 31 inches. The material below the duripan is sand and gravel at a depth of about 50 inches.

Representative profile, 480 feet east and 1,600 feet north of the southwest corner of sec. 4, T. 5 N., R. 3 W., about 7 miles north of Caldwell in Canyon County:

Ap1—0 to 8 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) when moist; moderate, fine, granular and weak, fine and medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; ranges from noncalcareous to moderately calcareous within a horizontal distance of 2 to 3 feet; ranges from mildly to moderately alkaline within a short distance; few fine gravel-sized particles of duripan randomly distributed; abrupt, smooth boundary.

Ap2—8 to 31 inches, mixture of the various soil horizons present before deep plowing; light silty clay to sandy loam, but dominantly heavy loam; medium continuous clay films on fragments of mixed B2t horizons; moderately and strongly calcareous fragments and particles of gypsum mixed and distributed throughout; few, fine, gravel-sized particles of duripan randomly distributed throughout; most of the structural aggregates from the original soil horizons remain; moderate and fine angular blocky structure, weak or moderate, fine and medium, subangular blocky, and massive; plentiful, very fine, fine, and medium roots throughout; reaction and calcareousness vary in strength and within short distances from mildly to moderately alkaline and from noncalcareous to strongly calcareous; abrupt, wavy boundary.

C1sicam—31 to 50 inches, very pale brown (10YR 7/3) silica and calcium carbonate cemented duripan; yellowish brown (10YR 5/4) when moist; top of duripan is glazed and has a pinkish color; indurated plates and less hard material between the plates; calcium carbonate lenses are light gray (10YR 7/2) when dry and light brownish gray (10YR 6/2) when moist; no roots; mildly to moderately alkaline; clear, wavy boundary.

IIC2casi—50 to 57 inches, light-gray, (10YR 7/1) weakly cemented sand and gravel; pale brown (10YR 6/3) when moist; clear, wavy boundary.

IIC3ca—57 inches, loose sand and gravel strongly coated with iron oxides; single grain; slightly calcareous; underside of pebbles coated with calcium carbonate.

The Ap horizon is 24 to 40 inches thick, and ranges from sandy loam to silty clay or clay in texture. It is light brownish gray, pale brown, white, or very pale brown when dry, and dark grayish brown, brown, light brownish gray, or pale brown when moist. The Ap horizon ranges from neutral to strongly alkaline, but it is mostly mildly or moderately alkaline. Part or all of a duripan remains below the Ap horizon. In most places plowing has broken or disturbed the upper part of the duripan.

This soil is well drained and is moderately deep over a duripan. The available water capacity is 3.75 to 7.5 inches. Permeability is moderate above the duripan. The duripan is impermeable except through cracks or other openings. This soil is very slightly saline or alkali in places. The organic-matter content is low, and fertility is high. Runoff is slow to medium, and erosion is a moderate hazard. Areas where this soil has slopes of 0 to 1 percent make up as much as 20 or 25 percent of some mapped areas.

This soil is used for irrigated small grains, alfalfa, corn, sugar beets, clover, and improved pasture. (Capability unit IIIe–6, irrigated; windbreak suitability group 1)

Durargidic Arents, 3 to 7 percent slopes (DuC).—This soil is similar to Durargidic Arents, 1 to 3 percent slopes, except that it is gently sloping. Runoff is medium to rapid, and erosion is a severe hazard.

This soil is used for crops and pasture. (Capability unit IIIe–8, irrigated; windbreak suitability group 2)

Elijah Series

The Elijah series consists of level to moderately sloping, well-drained soils that have a dominantly moderately fine textured subsoil and an indurated silica-calcium carbonate duripan at a depth of 20 to 40 inches. These soils formed in loess or loess-like alluvium underlain by me-

dium-textured or moderately coarse textured alluvium or lacustrine sediments. Elijah soils are on high terraces east and southeast of Nampa and on uplands north of the Boise River. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, cheatgrass, and big sagebrush. Elijah soils are associated with Chilcott, Sebree, and Vickery soils.

Elevation ranges from 2,300 to 2,750 feet. Annual precipitation is 8 to 11 inches. The average annual temperature is 50° to 52° F., and the average summer temperature is 69° to 71°. The frost-free season is 145 to 160 days.

Elijah soils are used for irrigated alfalfa, sugar beets, corn, small grains, clover, potatoes, and improved pasture, and for nonirrigated pasture.

Elijah silt loam, 1 to 3 percent slopes (EhB).—This soil occurs on terraces and uplands.

In a typical profile the surface layer is brown silt loam about 9 inches thick. The upper part of the subsoil is firm pale-brown light silty clay loam about 6 inches thick. The lower part is friable, pale-brown silt loam about 4 inches thick. The substratum is light-gray, moderately calcareous silt loam. It is underlain by a very pale brown and white, indurated duripan at a depth of about 22 inches.

Representative profile, 1,350 feet east and 1,840 feet south of the northwest corner of sec. 13, T. 3, N., R. 2 W, about 1 mile northeast of Nampa in Canyon County, in a cultivated field:

Ap—0 to 9 inches, brown (10YR 5/3) heavy silt loam, dark brown (10YR 4/3) when moist; moderate, very fine, granular and moderate, very fine and fine, subangular blocky structure; hard, friable, sticky and slightly plastic; noncalcareous; neutral; abrupt, smooth boundary.

B21t—9 to 15 inches, pale-brown (10YR 6/3) light silty clay loam, dark brown (10YR 4/3) when moist; about 15 percent of ped surfaces have dark-brown (10YR 3/3) coatings; weak, medium, prismatic structure parting easily to moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; thin nearly continuous clay films on ped and pore surfaces; many very fine and fine pores; noncalcareous; mildly alkaline; gradual, smooth boundary.

B22t—15 to 19 inches, pale-brown (10YR 6/3) silt loam, yellowish brown (10YR 5/4) on moist broken surfaces, pale brown (10YR 6/3) when moist and crushed; about 10 percent of ped surfaces have dark-brown (10YR 4/3) coatings; moderate, fine and very fine, angular blocky structure; hard, friable, sticky and slightly plastic; thin nearly continuous clay films on ped surfaces and in pores; many very fine and fine pores; few fine manganese concretions, fine basaltic gravel or coarse sands; noncalcareous; neutral; abrupt, wavy boundary.

IIClca—19 to 22 inches, light-gray (10YR 7/2) silt loam, light yellowish brown (10YR 6/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; small pieces of caliche from hardpan mixed in this horizon; few nodules of more dense soil material; moderately calcareous; mildly alkaline; abrupt, broken boundary.

IIC2sicam—22 to 40 inches, very pale brown (10YR 7/3) and white (10YR 8/2), indurated, silica-calcium carbonate cemented duripan; light gray (10YR 7/2) when moist; upper part fractured and tending toward platy structure; silt loam material between plates; strongly calcareous; moderately alkaline.

The A horizon is dominantly silt loam, but in a few small areas it is silty clay loam or clay loam. The Ap horizon is light brownish gray, grayish brown, or pale brown when dry. The B2t horizon is silty clay loam, silt loam, or clay loam in texture. The Cca horizon is weakly cemented in places. Nodules are common. The depth to calcareous material ranges from 12 to 20 inches.

The duripan ranges from about 7 inches to several feet in thickness, The upper part commonly is indurated. Depth to the duripan ranges from 20 to 40 inches. The soil commonly is underlain by stratified deposits of coarse or moderately coarse sand and gravel derived mostly from granitic materials. In areas east and southeast of Nampa, basalt bedrock is below the duripan.

This soil is moderately permeable to the duripan. The duripan is very slowly permeable. The available water capacity is 5.0 to 7.5 inches. Fertility is high, and organic-matter content is low to moderately low. Runoff is slow to medium, and erosion is a moderate hazard.

Included in mapping are small spots of Sebree soils that make up 5 to 15 percent of some mapped areas. Also included are areas of Chilcott and Vickery soils that make up as much as 10 percent of some mapped areas.

This soil is used for corn, sugar beets, small grains, clover, alfalfa, and improved pasture. (Capability unit IIIe–6, irrigated; windbreak suitability group 1)

Elijah silt loam, 0 to 1 percent slopes (EhA).—This soil occurs on terraces. Runoff is slow or very slow, and there is little erosion hazard.

This soil is used for crops and pasture. (Capability unit IIs–1, irrigated; windbreak suitability group 1)

Elijah silt loam, shallow, 0 to 1 percent slopes (ElA).—This soil occurs on terraces.

Representative profile, 195 feet east and 595 feet south of the northwest corner of sec. 29, T. 3 N., R. 1 W., about 4 miles east of Nampa, in an abandoned field:

Ap1—0 to 2½ inches, light brownish-gray (10YR 6/2) silt loam, dark brown (10YR 3/3) when moist and rubbed; ped surfaces are very dark grayish brown (10YR 3/2) when moist; weak and moderate, medium, platy and moderate, fine, granular structure; hard, firm, slightly sticky and slightly plastic; plentiful very fine and fine roots and few coarse roots; many very fine interstitial pores; slightly calcareous fragments, noncalcareous in matrix; mildly alkaline; abrupt, smooth boundary.

Ap2—2½ to 5 inches, light brownish-gray (10YR 6/2) heavy silt loam, dark grayish brown (10YR 4/2) when moist; moderate, fine and medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; plentiful very fine and fine roots and few medium roots; few fine tubular pores; few worm casts; noncalcareous in matrix; few slightly calcareous spots and specks; mildly alkaline; abrupt, smooth boundary.

B2t—5 to 8 inches, pale-brown (10YR 6/3) light silty clay loam or heavy silt loam, dark brown (10YR 3/3) when moist; ped surfaces are dark brown (10YR 4/3) when moist and rubbed; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; moderate patchy clay films on ped and pore surfaces; films are brown (10YR 5/3) when dry and dark brown (10YR 3/3) when moist; plentiful fine roots and few medium roots; few fine tubular pores; noncalcareous in matrix; few slightly calcareous spots and specks; moderately alkaline; abrupt, wavy boundary.

B3t—8 to 11 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) when moist; weak and moderate, medium, prismatic structure; hard, friable, slightly sticky and slightly plastic; thin patchy clay films on ped and pore surfaces; few very fine and fine roots; common fine tubular pores; noncalcareous in matrix; few slightly calcareous spots and specks; moderately alkaline; abrupt, smooth boundary.

C1ca—11 to 17 inches, white (2.5Y 8/2) light silt loam, light gray (2.5Y 7/2) when moist; weak, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; 15 to 20 percent hard firm nod-

ules of soil material formed from filling holes occupied by cicada or other insects; nodules are about half an inch in diameter; interior of nodules is slightly calcareous and grayish brown (10YR 5/2) when moist; many very fine and fine roots; some roots matted between nodules and at the lower boundary of the horizon; few fine tubular pores; moderately calcareous; moderately alkaline; clear, wavy boundary.

IIC2sicam—17 to 19 inches, very pale brown (10YR 8/3) loam, pale brown (10YR 6/3) and very pale brown (10YR 7/3) when moist; massive material occurs in fractured lenses or strong, coarse plates; several thin, indurated, calcium carbonate and silica cemented layers are imbedded in strongly cemented material; strongly cemented material is very hard and very firm; moderately calcareous; moderately alkaline.

The A horizon is dominantly silt loam, but in a few places it is silty clay loam or clay loam. The Ap horizon is light brownish gray, grayish brown, or pale brown when dry. The B2t horizon is silty clay loam, silt loam, or clay loam. Depth to calcareous material is generally 10 to 14 inches. The Cca horizon is weakly cemented in places. Nodules are common. Depth to the duripan ranges from about 14 to 20 inches. The duripan is from 7 inches to several feet thick and is commonly indurated in the upper part. In cultivated areas, where the surface has been smoothed for irrigation, material from the Bt horizons is mixed in the plow layer. In about 15 to 20 percent of the acreage, part of the C1 horizon also is mixed into the plow layer.

This soil is well drained. The available water capacity is 3.75 to 7.5 inches. Permeability is moderate to the duripan. The duripan is very slowly permeable. Fertility is high, and organic-matter content is low to moderately low. Runoff is slow or very slow, and there is little erosion hazard.

Included in mapping are small spots of Sebree soils that make up 5 or 10 percent of some mapped areas. Also included are Vickery soils that make up 10 percent of some mapped areas.

This soil is used for alfalfa, corn, small grains, clover, and sugar beets. (Capability unit IIs–1, irrigated)

Elijah silt loam, shallow, 1 to 3 percent slopes (ElB).—This soil occurs on terraces and uplands. Runoff is slow to medium, and erosion is a moderate hazard. Spots where this soil is severely eroded make up 10 to 15 percent of some mapped areas.

This soil is used for corn, small grains, alfalfa, clover, and improved pasture. (Capability unit IIIe–6, irrigated)

Elijah silt loam, shallow, 3 to 7 percent slopes (ElC).—This soil occurs on the edges of terraces and on uplands. Runoff is medium to rapid, and erosion is a severe hazard. Spots where the soil is severely eroded make up 15 percent of some mapped areas.

This soil is used for small grains, alfalfa, clover, corn, and improved pasture. (Capability unit IIIe–8, irrigated)

Elijah-Sebree silt loams, 0 to 1 percent slopes (EsA).—This mapping unit is about 50 to 60 percent Elijah silt loam, 20 to 30 percent Chilcott silt loam, 10 to 15 percent Vickery silt loam, and 5 to 15 percent Sebree silt loam. This unit occurs in and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. Runoff is slow, and there is little erosion hazard.

Elijah and Chilcott soils occupy similar positions on the landscape. In uncultivated areas, the Vickery soils occur as small rounded spots and low mounds. These spots are smoothed out where the land has been prepared for irrigation. Sebree soils occur as very small, nearly barren slick spots. They have an alkali subsoil. They are described under the heading "Sebree Series."

Most of the acreage is used for irrigated corn, sugar beets, small grains, clover, alfalfa, and improved pasture. Vegetation in uncultivated areas is mainly cheatgrass, big sagebrush, rabbitbrush, and wild mustard. (Capability unit IIs–1, irrigated; VIs–1, dryland pasture or range; windbreak suitability group 1)

Elijah-Sebree silt loams, 1 to 3 percent slopes (EsB).—This mapping unit is about 50 to 60 percent Elijah silt loam, 20 to 30 percent Chilcott silt loam, 10 to 15 percent Vickery silt loam, and 5 to 10 percent Sebree silt loam. This unit occurs on uplands in and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. Runoff is slow to medium, and erosion is a moderate hazard.

Elijah and Chilcott soils occupy similar positions on the landscape. In uncultivated areas, the Vickery soils occur as small rounded spots and low mounds. These spots are smoothed out where the land has been prepared for irrigation. Sebree soils occur as very small, nearly barren slick spots. They have an alkali subsoil. They are described under the heading "Sebree Series."

Through grading and leveling for irrigation, part or all of the original surface layer has been removed from some areas, and this material has been added to other areas. In places where the clayey subsoil is within plow depth, intake of water is slower, tilth is poorer, and crops grow less well than on typical soils.

These soils are used for corn, sugar beets, small grains, clover, alfalfa, and improved pasture. Vegetation in uncultivated areas is mainly cheatgrass, big sagebrush, rabbitbrush, and wild mustard. (Capability unit IIIe–6, irrigated; VIs–1, dryland pasture or range; windbreak suitability group 1)

Elijah-Vickery silt loams, 3 to 7 percent slopes (EvC).—This mapping unit is about 55 to 65 percent Elijah silt loam, 20 to 30 percent Vickery silt loam, and 10 to 20 percent Chilcott silt loam. Inclusions of Sebree soils make up less than 5 percent of the acreage. This unit occurs on uplands in and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. Runoff is medium to rapid, and erosion is a severe hazard. Vickery soils are described under the heading "Vickery Series."

Through grading and leveling for irrigation, part or all of the original surface layer has been removed from some areas, and this material has been added to other areas. In places where the subsoil is within plow depth, intake of water is slower, tilth is poorer, and crops grow less well than on typical soils.

These soils are used for improved pasture, small grains, corn, alfalfa, and clover. Vegetation in uncultivated areas is mainly cheatgrass, big sagebrush, rabbitbrush, and wild mustard. (Capability unit IIIe–8, irrigated; VIe–2, dryland pasture or range; windbreak suitability group 2)

Elijah-Vickery silt loams, 7 to 12 percent slopes (EvD).—This mapping unit is about 60 to 70 percent Elijah silt loam and 25 to 35 percent Vickery silt loam. Inclusions of Chilcott and Sebree soils make up about 5 percent of the acreage. This unit occurs on uplands in and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. Runoff is rapid, and the hazard of water erosion is very severe. Vickery soils are described under the heading "Vickery Series."

Soils that have been severely eroded by irrigation water

make up 15 percent of some mapped areas. Through grading and smoothing for irrigation, part or all of the original surface layer has been removed from some areas, and this material has been added to other areas. In places where the subsoil is within plow depth, intake of water is slower, tilth is poorer, and crops grow less well than on typical soils.

These soils are used for improved pasture, small grains, corn, alfalfa, and clover. Vegetation in uncultivated areas is mainly cheatgrass, big sagebrush, rabbitbrush, and wild mustard. (Capability unit IVe–1, irrigated; VIe–2, dryland pasture or range; windbreak suitability group 2)

Falk Series

The Falk series consists of moderately well drained, moderately coarse textured, nearly level to very gently sloping soils. These soils formed in alluvium derived mainly from acid igneous rock. Falk soils occur on high bottom lands and very low terraces, mostly near the Boise River. The native vegetation was mainly needlegrass and other bunchgrasses and big sagebrush. Falk soils are associated with Baldock, Moulton, and Chance soils.

Elevation ranges from about 2,200 to 2,400 feet. The average annual temperature is about 51° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 160 days. Annual precipitation is 9 to 11 inches. These soils receive additional moisture from runoff and seepage.

Falk soils are used for irrigated pasture, corn, small grains, clover, and alfalfa hay.

Falk fine sandy loam, 0 to 2 percent slopes (FaA).—This soil is on low terraces and bottom lands near the Boise River.

In a typical profile the surface layer is light brownish-gray fine sandy loam that is about 9 inches thick. The surface layer is underlain by very friable, pale-brown fine sandy loam about 7 inches thick. The next layer is very friable, light-gray fine sandy loam about 9 inches thick. Below this layer is mottled light-gray fine sandy loam about 8 inches thick. The underlying gravel and sand begins at a depth of about 33 inches.

Representative profile, 1,600 feet east and 2,500 feet south of the northwest corner of sec. 12, T. 4 N., R. 4 W., about 5 miles west of Middleton in Canyon County, in a cultivated field:

Ap—0 to 9 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; very weak, very fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; abundant, very fine, fine, and medium roots; many very fine interstitial pores; slightly acid; clear, smooth boundary.

C1—9 to 16 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) when moist; very weak, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many very fine tubular pores; neutral; clear, smooth boundary.

C2—16 to 25 inches, light-gray (2.5Y 7/2) fine sandy loam, brown (2.5Y 4/3) when moist; very weak, medium and coarse, subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine and fine roots; many very fine tubular pores; neutral; clear, wavy boundary.

C3g—25 to 33 inches, light-gray (2.5Y 7/2) fine sandy loam, olive brown (2.5Y 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common, medium, distinct pale-brown (10YR 6/3) mottles that are brown (7.5YR 4/2) when moist; neutral; clear, smooth boundary.

IIC4—33 to 60 inches, light-gray (2.5Y 7/2) gravel and sand, light brownish gray (2.5Y 6/2) when moist; about 65 to 75 percent gravel; loose; single grain; common, medium, distinct pale-brown (10YR 6/3) mottles that are brown (10YR 5/3) when moist; mildly alkaline.

The Ap horizon is dominantly fine sandy loam, but in small area it is loam, sandy loam, or gravelly sandy loam. It ranges in color from light brownish gray (10YR 6/2) to pale brown (10YR 6/3) when dry and from dark grayish brown (10YR 4/2) to brown (10YR 4/3) when moist. In some areas this soil is as much as 20 to 50 percent gravel.

The C horizons between depths of about 9 and 30 inches are dominantly fine sandy loam. Mottling is common below a depth of 20 to 30 inches. Depth to loose sand and gravel ranges from 20 to 40 inches. A fluctuating water table is in the sand and gravel.

This soil is moderately well drained. The available water capacity is 3.5 to 5.0 inches, and permeability is moderately rapid. Organic-matter content is moderately low to low, and fertility is low to moderate. Slopes are 2 to 3 percent in a few small areas, but in most areas slopes are less than 1 percent. Runoff is slow, and there is little or no erosion hazard.

Included in mapping are small areas of Moulton soils that make up as much as 10 percent of some mapped areas. Chance and Notus soils make up as much as 5 or 10 percent of some areas. Also included is a soil similar to Falk fine sandy loam that is 40 to 50 inches deep over loose sand and gravel. This included soil makes up as much as 5 or 10 percent of some mapped areas.

This soil is used for corn, sugar beets, small grains, vegetables, clover, alfalfa hay, and native and improved pasture. (Capability unit IIIs–1, irrigated; windbreak suitability group 4)

Feltham Series

The Feltham series consists of coarse-textured, well-drained to somewhat excessively drained, level to moderately steep soils. These soils formed in alluvium that consists of loamy sand, loamy fine sand, or loamy coarse sand. The alluvium was derived mainly from granitic or other acid igneous rock material, but it contains some basic materials. In places the alluvium has been modified by wind.

Feltham soils are on terraces and alluvial fans. Large areas occur near Sunnyslope, Central Cove, and Apple Valley in Canyon County and on terraces of the Snake River near Marsing and Homedale in Owyhee County. The vegetation on uncultivated soils is mainly big sagebrush, cheatgrass, Indian ricegrass, Russian-thistle, wild mustard, and Sandberg bluegrass. Feltham soils are associated with Turbyfill, Truesdale, and Quincy soils.

Elevaton ranges from 2,300 to 2,600 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 70° to 73°. The frost-free season is 145 to 160 days. Annual precipitation is 7 to 10 inches. Summers are dry.

Feltham soils are used for irrigated small grains, corn, hay, and improved pasture. Small areas of nonirrigated soils are used for pasture.

Feltham loamy fine sand, 0 to 3 percent slopes (FeB).—This soil is on terraces and alluvial fans.

In a typical profile the surface layer is grayish-brown

noncalcareous loamy fine sand about 6 inches thick. The surface layer is underlain by light brownish-gray, noncalcareous loamy fine sand about 26 inches thick. The next layer is light brownish-gray very fine sandy loam about 12 inches thick. Below this is moderately calcareous light-gray, pale-brown and very pale brown loam and fine sandy loam.

Representative profile, 768 feet south and 65 feet east of the northwest corner of the SE¼ sec. 6, T. 4 N., R. 5 W., about 2 miles north and 5 miles west of Wilder in Canyon County, in rangeland:

A1—0 to 6 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; very weak, very fine, granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many interstitial micropores; noncalcareous; mildly alkaline; clear, smooth boundary.

C1—6 to 32 inches, light brownish-gray (2.5Y 6/2) loamy fine sand, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; common fine tubular pores; noncalcareous; mildly alkaline; clear, wavy boundary.

IIC1ca—32 to 44 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; many fine tubular pores; moderately calcareous; small white splotches and thin veins of lime; strongly alkaline; clear, smooth boundary.

IIIC3ca—44 to 49 inches, light-gray (10YR 7/2) loam that has fine spots of brown (10YR 5/3), brown (10YR 4/3) when moist; massive; hard, firm, slightly sticky and slightly plastic; soil material occurs in medium and thick bedding plates; 20 to 50 percent, by volume, is rounded very weakly cemented nodules or krotovinas of soil materials about ¾ inch in diameter; material inside the nodules is slightly calcareous, and it is brown (10YR 4/3) when moist; moderately calcareous; large splotches and veins of lime; moderately alkaline; clear, smooth boundary.

IVC4ca—49 to 64 inches, very pale brown (10YR 8/3) and pale-brown (10YR 6/3) fine sandy loam, pale brown (10YR 6/3) and brown (10YR 5/3), respectively, when moist; massive; weak bedding plates; hard, friable, sticky and plastic; few rounded pebbles; moderately calcareous; moderately alkaline.

The A horizon is dominantly loamy fine sand, but in places it is fine sand. Loamy fine sand or loamy sand occurs between depths of 10 inches and 30 inches. The A1 and Ap horizons range in value from 5 to 6 when dry and from 3 to 4 when moist; the hue is 2.5Y to 10YR. The color of the C horizon is similar to or slightly lighter than that of the Ap horizon.

The A1, C1, and, in places, the C2 horizons are noncalcareous and neutral to moderately alkaline. The depth to calcareous material ranges from 20 to 35 inches. The Cca horizon contains less than 15 percent carbonates, and commonly less than 10 percent; this horizon ranges from mildly alkaline to strongly alkaline.

This Feltham soil is very deep and well drained to somewhat excessively drained. It is rapidly permeable in the upper part and moderately permeable in the underlying sediments. The available water capacity is 5 to 7 inches. The organic-matter content and fertility generally are low. Runoff is slow, and erosion is a slight to moderate hazard.

Included in mapping are small areas of sandy Quincy soils that make up 10 to 15 percent of some mapped areas.

This Feltham soil is used for irrigated pasture, hay, and small grains. A few small areas are used for corn and vegetables. The vegetation on uncultivated soils is mainly big sagebrush, cheatgrass, Indian ricegrass, Russian-thistle, and wild mustard. Uncultivated areas are used for pasture, and they provide some wildlife habitat. (Capability unit IVs–1, irrigated; windbreak suitability group 5)

Feltham loamy fine sand, 3 to 7 percent slopes (FeC).—This soil is similar to Feltham loamy fine sand, 0 to 3 percent slopes, except that it occurs at the edges of terraces and near drainageways. Runoff is medium to rapid, and erosion is a very severe hazard.

Included in mapping are areas of moderately coarse textured Turbyfill soils and sandy Quincy soils that make up 15 to 20 percent of some mapped areas.

This Feltham soil is used for irrigated pasture, small grains, and hay crops. The vegetation on uncultivated soils is mainly big sagebrush, cheatgrass, Indian ricegrass, Russian-thistle, and wild mustard. These uncultivated areas are used for pasture, and they provide some wildlife habitat. (Capability unit IVe–3, irrigated; windbreak suitability group 5)

Felham loamy fine sand, 7 to 12 percent slopes (FeD).—This soil is similar to Feltham loamy fine sand, 0 to 3 percent slopes, except that it is moderately sloping and occurs at the edges of terraces and on alluvial fans. Runoff is medium to rapid, and erosion is a very severe hazard.

Included in mapping are areas of Turbyfill and Quincy soils that make up 10 to 15 percent of some mapped areas. Also included are areas of soils that are slightly gravelly or eroded; these soils make up 5 to 10 percent of some mapped areas.

This Feltham soil is used for irrigated pasture, hay, and small grains. Uncultivated areas are used for pasture, and they provide some wildlife habitat. (Capability unit IVe–3, irrigated; windbreak suitability group 5)

Feltham loamy fine sand, 12 to 25 percent slopes (FeE).—This soil occurs along the edges of terraces. It varies more than Feltham loamy fine sand, 0 to 3 percent slopes. Lenses of gravel or sand are commonly mixed with medium-textured sediments in the substratum. Runoff is rapid, and erosion is a severe hazard. Included in mapping are areas of slightly gravelly or eroded soils that make up 10 to 15 percent of some mapped areas.

This Feltham soil is used mostly for pasture and wildlife habitat. Limitations for crops are very severe. The vegetation is mainly big sagebrush, cheatgrass, Indian ricegrass, Russian-thistle, wild mustard, and Sandberg bluegrass. (Capability unit VIIe–2, dryland pasture or range)

Feltham-Quincy complex, 0 to 12 percent slopes (FuD).—This mapping unit is about 65 percent Feltham loamy fine sand and 35 percent Quincy fine sand. These soils occur on low and medium dunes or ridges. The Felham soil occupies areas between dunes or ridges and the Quincy soil occupies the dunes and ridges. Runoff is slow. Erosion is a slight to moderate hazard on the Feltham soil. Soil blowing is a severe hazard on the Quincy soil. The Quincy soil is described under the heading "Quincy Series."

These soils are used for pasture. The vegetation is mainly big sagebrush, rabbitbrush, cheatgrass, Indian ricegrass, Russian-thistle, and wild mustard. (Capability unit VIe–3, dryland pasture or range; windbreak suitability group 5)

Garbutt Series

The Garbutt series consists of well-drained, level to moderately sloping, medium-textured soils. These soils occur

on alluvial fans and low terraces, mostly south of Marsing and Homedale in Owyhee County. They formed in light silty alluvium derived from lacustrine sediments. About 25 to 40 percent of the very fine sand fraction of the soils is volcanic ash and glass. In places, loess or alluvium from the Snake River or local streams is mixed into the soil material. Where the soils are not cultivated, the vegetation is wild barley, cheatgrass, winterfat, shadscale, budsage, big sagebrush, greasewood, squirreltail, and wild mustard. Garbutt soils are associated with Bahem, Nyssaton, and Vanderhoff soils.

Elevation ranges from 2,000 to 2,700 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 70° to 73°. The frost-free season is 145 to 160 days. Annual precipitation is 6 to 8 inches, including 5 to 15 inches of snowfall. Summers are dry.

Garbutt soils are used mostly for irrigated alfalfa, clover, corn, potatoes, small grains, and sugar beets.

Garbutt silt loam, 1 to 3 percent slopes (GaB).—This soil occurs on alluvial fans and terraces.

In a typical profile the upper 9 inches is light brownish-gray silt loam about 9 inches thick. Below this is very friable, light-gray, moderately calcareous silt loam about 31 inches thick. This is underlain by loam or silt loam alluvial deposits stratified with thin layers of coarser textured materials.

Representative profile, 1,800 feet west and 1,350 feet north of the southeast corner of sec. 19, T. 2 N., R. 4 W., about 5 miles southwest of Marsing and east of State Highway 72 in Owyhee County, in a native range:

A1—0 to 3 inches, light brownish-gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) when moist; moderate, very fine, granular structure beneath plants and weak, very thin, platy structure between plants; soft, loose, slightly sticky and slightly plastic; abundant very fine and fine roots; moderately alkaline; slightly calcareous; clear, irregular boundary.

C1—3 to 9 inches, light brownish-gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) when moist; moderate, thin and very thin, platy structure; soft, very friable, slightly sticky and slightly plastic; abundant fine and very fine roots; moderately alkaline; slightly calcareous; clear, smooth boundary.

C2—9 to 22 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; very weak, coarse, prismatic structure; soft, very friable, slightly sticky and slightly plastic; abundant fine and very fine roots; few very fine tubular pores; moderately calcareous; moderately alkaline; gradual, smooth boundary.

C3ca—22 to 40 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; massive; soft, very friable, slightly sticky and slightly plastic; abundant fine and very fine roots; common very fine tubular pores; some lime in spots and veins along root hairs and channels; fine pieces of plant stems, bark, and roots, and fine chunks of cemented caliche in the alluvium; moderately alkaline; moderately calcareous; abrupt, smooth boundary.

IIC4—40 to 42 inches, light brownish-gray (10YR 6/2) fine gravelly loam, dark grayish brown (10YR 4/2) when moist; single grain; loose dry or moist; nonsticky and nonplastic; 40 percent dark, fine, rounded gravel and coarse sand undercoated with lime; moderately alkaline; slightly calcareous; abrupt, broken boundary.

IIIC5—42 to 60 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; massive; soft, very friable, slightly sticky and slightly plastic; strongly alkaline; moderately calcareous.

The surface layer is dominantly silt loam, but in places it is very fine sandy loam and loam. In places it has a weak to moderate, fine and very fine, granular or a thin platy structure. The hue of the Ap and C1 horizons is dominantly 10YR, but ranges to 2.5Y; value is 6 to 8 dry and 4 to 6 moist; chroma is dominantly 2 but ranges to 3. This soil is calcareous, but the uppermost 2 to 4 inches is leached of carbonates in places. The Cca horizon has a weak to moderate accumulation of lime. Thin strata of sand or gravel occur in places.

This soil is well drained, deep to very deep, and moderately permeable. It has an available water capacity of more than 7.5 inches. The organic-matter content is low to moderately low, and the fertility is high. Runoff is medium, and there is a slight to moderate hazard of erosion from irrigation water.

Seepage from irrigation water has caused salts or alkali to accumulate in some areas. In uncultivated areas, and especially where the vegetation is mainly shadscale, budsage, and greasewood, this soil is relatively high in content of soluble salts and exchangeable sodium. These soluble salts and sodium are readily leached from the profile through normal irrigation.

Included in mapping are small areas of Bahem, Nyssaton, and Vanderhoff soils that make up about 15 percent of the acreage.

This soil is used for irrigated alfalfa, corn, sugar beets, potatoes, small grains, vegetables, vegetable seed, and improved pasture. (Capability unit IIc-2, irrigated; windbreak suitability group 1)

Garbutt silt loam, 0 to 1 percent slopes (GaA).—This soil occurs on alluvial fans and terraces. Runoff is slow, and there is little or no erosion hazard. Included in mapping are areas of Nyssaton soils that make up as much as 15 to 20 percent of some mapped areas.

This soil is used for irrigated alfalfa, corn, sugar beets, potatoes, small grains, vegetables, vegetable seed, and improved pasture. (Capability unit I-1, irrigated; windbreak suitability group 1)

Garbutt silt loam, 3 to 7 percent slopes (GaC).—This soil occurs on alluvial fans. Runoff is medium to rapid, and there is a severe erosion hazard from irrigation water.

This soil is used mostly for irrigated alfalfa, corn, small grains, and improved pasture. Small areas are used for range. Vegetation in uncultivated areas is mainly cheatgrass, wild barley, wild mustard, budsage, and big sagebrush. (Capability unit IIIe-2, irrigated; windbreak suitability group 2)

Garbutt silt loam, 7 to 12 percent slopes (GaD).—This soil occurs on alluvial fans. Runoff is rapid, and the hazard of water erosion in irrigated areas is very severe.

This soil is used for small grains, corn, alfalfa, and improved pasture. (Capability unit IVe-1, irrigated; windbreak suitability group 2)

Garbutt silt loam, deep over basalt, 1 to 3 percent slopes (GdB).—This soil is similar to Garbutt silt loam, 1 to 3 percent slopes, except that it is underlain by basalt bedrock at a depth of 40 to 60 inches. It occurs on terraces, mostly south of Melba in Canyon County. The available water capacity is 5 to 7.5 inches. Runoff is medium, and there is a slight to moderate erosion hazard from irrigation water. The water table may perch over the bedrock where these soils are overirrigated. Rock outcrops and areas where the soil is less than 40 inches deep over bedrock make up less than 5 percent of some mapped areas.

This soil is used for sugar beets, corn, potatoes, small grains, clover, alfalfa, and improved pasture. (Capability unit IIe-2, irrigated; windbreak suitability group 1)

Garbutt silt loam, deep over basalt, 3 to 7 percent slopes (GdC).—This soil is similar to Garbutt silt loam, 1 to 3 percent slopes, except that it is underlain by basalt bedrock at a depth of 40 to 60 inches. It occurs on alluvial fans and terraces, mostly south of Melba in Canyon County. A few small rock outcrops and areas where the soil is less than 40 inches deep over bedrock make up less than 10 percent of the acreage. The available water capacity is 5 to 7.5 inches. Runoff is medium to rapid, and erosion is a severe hazard in irrigated areas.

This soil is used for irrigated alfalfa, corn, small grains, and improved pasture. (Capability unit IIIe-2, irrigated; windbreak suitability group 2)

Grandview Series

The Grandview series consists of level to very gently sloping, medium-textured, moderately or strongly alkaline, moderately well drained, light-colored, calcareous soils. These soils formed in alluvium derived from mixed mineral material. Grandview soils occur mostly in Owyhee County south of Homedale near Jump and Poison Creeks. They are on concave parts of alluvial fans and low terraces. The vegetation in uncultivated areas is mainly greasewood, saltgrass, and alkali weed. Grandview soils are associated with Bram and Garbutt soils.

Elevation ranges from 2,200 to 2,400 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 150 to 160 days. Annual precipitation is 6 to 8 inches, including very light snowfall. Summers are dry.

Grandview soils are used for irrigated pasture and hay. Small acreages are used for barley, corn, and alfalfa seed. Uncultivated areas are commonly strongly saline-alkali and provide very little forage.

Grandview loam (Gn).—This soil is level to very gently sloping. It occurs on alluvial fans and low terraces.

In a typical profile the surface layer is pale-brown loam about 5 inches thick. The subsoil is firm, pale-brown silty clay loam that is moderately calcareous and strongly alkaline. It is about 9 inches thick. The next layer, extending to a depth of about 38 inches, is firm, pale-brown clay loam that is strongly calcareous. Below this layer is about 7 inches of very pale brown clay loam over very pale brown loam.

Representative profile, 1,340 feet east and 1,210 feet south of the northwest corner of sec. 17, T. 1 S., R. 2 W., on a low terrace southwest of the Snake River in Owyhee County, in a pasture:

Ap—0 to 5 inches, pale-brown (10YR 6/3) loam, brown (10YR 4/3) when moist; weak, very fine, granular structure; hard, firm, slightly sticky and slightly plastic; plentiful very fine roots; many very fine tubular pores; thin organic coatings on some peds; slightly calcareous; strongly alkaline; clear, smooth boundary.

B—5 to 14 inches, pale-brown (10YR 6/3) silty clay loam, brown (10YR 4/3) when moist; weak, fine and medium, angular and subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; thin organic coatings and thin clay films on some vertical ped faces; moderately calcareous; strongly alkaline; abrupt, smooth boundary.

C1ca—14 to 38 inches, pale brown (10YR 6/3) clay loam, brown (10YR 5/3) when moist; weak, coarse, subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; strongly calcareous; strongly alkaline; gradual, smooth boundary.

C2casa—38 to 45 inches, very pale brown (10YR 7/3) light clay loam, brown (10YR 5/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; common veins and fine spots of salts; moderately calcareous; moderately alkaline; gradual, smooth boundary.

C3sa—45 to 60 inches, very pale brown (10YR 7/3) heavy loam, brown (10YR 5/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few veins and splotches of salts; slightly calcareous; moderately alkaline.

The A horizon is dominantly loam, but in small areas it is silt loam or silty clay loam. The uppermost 6 inches, where mixed, is light brownish gray, light gray, pale brown, or very pale brown when dry and dark grayish brown, grayish brown, or brown when moist. Where undisturbed, the uppermost 2 or 3 inches is weak to strong platy in structure and is commonly vesicular. Where disturbed, the Ap horizon is weak, very fine or fine, granular in structure or is massive.

The B horizon is dominantly clay loam, but in places it is silty clay loam. It is pale brown or very pale brown when dry and is brown when moist. The B horizon is 5 to 15 inches thick. The structure ranges from weak to moderate, medium to very fine, subangular to angular blocky to weak, medium to coarse, prismatic. The A and B horizons are slightly to moderately calcareous. Depth to strongly calcareous material ranges from 10 to 25 inches. Some iron mottles occur below a depth of 40 inches. Some gypsum and, in places, other soluble salts are below a depth of 30 to 50 inches.

The soil is slightly to strongly saline or saline-alkali. The A horizon ranges from moderately to very strongly alkaline. The B and C1ca horizons range from strongly to very strongly alkaline, and the lower C layers range from moderately to strongly alkaline.

This soil is deep to very deep and is moderately well drained. Permeability is slow, the available water capacity is more than 7.5 inches, and the organic-matter content is low. Slopes range from 0 to 3 percent but are mostly less than 2 percent. Runoff is slow, and there is little erosion hazard.

This soil is used mostly for irrigated hay and pasture. Small areas are used for barley, corn, and alfalfa seed. About 30 to 50 percent of the acreage is severely affected by salts and alkali and is not used for crops. Alkali bees nest in these areas and pollinate alfalfa grown for seed. (Capability unit IVw-3, irrigated)

Gravel Pit

Gravel pit (Gp) consists of areas from which the soil material and much gravel has been removed. Areas too small to be delineated on the map are shown by symbols. Gravel pits are not suitable for cultivation or grazing. (Capability unit VIIIs-1)

Greenleaf Series

The Greenleaf series consists of medium-textured and moderately fine textured, well-drained, nearly level to strongly sloping soils. These soils formed in laminated medium-textured lacustrine material and old alluvium that is overlain by loess in places. Greenleaf soils occur on low and moderate terraces that are slightly to moderately dissected. Slopes range from 0 to 20 percent but commonly are uniform and less than 3 percent. These soils occur in areas near Greenleaf, Wilder, Notus, and Parma in Canyon County. The native vegetation was mainly blue-

bunch wheatgrass, Sandberg bluegrass, cheatgrass, and big sagebrush. Greenleaf soils are associated with Owyhee and Nyssaton soils.

Elevation ranges from 2,300 to 2,650 feet. Annual precipitation is 8 to 11 inches. The average annual temperature is 50° to 52° F., and the average summer temperature is 69° to 71°. The frost-free season is 145 to 160 days.

Greenleaf soils are used mostly for irrigated alfalfa, sugar beets, corn, hops, potatoes, small grains, vegetables, and vegetable seed (fig. 4).

Greenleaf-Owyhee silt loams, 0 to 1 percent slopes (GwA).—This mapping unit is about 60 to 80 percent Greenleaf silt loam and 20 to 40 percent Owyhee silt loam. These soils generally occur in similar positions on the landscape, but the Owyhee soil is more sloping and occupies slightly elevated areas. The Owyhee soil is described under the heading "Owyhee Series."

In a typical profile of the Greenleaf soil, the surface layer is light brownish-gray silt loam about 8 inches thick. The subsoil is about 9 inches thick. It is firm grayish-brown light silty clay loam in the upper 5 inches, and firm, calcareous, light-gray silt loam in the lower 4 inches. Part of the subsoil generally is mixed into the plow layer. The substratum is light-gray silt loam in the upper 5 inches; the next 24 inches is light-gray silt, and the lower part is pale-brown silt. The profile is free of stones or gravel.

Representative profile of Greenleaf silt loam, 0 to 1 percent slopes, 1,340 feet north and 60 feet east of the southwest corner of sec. 32, T. 5 N., R. 3 W., about 5 miles northwest of Caldwell in Canyon County, in a cultivated area:

Ap—0 to 8 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, fine and very fine, granular structure; hard, friable, slightly sticky and slightly plastic; plentiful very fine roots; common very fine pores; part of the Bt horizon has been mixed into this layer by plowing; noncalcareous; neutral; abrupt, smooth boundary.

B2t—8 to 13 inches, grayish-brown (10YR 5/2) light silty clay loam; ped faces are dark brown (10YR 3/3) when moist and brown (10YR 4/3) when rubbed and moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; hard, firm, sticky and plastic; plentiful very fine and fine roots and few medium and coarse roots; common very fine and fine tubular pores; medium continuous clay films on ped and pore surfaces; common, fine, soft, manganese-oxide concretions and stains on peds; noncalcareous; mildly alkaline; abrupt, wavy boundary.

B3tca—13 to 17 inches, light-gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, fine, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; abundant very fine and fine roots and few medium and coarse roots; many micropores and many very fine tubular pores; few, thin, patchy clay films on ped and pore surfaces; strongly calcareous; moderately alkaline; gradual, smooth boundary.

C1ca—17 to 22 inches, light-gray (10YR 8/2) silt loam, grayish brown (10YR 5/2) when moist; moderate, medium

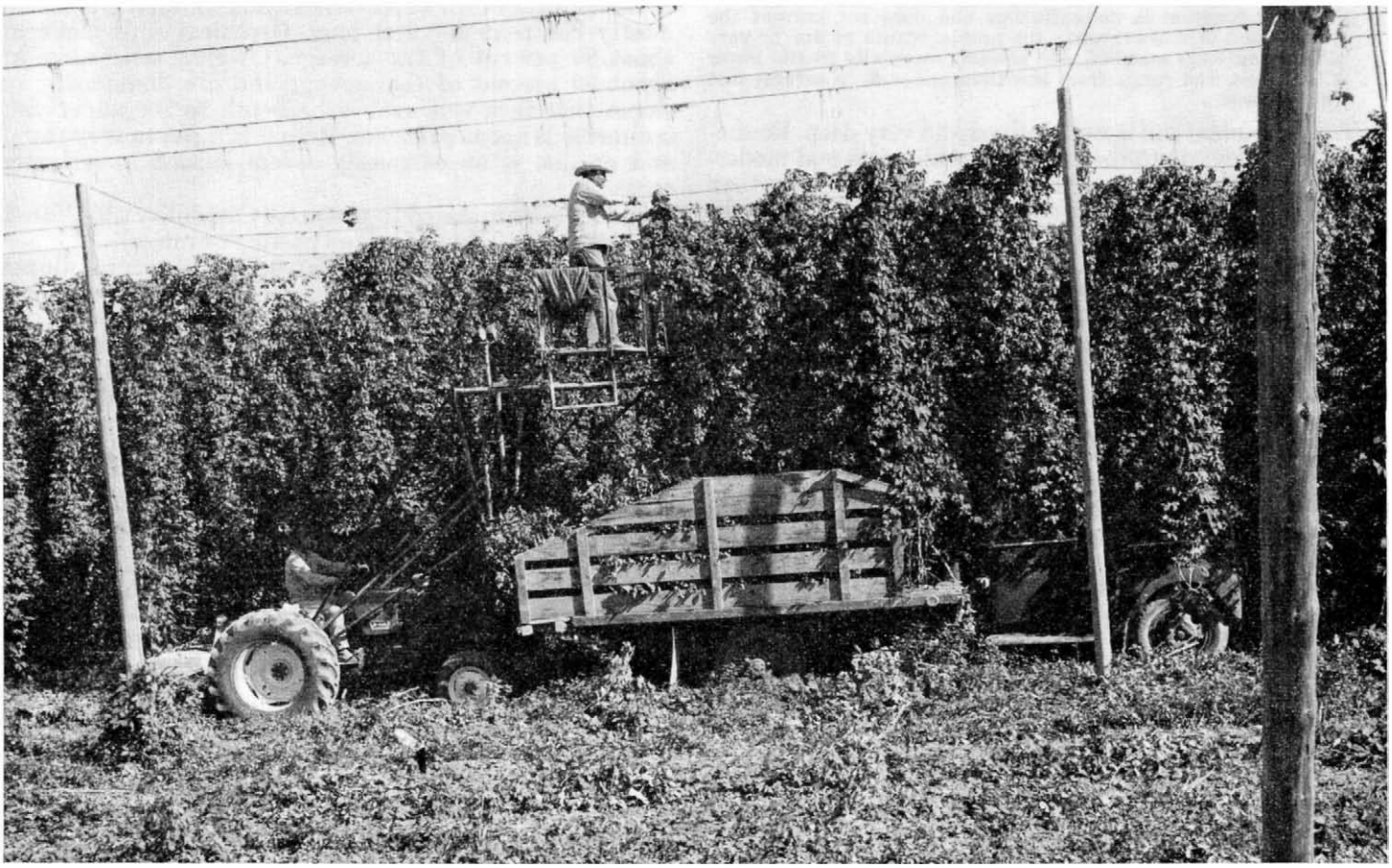

Figure 4.—**Harvesting hops on Greenleaf silty clay loam, 0 to 1 percent slopes.**

and thin, platy structure; layer consists of original laminated lacustrine sediments; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots and few medium and coarse roots between the laminas; few very fine and fine roots within the laminas; common micropores and common very fine tubular pores; few, fine, manganese-oxide concretions and coatings; strongly calcareous; mildly alkaline; clear, smooth boundary.

C2ca—22 to 46 inches, light-gray (10YR 7/2) silt, dark grayish brown (10YR 4/2) when moist; strong, medium and thin, platy structure; layer consists of laminated lacustrine sediments; slightly hard, firm, nonsticky and slightly plastic; abundant very fine and fine roots between laminas; few very fine tubular pores; few, fine, manganese-oxide coatings mainly on lamina surfaces; strongly calcareous; few lime veins in root channels; moderately alkaline; lowermost 2 to 3 inches is moderate thick and very thick laminas that have abundant, fine, manganese-oxide stains; abrupt, smooth boundary.

C3—46 to 60 inches, pale-brown (10YR 6/3) silt, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; abundant, soft, fine, manganese-oxide concretions; very slightly calcareous; moderately alkaline.

The A horizon is mainly silt loam, but in small areas it is very fine sandy loam and loam. It is light brownish gray to light gray. The B2t horizon is heavy silt loam to light silty clay loam. In places, few fine black manganese stains occur in the lower B or upper C horizons.

Depth to calcareous material ranges from 14 to 22 inches. Depth to laminated lacustrine sediments ranges from 17 to 40 inches. In places, one or more of the laminas is weakly or very weakly cemented. The laminas have extremely thin, fragile, very dense lime crusts that are pink, brown, or reddish brown. This cementation is discontinuous and does not prevent the penetration of roots through the profile. Strata of fine or very fine sandy loam material are present, especially in the lower C horizons, and range from less than one inch to several feet in thickness.

This Greenleaf soil is well drained and very deep. Permeability is moderate to the laminated sediments and moderately slow below. The available water capacity is more than 7.5 inches. The organic-matter content is low to moderately low, and fertility is high. Runoff is slow, and there is little or no erosion hazard.

The soils of this mapping unit are used for irrigated hops, sugar beets, corn, potatoes, small grains, alfalfa hay and seed, vegetables, and vegetable seed. Low content of zinc in the soils affects hops and fruit trees and may affect other crops. (Capability unit I–1, irrigated; windbreak suitability group 1)

Greenleaf-Owyhee silt loams, 1 to 3 percent slopes (GwB).—This mapping unit is about 60 to 80 percent Greenleaf silt loam and 20 to 40 percent Owyhee silt loam. Erosion is a slight to moderate hazard. Runoff is slow. Included in mapping northeast of Parma are about 200 acres of Greenleaf very fine sandy loam.

These soils are used and managed in nearly the same way as Greenleaf-Owyhee silt loams, 0 to 1 percent slopes, but irrigation runs should be somewhat shorter because erosion is a greater hazard. (Capability unit IIe–2, irrigated; windbreak suitability group 1)

Greenleaf-Owyhee silt loams, 3 to 7 percent slopes (GwC).—This mapping unit is about 50 percent Greenleaf silt loam and 50 percent Owyhee silt loam. The Owyhee soil is steeper and occurs at the edges of terraces. The unit occurs mostly in the more dissected areas north and northeast of Parma and along the sides of drainageways in other parts of the survey area. Most areas are long and narrow, and slopes are short.

Depth to calcareous material and underlying sediments is 2 to 8 inches less than in Greenleaf-Owyhee silt loams, 0 to 1 percent slopes. The surface layers are thinner, and in a few cultivated areas the surface layer and the subsoil are mixed in the plow layer. Runoff is medium, and erosion is a severe hazard on irrigated soils. Included in mapping northeast of Parma are about 150 acres of Greenleaf very fine sandy loam.

These soils are suited to intertilled row crops, alfalfa, small grains, and pasture. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Greenleaf-Owyhee silt loams, 7 to 12 percent slopes (GwD).—This mapping unit is about 50 percent Greenleaf silt loam, 35 percent Owyhee silt loam, and about 15 percent eroded spots where these soils are calcareous throughout. This unit is similar to Greenleaf-Owyhee silt loams, 0 to 1 percent slopes, except that several inches of the surface layer have been lost through erosion. These soils occur on the edges of terraces and drainageways. The areas generally are long and narrow, and slopes are 150 to 250 feet long. Runoff is rapid, and the hazard of water erosion in irrigated areas is very severe.

These soils are used for irrigated pasture, hay, corn, and small grains. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Greenleaf-Owyhee silt loams, 12 to 20 percent slopes (GwE).—This unit occurs on the edges of terraces and drainageways north of Greenleaf and Wilder. Slopes are mostly less than 100 feet long. Greenleaf soils make up about 80 percent of the acreage. Owyhee soils make up about 20 percent of the acreage and are dominantly on slopes that face west or south. Depth to the underlying sediments is about 20 inches. Runoff is rapid to very rapid, and erosion is an extremely severe hazard in irrigated areas.

These soils are suited to pasture. (Capability unit VIe–1, irrigated; unit VIe–2, dryland pasture or range)

Greenleaf silty clay loam, 0 to 1 percent slopes (GrA).—This soil occurs on terraces and in depressional areas north and northeast of Notus. Except for the texture of the surface layer and the slower water intake, it is similar to Greenleaf silt loam, 0 to 1 percent slopes.

This soil is used for irrigated hops, sugar beets, corn, potatoes, small grains, alfalfa, vegetables, and vegetable seed. (Capability unit I–1, irrigated; windbreak suitability group 1)

Greenleaf silt loam, 0 to 1 percent slopes (GsA).—Small rounded alkali spots less than a quarter acre in size make up about 10 to 25 percent of some mapped areas. In these spots, water intake and permeability are very slow, and plants grow poorly. Deep plowing to a depth of 2 to 3 feet mixes the profile, increases water intake and permeability, and insures more uniform plant growth.

This soil is used for irrigated sugar beets, corn, small grains, and alfalfa. (Capability unit I–1, irrigated; windbreak suitability group 1)

Greenleaf silt loam, 1 to 3 percent slopes (GsB).—Except for slope, this soil is similar to Greenleaf silt loam, 0 to 1 percent slopes. Small, rounded, alkali slick spots less than a quarter acre in size make up 10 to 20 percent of some mapped areas. In these spots, water intake and perme-

ability are very slow, and plants grow poorly. Deep plowing to a depth of 2 to 3 feet mixes the profile, increases water intake and permeability, and insures more uniform plant growth. Runoff is slow and the erosion hazard is slight to moderate. Areas where slopes are as steep as 5 percent make up about 30 percent of the acreage.

This soil is used for irrigated sugar beets, small grains, and alfalfa. (Capability unit IIe–2, irrigated; windbreak suitability group 1)

Harpt Series

The Harpt series consists of nearly level, well-drained, deep to very deep, medium-textured soils. These soils formed in noncalcareous alluvium that is high in content of quartz, feldspar, and mica. They occur on alluvial fans and terraces, mainly near Willow Creek in Canyon County and near Reynolds Creek in Owyhee County. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, cheatgrass, giant wildrye, and big sagebrush. Harpt soils are associated with Draper and Jenness soils.

Elevation ranges from 2,250 to 2,600 feet. Annual precipitation is 9 to 12 inches. The average annual temperature is about 51° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 160 days.

Harpt soils are used for irrigated corn, sugar beets, small grains, alfalfa, and improved pasture.

Harpt loam (Ha).—This soil occurs on alluvial fans and terraces. In a typical profile the surface layer is grayish-brown loam about 10 inches thick. Below this is friable grayish-brown loam about 12 inches thick. The next layer, extending to a depth of about 30 inches, is firm grayish-brown sandy clay loam. Stratification is common below a depth of about 30 inches, and in places thin layers of sandy loam, loamy sand, or sand are in the lower part of the profile.

Representative profile, 2,050 feet east and 450 feet south of the northwest corner of sec. 32, T. 5 N., R. 2 W., about 1.5 miles northeast of Middleton in Canyon County in a cultivated area:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many micropores and interstitial pores; noncalcareous; slightly acid; clear, smooth boundary.

C1—10 to 15 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots and few medium and coarse roots; many very fine tubular pores; noncalcareous; slightly acid; clear, smooth boundary.

C2—15 to 22 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; very weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots and few medium and coarse roots; many very fine tubular pores; noncalcareous; slightly acid; clear, wavy boundary.

C3—22 to 30 inches, grayish-brown (10YR 5/2) light sandy clay loam, very dark grayish brown (10YR 3/2) when moist; very weak, medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; plentiful very fine roots and few medium and coarse roots; many fine tubular pores; very thin coatings or clay films on vertical ped surfaces; films are very dark brown (10YR 2/2) when moist; organic coatings on vertical ped surfaces; slightly calcareous; moderately alkaline; clear, wavy boundary.

C4ca—30 to 44 inches, light brownish-gray (2.5Y 6/2) light sandy clay loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; few medium and coarse roots; many very fine tubular pores; very thin clay films on vertical ped surfaces; films are very dark brown (10YR 2/2) when moist; organic coatings on vertical ped surfaces; moderately calcareous; common, fine, distinct lime veins; moderately alkaline; clear, wavy boundary.

IIC5—44 to 60 inches, light brownish-gray (10YR 6/2) coarse sandy loam and some gravel, dark grayish brown (10YR 4/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; few medium roots; many very fine tubular pores; slightly calcareous; common, fine, distinct lime veins; strongly alkaline; clear, wavy boundary.

The A horizon is mostly loam, but in small areas it is silt loam or coarse sandy loam. It ranges from grayish brown to dark grayish brown when dry and from very dark grayish brown to very dark brown when moist. Sandy clay loam or clay loam layers occur below a depth of 24 to 30 inches. Thin stratified, moderately coarse textured or coarse textured material is common below a depth of 30 inches. Parts of the C horizon are slightly to moderately calcareous, but in places the soil is noncalcareous throughout.

This soil is well drained and deep to very deep. Permeability is moderate, and the available water capacity is more than 7.5 inches. Organic-matter content is low to moderately low, and the fertility is high. Runoff is slow, and there is little hazard of erosion.

Included in mapping are a few small areas where the depth to coarse sand is less than 40 inches and the available water capacity is moderate. These areas make up less than 5 percent of the acreage. Also included are areas where the surface layer is silt loam and areas of Draper and Jenness soils that make up as much as 10 or 15 percent of some mapped areas.

This soil is used for irrigated corn, sugar beets, small grains, alfalfa, and improved pasture. (Capability unit I–1, irrigated; windbreak suitability group 1)

Jacquith Series

The Jacquith series consists of level to moderately sloping, well-drained, coarse-textured soils. These soils are on slightly dissected medium and high terraces near Sunnyslope and Central Cove in Canyon County. They formed in wind-modified alluvium derived mainly from granitic sources and are moderately deep to a strongly cemented layer. Vegetation in uncultivated areas is mainly big sagebrush, cheatgrass, Indian ricegrass, Sandberg bluegrass, Russian-thistle, wild mustard, and forbs. Jacquith soils are associated with Feltham and Truesdale soils.

Elevation ranges from 2,200 to 2,700 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 75°. The frost-free season is 150 to 160 days. Annual precipitation is 7 to 11 inches, including about 1 to 2 feet of snowfall.

Jacquith soils are used for irrigated orchards, alfalfa, small grains, and improved pasture. Nonirrigated areas are used for pasture and wildlife habitat.

Jacquith loamy fine sand, 1 to 3 percent slopes (JaB).—This soil is on slightly dissected upland terraces.

In a typical profile the upper 19 inches is grayish-brown and brown loamy fine sand. Below this is friable, light brownish-gray loamy fine sand about 8 inches thick. The

next layer, extending to a depth of about 36 inches, is very friable, light-gray fine sandy loam. Below this layer is a strongly cemented layer about 14 inches thick. The profile is free of stones, but it contains gravel in places.

Representative profile, 200 feet north and 80 feet west of the southeast corner of sec. 5, T. 3 N., R. 4 W., about 3.5 miles east of Homedale in Canyon County, in a pasture:

A1—0 to 3 inches, grayish-brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; very weak, very fine, granular structure; loose, very friable, nonsticky and nonplastic; abundant fine roots; noncalcareous; mildly alkaline; clear, smooth boundary.

C1—3 to 19 inches, brown (10YR 5/3) loamy fine sand, dark grayish brown (10YR 4/2) when moist; very weak, coarse, subangular blocky structure; soft, very friable, nonsticky and nonplastic; plentiful fine roots; few micropores and very fine tubular pores; noncalcareous; moderately alkaline; clear, smooth boundary.

C2—19 to 27 inches, light brownish-gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; few micropores and very fine and fine tubular pores; very slightly calcareous; moderately alkaline; clear, wavy boundary.

IIC3ca—27 to 36 inches, light-gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine and fine tubular pores; very few fine pebbles; about 5 percent is soft nodules; strongly calcareous; moderately alkaline; abrupt, smooth boundary.

IIIC4casi—36 to 50 inches, light-gray (10YR 7/2), weakly to strongly cemented duripan, light brownish gray (10YR 6/2) when moist; many very fine and fine tubular pores; duripan fractures into plates one half to several inches thick; duripan is about 1 to 2 feet thick.

IIIC5—50 inches, stratified sandy loam, loamy sand, and gravelly loamy sand.

The A horizon in uncultivated areas is loamy fine sand, loamy sand, or fine sand, and the soil is gravelly in places. Where the uppermost 7 inches is mixed, the dominant texture is loamy fine sand. The A horizon is grayish brown, light gray, or pale brown when dry. The texture is commonly loamy fine sand between depths of 6 and 30 inches, but it is loamy coarse sand or loamy sand in places. Nodules make up as much as 25 percent of the C2 and Cca horizons.

Depth to the strongly cemented duripan ranges from 20 to 40 inches, but is dominantly 30 to 40 inches. The duripan consists of coarse plates separated by sandy loam or loamy sand material. Undisturbed soils are noncalcareous in the upper part, slightly calcareous in the C horizon, and strongly calcareous in the Cca horizon above the duripan.

This soil is well drained. Permeability is rapid to the duripan, and slow below it. The available water capacity is less than 3.75 inches, the organic-matter content is very low, and the fertility is low. Runoff is slow. Water erosion is a slight hazard, but soil blowing is a moderate hazard in places.

On top of ridges and terraces this soil is nearly level. These areas make up less than 15 percent of the acreage. Included in mapping are small areas of Feltham and Truesdale soils that make up 10 or 15 percent of some mapped areas.

This soil is used for irrigated orchards, alfalfa, small grains, and improved pasture. Nonirrigated areas are used for pasture and wildlife habitat. (Capability unit IVs–1, irrigated; windbreak suitability group 5)

Jacquith loamy fine sand, 3 to 7 percent slopes (JaC).—Runoff is medium on this soil, and erosion is a very severe hazard. Included on terrace edges are soils that have slopes of 7 to 12 percent. These soils make up less than 15 percent of the acreage. Also included are small areas of Feltham and Truesdale soils that make up as much as 10 percent of some mapped areas.

This soil is used for irrigated orchards, alfalfa, small grains, and improved pasture. Nonirrigated areas are used for pasture and wildlife habitat. (Capability unit IVe–3, irrigated; windbreak suitability group 5)

Jenness Series

The Jenness series consists of well-drained, nearly level to gently sloping, medium-textured, deep to very deep soils. These soils formed in micaceous and noncalcareous alluvium that consists mostly of material weathered from acid igneous rocks. The alluvium contains angular quartz sand. Jenness soils are on bottom lands, alluvial fans, and low terraces along small intermittent streams and drainageways in uplands north of the Boise River. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, giant wildrye, and big sagebrush. Jenness soils are associated with Chilcott, Elijah, and Lankbush soils.

Elevation ranges from 2,500 to 3,000 feet. Annual precipitation is 9 to 11 inches. The average annual temperature is about 51° F., and the average summer temperature is 67° to 70°. The frost-free season is 145 to 155 days.

Jenness soils are used for irrigated alfalfa, corn, potatoes, small grains, sugar beets, and pasture. The vegetation in uncultivated areas is cheatgrass, wild mustard, sunflower, and big sagebrush. These areas are used for range.

Jenness loam, 0 to 1 percent slopes (JeA).—This soil occurs on the bottom lands of broad drainageways and on low terraces.

In a typical profile the surface layer is light brownish-gray loam about 9 inches thick. Below this is friable, light brownish-gray silt loam about 5 inches thick. The next layer, extending to a depth of about 24 inches, is pale-brown, friable silt loam. Below this layer is friable, pale-brown loam about 19 inches thick. Stratification is common below a depth of about 40 inches, and in places layers of sandy loam, loamy sand, and sand are in the lower part of the profile. The profile contains no stones and little gravel.

Representative profile, 420 feet east and 480 feet north of the southwest corner of sec. 5, T. 5 N., R. 2W., about 6 miles north of Middleton in Canyon County, in native range:

A11—0 to 3 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 3/2) when moist; weak, thin and medium, platy structure parting to moderate, medium and fine, granular; soft, very friable; slightly sticky and nonplastic; abundant fine and very fine fibrous roots; noncalcareous; neutral; clear, smooth boundary.

A12—3 to 9 inches, light brownish-gray (10YR 6/2) light loam, brown (10YR 4/3) when moist; weak, medium, platy structure parting to weak, medium, subangular blocky; slightly hard, friable, slightly sticky and nonplastic; plentiful fine and very fine fibrous roots; noncalcareous; neutral; clear, wavy boundary.

C1—9 to 14 inches, light brownish-gray (10YR 6/2) light silt loam, brown (10YR 4/3) when moist; massive; slightly hard, friable, slightly sticky and nonplastic; plentiful fine and very fine roots; noncalcareous; mildly alkaline; clear, wavy boundary.

C2—14 to 24 inches, pale-brown (10YR 6/3) light silt loam, brown (10YR 4/3) when moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; few very weakly cemented

nodules of soil material; noncalcareous; mildly alkaline; gradual, wavy boundary.

C3—24 to 43 inches, pale-brown (10YR 6/3) loam, brown (10YR 4/3) when moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; noncalcareous; few splotches and veins of lime in lower 6 inches; mildly alkaline; clear, wavy boundary.

IIC4—43 to 50 inches, light-gray (10YR 7/2) coarse sand, brown (10YR 5/3) when moist; single grain; loose dry and moist, nonsticky and nonplastic; noncalcareous; mildly alkaline.

IIIC4—50 to 60 inches, stratified loamy sand and sand.

The A horizon dominantly is loam, but it is silt loam or sandy loam in a few areas. The Ap horizon ranges from light brownish gray or grayish brown to pale brown when dry and from dark or very dark grayish brown to brown when moist.

To a depth of at least 30 inches, the C horizon is dominantly loam or silt loam, but it is sandy loam or clay loam in places. Stratified silt loam and sand is common below a depth of about 30 inches. In places a faint Cca horizon is in the lower subsoil.

This soil is well drained, deep to very deep, and moderately permeable. It has high available water capacity, low to moderately low organic-matter content, and high fertility. Runoff is slow, and the hazard of erosion is slight.

Included in mapping are a few small areas where the depth to coarse sand is less than 40 inches. The soils in these areas have moderate available water capacity. They make up less than 5 percent of the acreage. Also included are areas of Harpt and Lankbush soils that make up as much as 5 percent of some mapped areas.

This soil is used for irrigated crops, pasture, and range. The main crops are alfalfa, corn, potatoes, small grains, and sugar beets. Vegetation in uncultivated areas consists of cheatgrass, wild mustard, sunflower, Sandberg bluegrass, and big sagebrush. (Capability unit I–1, irrigated; unit VIs–1, dryland pasture or range; windbreak suitability group 1)

Jenness loam, 1 to 3 percent slopes (JeB).—This soil is similar to Jenness loam, 0 to 1 percent slopes, except that it is on bottom lands, alluvial fans, and low terraces. Runoff is medium, and erosion is a slight to moderate hazard in irrigated areas. Inclusions of Harpt and Lankbush soils make up as much as 10 to 15 percent of some mapped areas.

This soil is used for irrigated crops, pasture, and range. The main crops are alfalfa, corn, potatoes, small grains, and sugar beets. Vegetation in uncultivated areas consists of cheatgrass, wild mustard, sunflower, Sandberg bluegrass, and big sagebrush. (Capability unit IIe–2, irrigated; units VIs–1, dryland pasture or range; windbreak suitability group 1)

Jenness loam, 3 to 7 percent slopes (JeC).—This soil is on edges of terraces and on alluvial fans. It occurs in long narrow strips at the base of steeper soils. Soil material washed from overlying soils is regularly deposited on this soil. Runoff is medium to rapid, and erosion is a severe hazard in irrigated areas.

This soil is used mostly for range or pasture. Vegetation in uncultivated areas consist of cheatgrass, wild mustard, Sandberg bluegrass, and big sagebrush. Where irrigated, this soil is used for small grains, corn, alfalfa, and improved pasture. (Capability unit IIIe–2, irrigated; unit VIe–2, dryland pasture or range; windbreak suitability group 2)

Lankbush Series

The Lankbush series consists of gently sloping to steep, well-drained, deep to very deep soils that have a moderately fine textured subsoil. These soils formed in alluvial or fluviatile sediments derived from granitic materials. The sediments contain much quartz, mica, coarse sand, and fine gravel. Lankbush soils are on alluvial fans, old dissected terraces, and uplands in the northern and northeastern parts of Canyon County. Slopes range from 0 to 50 percent, but are mostly 7 to 20 percent. Vegetation in uncultivated areas is mainly big sagebrush, Sandberg bluegrass, cheatgrass, medusahead wildrye, wild mustard, and little sunflower. Lankbush soils are associated with Lolalita, Jenness, and Elijah soils.

Elevation ranges from 2,500 to 2,900 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. Annual precipitation is 9 to 12 inches. The frost-free season is 140 to 155 days.

Lankbush soils are used mostly for dryland pasture or range. Some areas are irrigated to small grains, alfalfa, corn, hay, and improved pasture.

Lankbush sandy loam, 12 to 30 percent slopes (LaE).—This soil is on alluvial fans, dissected terraces, and uplands.

In a typical profile the surface layer is light brownish-gray sandy loam about 14 inches thick. The subsoil is sandy clay loam that extends to a depth of about 50 inches. It is light brownish gray and friable in the uppermost 3 inches and grayish brown and firm in the next 10 inches; the rest is pale brown and firm. The underlying material consists of light-gray and very pale brown sand.

Representative profile, 1,240 feet west and 600 feet south of the northeast corner of sec. 13, T. 5 N., R. 2 W., about 6 miles northeast of Middleton in Canyon County, in rangeland:

A11—0 to 2 inches, light brownish-gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, fine and medium, granular structure; soft, very friable, slightly sticky and nonplastic; abundant very fine and fine roots; noncalcareous; neutral; abrupt, irregular boundary.

A12—2 to 14 inches, light brownish-gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, thick and medium, platy structure; slightly hard, very friable, slightly sticky and slightly plastic; abundant very fine and fine roots; common fine tubular pores; noncalcareous; neutral; clear, smooth boundary.

B21t—14 to 17 inches, light brownish-gray (10YR 6/2) light sandy clay loam, dark grayish brown (10YR 4/2) when moist; weak, medium, prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; thin patchy clay films on ped and pore surfaces; plentiful fine and very fine roots; common fine tubular pores; noncalcareous; mildly alkaline; clear, smooth boundary.

B22t—17 to 27 inches, grayish-brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, subangular blocky structure; hard, firm, sticky and slightly plastic; medium patchy clay films on ped and pore surfaces; few fine and very fine roots; many fine and very fine tubular pores, noncalcareous; mildly alkaline; clear, smooth boundary.

B23t—27 to 42 inches, pale-brown (10YR 6/3) heavy sandy clay loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; medium patchy dark grayish-brown (10YR 4/2) clay films on vertical ped and pore surfaces; few very fine roots; many very fine

and fine tubular pores; noncalcareous; mildly alkaline; clear, smooth boundary.

B3t—42 to 50 inches, pale-brown (10YR 6/3) light sandy clay loam, brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; thin patchy clay films on ped and pore surfaces; few very fine roots; many very fine and fine tubular pores; noncalcareous; moderately alkaline; abrupt, smooth boundary.

IC—50 to 65 inches, light-gray (10YR 7/2) and very pale brown (10YR 7/3), micaceous, granitic sand; single grain; loose; noncalcareous; moderately alkaline; stratified with lenses of coarse sandy loam ½ to 1½ inches thick at intervals of 4 to 12 inches.

The solum is 30 to 50 inches thick. The A horizon is mainly sandy loam, but it is coarse sandy loam or loam in a few places. It is grayish brown, light brownish gray, or pale brown when dry and very dark grayish brown or dark grayish brown when moist. The combination of grayish brown dry color and very dark grayish brown moist color occurs only where the A horizon is less than 4 inches thick.

The B2t horizon contains 20 to 30 percent clay and is mainly sandy clay loam; it is coarse sandy clay loam or heavy loam in places. The B2t horizon is mostly grayish brown, brown, or pale brown and has weak or moderate subangular blocky or weak prismatic structure.

The profile is neutral to moderately alkaline; generally the more alkaline layers are in the lower part. The profile is mainly noncalcareous, but a weak zone of lime accumulation is below a depth of 40 inches in places. The soils are slightly gravelly in places.

This soil is well drained and is deep to very deep. It has moderately slow permeability. The available water capacity is more than 7.5 inches, the organic-matter content is low, and the fertility is moderate to high. Runoff is rapid, and erosion is a severe hazard. Where this soil is irrigated, erosion is an extremely severe hazard.

Some areas where slopes are 12 to 15 percent are used for irrigated pasture, hay, and occasionally a small grain. Most areas are used for dryland pasture or range. (Capability unit VIe–1, irrigated; unit VIe–2, dryland pasture or range)

Lankbush sandy loam, 3 to 7 percent slopes (LaC).—This soil is on alluvial fans and uplands. Runoff is medium, and erosion is a severe hazard. Included in mapping are a few areas where slopes are 1 to 3 percent, and areas of Jenness loam, 3 to 7 percent slopes. These inclusions make up as much as 15 to 20 percent of some mapped areas.

This soil is used for irrigated corn, small grains, alfalfa, and improved pasture. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Lankbush sandy loam, 7 to 12 percent slopes (LaD).—Runoff is rapid on this soil, and erosion is a very severe hazard. This soil is suited to irrigated pasture, hay, small grains, and row crops. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Lankbush sandy loam, 30 to 50 percent slopes (LaF).—This soil is on south-facing slopes on uplands in the northern and northeastern parts of Canyon County. The lower part of the surface layer is thinner than is typical for the series and is only 2 to 4 inches thick on steep slopes. Also, the upper part of the subsoil is only 8 to 12 inches thick. In places, this soil is gravelly. The underlying material consists of micaceous sandy loam and thin strata of loamy sand or gravelly loamy sand.

This soil is well drained and is deep to very deep. It has moderate permeability and moderate to moderately high available water capacity. Organic-matter content is low, and fertility is moderate. Runoff is rapid or very rapid, and erosion is a severe hazard.

Included in mapping are Lolalita soils, barren severely eroded areas, and gravelly spots that make up as much as 10 or 15 percent of some mapped areas.

This soil is too steep for cultivation. It is used for dryland pasture or range. (Capability unit VIe–2, dryland pasture or range)

Lankbush-Elijah silt loams, 12 to 30 percent slopes (LeE).—This mapping unit is about 65 to 75 percent Lankbush silt loam and 15 to 20 percent Elijah silt loam. These soils occur in and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. Except for texture, the Lankbush soil is similar to Lankbush sandy loam, 12 to 30 percent slopes. Most areas are only slightly eroded, but some spots are moderately or severely eroded. Runoff is rapid to very rapid on these soils, and erosion is a moderate to severe hazard. Where these soils are irrigated, erosion is an extremely severe hazard. The Elijah soil has a hardpan and 12 to 15 percent slopes. It is described under the heading "Elijah Series."

Included in mapping are Power and Purdam soils and severely eroded spots that make up as much as 10 to 15 percent of some mapped areas.

Most of the acreage is used for dryland pasture or range. A few areas of less steep soils are irrigated to improved pasture, alfalfa hay, and occasionally a small grain. (Capability unit VIe–1, irrigated; unit VIe–2, dryland pasture or range)

Lankbush-Power complex, 12 to 30 percent slopes (LhE).—This mapping unit is about 60 percent Lankbush sandy loam and 40 percent Power silt loam. These soils occur mostly on short south-facing slopes in and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. The surface layer is loam in as much as 20 percent of some mapped areas. In most places the soils are only slightly eroded, but spots of moderately or severely eroded soils make up as much as 15 percent of some mapped areas. Runoff is rapid to very rapid, and erosion is a moderate to severe hazard. Where these soils are irrigated, erosion is an extremely severe hazard. The Power soil is described under the heading "Power Series."

Most of the acreage is used for dryland pasture or range. A few areas are irrigated to improved pasture, alfalfa hay, and occasionally a small grain. (Capability unit VIe–1, irrigated; unit VIe–2, dryland pasture or range)

Lankbush-Vickery silt loams, 3 to 7 percent slopes (LkC).—This mapping unit is about 40 percent Lankbush silt loam, 40 percent Elijah silt loam, and 20 percent Vickery silt loam. The Lankbush soils in this unit have a silt loam surface layer, and the lower part of the surface layer, 3 to 7 inches thick, is thinner than that in Lankbush sandy loam. The Vickery soil is described under the heading "Vickery Series."

These soils are on uplands in and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. In most places they have a discontinuous hardpan. Generally the soils are only slightly eroded, but in spots they are moderately eroded. Through grading and leveling for irrigation part or all of the original surface layer has been removed from some areas and this material has been added to other areas. Where the

clayey subsoil is within plow depth, water intake is slower, tilth is poorer, and crops grow less well than on typical soils. Runoff is medium, and erosion is a severe hazard in irrigated areas.

Included in mapping are small slick spots of Sebree soils that make up less than 5 percent of the acreage. Also included is an unnamed soil similar to Lankbush silt loam that has some lime slightly above a depth of 40 inches. Areas of this included soil make up less than 10 percent of the acreage.

The soils in this unit are used for irrigated alfalfa, clover, improved pasture, small grains, corn, and sugar beets. Nonirrigated areas are used for pasture or range. (Capability unit IIIe–8, irrigated; unit VIe–2, dryland pasture or range; windbreak suitability group 2)

Lankbush-Vickery silt loams, 7 to 12 percent slopes (LkD).—This mapping unit is about 60 percent Lankbush silt loam, 20 percent Elijah silt loam, and 20 percent Vickery silt loam. The Lankbush soil in this unit has a silt loam surface layer. The lower part of the surface layer, 3 to 7 inches thick, is thinner than in Lankbush sandy loam soils.

These soils are on uplands in and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. Runoff is rapid, and water erosion is a very severe hazard in irrigated areas.

These soils are suited to irrigated pasture, hay, small grains, and occasionally a row crop such as corn. Nonirrigated areas are used for pasture or range. (Capability unit IVe–1, irrigated; unit VIe–2, dryland pasture or range; windbreak suitability group 2)

Lankbush Loam, Dark Variant

This variant of the Lankbush series consists of somewhat poorly drained, medium-textured to moderately fine textured, level to very gently sloping soils. These soils formed in medium-textured and moderately fine textured alluvium that is high in content of quartz, mica, and feldspar. The alluvium was derived mainly from granitic or rhyolitic materials, but it contains some basaltic material. These soils occur on terraces, alluvial fans, and high bottom lands near Sucker Creek in Owyhee County and near Middleton and along Willow Creek in Canyon County. Slopes range from 0 to 3 percent, but most are uniform and less than 1 percent. The native vegetation was mainly big sagebrush, bunchgrasses, redtop, rushes, sedges, cheatgrass, and herbaceous plants. These soils are associated with Draper and Harpt soils.

Elevation ranges from 2,500 to 2,900 feet. Annual precipitation is 7 to 12 inches. The soils receive additional moisture from runoff and seepage. The average annual temperature is about 52° F., and the average summer temperature is about 70°. The frost-free season is 145 to 160 days.

These soils are used mostly for irrigated sugar beets, corn, small grains, hay and pasture.

Lankbush loam, dark variant, 0 to 1 percent slopes (LnA).—This soil is on terraces, alluvial fans, and high bottom lands.

Representative profile at the center of the NW¼ sec. 13, T. 3 N., R. 6 W., about 4 miles southwest of Homedale in Owyhee County, in a cultivated area:

Ap—0 to 9 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; mostly massive; 5 to 10 percent is moderate, coarse, granular and 5 to 10 percent is moderate, medium, subangular blocky in structure; hard, firm, sticky and plastic; abundant fine roots; noncalcareous; moderately alkaline; abrupt, smooth boundary.

A3—9 to 15 inches, grayish-brown (10YR 5/2) heavy silt loam, very dark grayish brown (10YR 3/2) when moist; very dark brown (10YR 2/2) organic coatings on ped surfaces; moderate, medium and coarse, subangular blocky structure; hard, firm, sticky and plastic; abundant fibrous and fine roots; common fine tubular pores; noncalcareous; moderately alkaline; clear, smooth boundary.

B2tca—15 to 31 inches, light brownish-gray (10YR 6/2) light silty clay loam, very dark grayish brown (10YR 3/2) when mixed and dark grayish brown (10YR 4/2) when moist; moderate, medium, prismatic structure parting to moderate, medium and coarse, subangular blocky; hard, firm, sticky and plastic; abundant fine and very fine roots; many fine tubular pores; thin patchy clay films on ped surfaces and in pores; patchy very dark brown (10YR 2/2) organic coatings on ped surfaces; noncalcareous in matrix; few fine lime splotches and veins; moderately alkaline; gradual, smooth boundary.

B3ca—31 to 39 inches, light brownish-gray (10YR 6/2) light silty clay loam, very dark grayish brown (3/2) when mixed, and dark brown (10YR 3/3) and dark grayish brown (10YR 4/2) when moist; weak, medium, subangular blocky structure; slightly hard, firm, sticky and plastic; common, fine, faint, brown (10YR 4/3) mottles; few fine and very fine roots; many fine tubular pores; thin patchy clay films on ped surfaces; slightly calcareous in matrix; abundant fine lime veins and splotches; moderately alkaline; gradual, smooth boundary.

C—39 to 60 inches, light brownish-gray (10YR 6/2) heavy silt loam, dark grayish brown (10YR 4/2) when moist; massive; many fine distinct mottles of brown (7.5YR 4/2) and very dark grayish brown (2.5Y 3/2); slightly hard, friable, sticky and plastic; few fine and very fine roots; many fine tubular pores; slightly calcareous; lime splotches and veins less prominent than in layer above; noncalcareous in some spots; moderately alkaline; gradual, smooth boundary.

The A horizon is loam, silt loam, or clay loam. The B horizon is silty clay loam, clay loam, or sandy clay loam. The C horizon is stratified, and in places strata of sandy loam, loam, or clay loam occur in the profile. The depth to calcareous material ranges from about 20 to 36 inches; in small areas the zone of lime accumulation is absent. The material below a depth of about 20 inches is mottled or stained.

This soil is somewhat poorly drained and is deep to very deep. The permeability is moderate, and the available water capacity is more than 7.5 inches. The organic-matter content is moderate to moderately low, and the fertility is high. Runoff is slow, and there is little erosion hazard.

Included in mapping are small areas of Harpt loam and small areas where slopes are 1 to 3 percent. These inclusions make up as much as 10 percent of some mapped areas.

The soils of this mapping unit are used for irrigated sugar beets, corn, small grains, hay, and pasture. (Capability unit IIw–1, irrigated; windbreak suitability group 3)

Letha Series

The Letha series consists of moderately well drained, moderately coarse textured soils that are moderately to strongly alkaline and are calcareous. These soils are on low terraces along the Boise River, mostly west of Caldwell. They formed in moderately coarse textured alluvium derived from coarse-grained acid igneous rocks and are

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somewhat saline. The vegetation in uncultivated areas is mainly greasewood, saltgrass, bassia, and foxtail. Big sagebrush and bunch grasses grow in some areas of better drained, less saline-alkali soils. Letha soils are associated with Moulton and Baldock soils.

Elevation ranges from 2,200 to 2,500 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 70° to 72°. The frost-free season is 145 to 165 days. Annual precipitation is 8 to 11 inches.

Letha soils are used for irrigated crops and pasture.

Letha fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes (LtA).—This soil is on alluvial plains and low river terraces.

In a typical profile the surface layer is light-gray fine sandy loam about 5 inches thick. Below this is very friable light-gray fine sandy loam 11 inches thick. The next layer, extending to a depth of 22 inches, is very friable light brownish-gray fine sandy loam. Below this is very friable light-gray fine sandy loam that extends to a depth of about 31 inches. The underlying material is stratified sandy loam, sand, and sand and gravel. The layers between depths of 20 and 40 inches are mottled.

Representative profile, 200 feet south and 360 feet east of the northwest corner of the NE¼ sec. 14, T. 4 N., R. 4 W., near Caldwell in Canyon County, in a pasture:

A1—0 to 5 inches, light-gray (2.5YR 7/2) fine sandy loam, light olive brown (2.5YR 5/4) when moist; moderate, thick, platy structure, slightly hard, very friable; slightly sticky and nonplastic; plentiful very fine and fine roots; common very fine and fine vescular pores; moderately calcareous; very strongly alkaline; clear, smooth boundary.

C1—5 to 12 inches, light-gray (2.5YR 7/2) fine sandy loam, brown (10YR 5/3) when moist; weak, coarse, subangular blocky structure; slightly hard, very friable; slightly sticky and nonplastic; plentiful very fine and fine roots and few medium roots; common very fine and fine tubular pores; moderately calcareous; very strongly alkaline; gradual, smooth boundary.

C2—12 to 16 inches, light-gray (2.5Y 7/2) fine sandy loam, brown (10YR 4/3) when moist and olive brown (2.5Y 4/3) when moist and rubbed; weak, coarse, subangular blocky structure; slightly hard, very friable; slightly sticky and nonplastic; plentiful very fine and fine roots and few coarse roots; many micropores and very fine tubular pores; moderately calcareous; very strongly alkaline; clear, smooth boundary.

C3—16 to 22 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; weak, coarse, subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; plentiful very fine and fine roots; many micropores and very fine tubular pores; moderately calcareous; strongly alkaline; gradual, smooth boundary.

C4—22 to 31 inches, light-gray (2.5Y 7/2) fine sandy loam, dark grayish brown (2.5 4/2) when moist; massive; soft, very friable, slightly sticky and nonplastic; very few, fine, faint mottles of dark yellowish brown (10YR 4/4); plentiful very fine and fine roots; many micropores and very fine tubular pores; moderately calcareous; strongly alkaline; gradual, smooth boundary.

IIC5—31 to 40 inches, light-gray (2.5Y 7/2) light sandy loam, olive brown (2.5Y 4/4) when moist; massive; soft, very friable, nonsticky and nonplastic; common, fine, distinct mottles of reddish brown (7.5YR 5/4); few very fine and fine roots; many micropores and very fine tubular pores; slightly calcareous; strongly alkaline; gradual, smooth boundary.

IIIC6—40 to 58 inches, very pale brown (10YR 8/3) medium sand, very pale brown (10YR 7/3) when moist; single grain; loose dry and moist; nonsticky and nonplastic; about 10 percent streaks and narrow bands of white (10 YR 8/1 and 8/2) coarse sand; common, medium, distinct brown (7.5YR 5/4) mottles; very slightly calcareous; strongly alkaline; clear, smooth boundary.

The A horizon ranges from loam to fine sandy loam. It is light olive brown to grayish brown or olive brown when moist and white to pale yellow, light gray, or light brownish gray when dry. Reaction in the A horizon is moderately to very strongly alkaline. In places a salt crust or puffed salt spots occur on the surface. Dispersed hard spots are common. Sodium saturation commonly is more than 50 percent in some part of the upper 20 inches of this soil.

The C horizon is dominantly fine sandy loam, but in places it contains thin layers of loam or light sandy clay loam. The C horizon ranges from weak and moderate subangular blocky to weak prismatic in structure. In some areas veins of calcium carbonate are below a depth of 20 to 30 inches.

The soil is deep and moderately well drained. Permeability is slow in the upper part of the underlying material. It is very slow in the alkali spots. The available water capacity is 3.75 to 5.0 inches. Runoff is slow or very slow, and there is little or no erosion hazard.

Included in mapping is a similar soil that is about 36 inches deep over sand and gravel. This included soil makes up as much as 10 percent of the acreage. Soils that have a loam texture in the uppermost 7 to 12 inches make up 10 to 15 percent of some mapped areas. Also included are Notus, Falk, and Chance soils that make up as much as 5 to 10 percent of some mapped areas.

Tall wheatgrass or other alkali-tolerant grasses are grown on this soil during early stages of reclamation. Alfalfa, corn, and sugar beets are grown in the later stages. In some areas the vegetation is greasewood and saltgrass. These areas are used for pasture. (Capability unit IVw–3, irrigated)

Letha fine sandy loam, 0 to 1 percent slopes (LsA).—This soil is similar to Letha fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes, except that generally it is less affected by salts and alkali. Alkali spots make up 5 to 20 percent of the acreage.

Depth to the water table commonly is 30 to 40 inches. In a few places the water table has been lowered to a depth of more than 40 inches through the use of deep, open drainage ditches. Where the water table has been lowered, further accumulation of soluble salts is less likely and conditions are more favorable for the removal of salts and alkali. In these areas plants grow somewhat better, especially deep-rooted plants. In places where overirrigation has raised the water table to a depth of somewhat less than 30 inches, further accumulation of soluble salts and alkali has occurred and deep-rooted plants grow less well. Soils that are loam in the uppermost 7 to 12 inches make up 15 to 25 percent of some mapped areas.

Most of the acreage is used for irrigated pasture and crops. Tall wheatgrass, barley, or sugar beets are grown during the early stages of reclamation. Alfalfa, corn, small grains, and vegetables are grown during the later stages. Some areas where saltgrass and greasewood grow are used for dryland pasture. (Capability unit IIIw–6, irrigated; windbreak suitability group 4)

Letha fine sandy loam, 1 to 3 percent slopes (LsB).—This soil occurs near drainage channels and in undulating or channeled areas. In most areas slopes are short and less than 100 feet long. Included on edges of terraces and drainageways are slopes of slightly more than 3 percent.

This soil is used for the same crops as Letha fine sandy loam, 0 to 1 percent slopes. Where this soil is irrigated, short runs and small streams of water are needed to con-

trol erosion. (Capability unit IIIw–6, irrigated; windbreak suitability group 4)

Lolalita Series

The Lolalita series consists of deep, well-drained and somewhat excessively drained, very gently sloping to steep, moderately coarse textured soils. These soils formed in old, unconsolidated, moderately coarse textured or coarse textured sediments that are mainly noncalcareous, quartzose, feldspathic, and micaceous and that derived from intrusive acid igneous rocks. The Lolalita soils are on alluvial fans and uplands in the northern and northeastern parts of Canyon County. The native vegetation was mainly big sagebrush, Sandberg bluegrass, Indian ricegrass, and bluebunch wheatgrass. The vegetation in uncultivated areas now consists mainly of cheatgrass, medusahead wildrye, three-awn, and annual weeds. Lolalita soils are associated with Lankbush, Jenness, and Elijah soils.

Elevation ranges from 2,500 to 3,000 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 70° to 72°. The frost-free season is 130 to 150 days. The annual precipitation is 9 to 12 inches. Summers are dry.

Lolalita soils are used for pasture, for range, and for irrigated small grains, alfalfa, and corn.

Lolalita sandy loam, 12 to 30 percent slopes (LvE).—This soil is on alluvial fans and uplands.

In a typical profile the surface layer is light brownish-gray sandy loam about 5 inches thick. Below this is very friable brown sandy loam about 13 inches thick. The next layer, extending to a depth of about 36 inches, is firm pale-brown fine sandy loam. The underlying material, extending to a depth of 60 inches, is very friable very pale brown loamy fine sand.

Representative profile, 1,550 feet west and 2,100 feet north of the southeast corner of sec. 2, T. 5 N., R. 4 W., in Canyon County, in rangeland.

A1—0 to 5 inches, light brownish-gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) when moist; weak, very fine, granular structure; soft, very friable, nonsticky and nonplastic; abundant very fine and fine roots; many micropores and very fine interstitial pores; noncalcareous; neutral; clear, smooth boundary.

C1—5 to 18 inches, brown (10YR 5/3) sandy loam (3 to 5 percent fine gravel), dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many fine tubular pores; noncalcareous; neutral; clear, smooth boundary.

C2—18 to 27 inches, pale-brown (10YR 6/3) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, firm, nonsticky and nonplastic; few very fine roots; many fine tubular pores; noncalcareous; mildly alkaline; clear, smooth boundary.

C3—27 to 36 inches, pale-brown (10YR 6/3) light fine sandy loam, brown (10YR 4/3) when moist; massive; slightly hard, firm, nonsticky and nonplastic; noncalcareous; moderately alkaline; clear, smooth boundary.

C4ca—36 to 60 inches, very pale brown (10YR 7/3) heavy loamy fine sand, brown (10YR 5/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; moderately calcareous; moderately alkaline.

The A horizon is dominantly sandy loam and fine sandy loam, but in a few areas it is gravelly or coarse sandy loam. The A horizon is light brownish gray (2.5Y 6/2 or 10YR 6/2) to light yellowish brown or pale brown (2.5Y 6/3 or 10YR 6/3) when dry and dark grayish brown (10YR 4/2 or 2.5Y 4/2) to grayish brown (10YR 5/2 or 2.5Y 5/2) when moist. The A horizon is slightly acid to neutral in reaction.

The C horizon is dominantly fine sandy loam or coarse sandy loam, but in places it contains thin strata of coarse-textured or moderately coarse textured gravelly material. The C horizon is slightly acid to moderately alkaline.

This soil is deep and well drained. It has moderate permeability. The available water capacity is 3.75 to 5 inches. The organic-matter content is low, and the fertility is moderate. Runoff is rapid to very rapid, and erosion is a moderate to severe hazard. In irrigated areas, erosion is an extremely severe hazard. Spots of moderately and severely eroded soil make up about 5 percent of the acreage.

This soil is used for pasture and range and for irrigated pasture, hay, and occasionally a small grain. (Capability unit VIe–1, irrigated; unit VIe–2, dryland pasture or range)

Lolalita sandy loam, 1 to 3 percent slopes (LvB).—This soil occurs on low terraces and alluvial fans and at the base of steeper soils on uplands. The surface layer is dominantly sandy loam, but in a few small areas it is fine sandy loam or coarse sandy loam. The underlying material is thicker than in Lolalita sandy loam, 12 to 30 percent slopes, and this soil is about 5 feet deep over sand or gravelly sand.

The available water capacity is 5 to 7.5 inches, and the permeability and fertility are moderate. Runoff is slow to medium, and erosion is a moderate hazard.

This soil is used for dryland pasture and range and for irrigated alfalfa, improved pasture, small grains, and corn. This soil is well suited to apple, peach, and plum trees. (Capability unit IIe–3, irrigated; VIe–3, dryland pasture or range; windbreak suitability group 1)

Lolalita sandy loam, 3 to 7 percent slopes (LvC).—This soil is on alluvial fans and terraces and at the base of steeper soils on uplands. The surface layer is dominantly sandy loam, but in many areas it is fine sandy loam or coarse sandy loam. The underlying material is thicker than in Lolalita sandy loam, 12 to 30 percent slopes, and this soil is about 5 feet deep over sand or gravelly sand.

The available water capacity is 5 to 7.5 inches, and the permeability and fertility are moderate. Runoff is medium, and erosion is a severe hazard.

This soil is well suited to orchard trees and to irrigated alfalfa, small grains, improved pasture, and corn. Uncultivated areas are used for dryland pasture or range. (Capability unit IIIe–3, irrigated; VIe–3, dryland pasture or range; windbreak suitability group 2)

Lolalita coarse sandy loam, 30 to 55 percent slopes (LuG).—This soil is similar to Lolalita sandy loam, 12 to 30 percent slopes, except that it has steeper slopes and is coarser textured. It occurs mostly on south-facing slopes. Much of the acreage is only slightly eroded, but a considerable acreage is moderately eroded and gullies have formed in places. Permeability is moderate, and the available water capacity is low. Runoff is rapid to very rapid, and erosion is a severe hazard.

Included in mapping are areas where the surface layer is sandy loam, loamy coarse sand, or gravelly coarse sandy loam. These areas make up as much as 10 to 15 percent of some mapped areas. Spots of barren land and of severely eroded soil make up about 5 percent of some mapped areas.

This soil is used for dryland pasture or range. (Capability unit VIe–2, dryland pasture or range)

Marsh

Marsh (Ma) occurs mostly in the backwater areas of Lake Lowell. These areas are covered with water when the reservoir is full. The vegetation is mainly cattails, rushes, grasses, and other herbaceous plants. A few cottonwood and willow trees grow in places. The soil is too wet for cultivation or grazing, but it provides habitat for ducks, geese, and fish. (Capability unit VIIIw–1)

Marsing Series

The Marsing series consists of level to strongly sloping, medium-textured, well-drained soils that formed in alluvium derived from quartzic, basaltic, and rhyolitic materials. These soils are moderately deep over sand and gravel. They are on terraces, alluvial fans, and bottom lands of the Snake River near Marsing and Homedale and on high terraces and hills near Lake Lowell. The vegetation in uncultivated areas is big sagebrush, cheatgrass, and shadscale. Marsing soils are associated with Garbutt, Nyssaton, and Cencove soils.

Elevation ranges from 2,200 to 2,600 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 70° to 73°. The frost-free season is 145 to 160 days. Annual precipitation is 6 to 10 inches, including 5 to 15 inches of snowfall. Summers are dry.

Marsing soils are used mostly for irrigated alfalfa, clover, corn, sugar beets, small grains, and improved pasture. Strongly sloping soils are used for nonirrigated pasture.

Marsing loam, 0 to 1 percent slopes (MgA).—This soil occurs on terraces.

In a typical profile the surface layer is light-gray loam about 9 inches thick. Below this is light-gray, moderately calcareous, friable loam extending to a depth of about 23 inches. This is underlain by light brownish-gray gravelly coarse sand.

Representative profile, 850 feet east and 100 feet north of the southwest corner of the SE¼ Sec. 3, T. 2 N., R. 4 W., in Owyhee County, in a cultivated area on an alluvial terrace:

Ap—0 to 9 inches, light-gray (10YR 7/2) loam, dark grayish brown (10YR 4/2) when moist; very weak, very fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; slightly calcareous; moderately alkaline; clear, smooth boundary.

C1ca—9 to 15 inches, light-gray (10YR 7/2) loam, brown (10YR 5/3) when moist; massive to very weak, fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; common very fine tubular pores; moderately calcareous; moderately alkaline; clear, smooth boundary.

C2ca—15 to 23 inches, light-gray (10YR 7/2) loam, grayish brown (10YR 5/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine tubular pores; moderately calcareous, moderately alkaline; abrupt, smooth boundary.

IIC3—23 to 60 inches, light brownish-gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) when moist; single grain; loose, nonsticky and nonplastic; moderately calcareous; moderately alkaline.

The A horizon is dominantly loam, but in places it is silt loam, very fine sandy loam, or gravelly loam. The Ap horizon is grayish brown or dark grayish brown when moist. Between depths of 6 and 20 inches the material is dominantly loam, but in places it is silt loam, very fine sandy loam, or gravelly loam. The Cca horizon contains few firm round nodules. A layer of gravelly sand or sand is at a depth of 20 to 40 inches. This layer is slightly or moderately calcareous.

This soil is well drained. Permeability is moderate to the underlying coarse materials, where it is rapid. The available water capacity is 5.0 to 7.5 inches. The organic-matter content is low, and the fertility is high. Runoff is slow, and there is little or no erosion hazard.

Included in mapping are a few gravelly areas. Also included are Garbutt and Bahem soils that make up 5 to 15 percent of some mapped areas.

This Marsing soil is used for irrigated alfalfa, clover, corn, sugar beets, and small grains. (Capability unit IIs–1, irrigated; windbreak suitability group 1)

Marsing loam, 1 to 3 percent slopes (MgB).—This soil is on terraces and fans. Runoff is medium, and there is a moderate erosion hazard from irrigation water. This soil is used for irrigated alfalfa, clover, corn, sugar beets, and small grains. (Capability unit IIIe–6, irrigated; windbreak suitability group 1)

Marsing loam, 3 to 7 percent slopes (MgC).—This soil is on alluvial fans and terrace edges. Most slopes are less than 400 feet long. This soil has a profile similar to that of Marsing loam, 0 to 1 percent slopes, except that several inches of the underlying material are mixed into the surface layer. In places the surface layer is moderately calcareous, and in a few small areas the soil is gravelly. Runoff is medium, and erosion is a severe hazard in irrigated areas.

Included in mapping are areas of Cencove fine sandy loam, 3 to 7 percent slopes, that make up 5 to 15 percent of some mapped areas, and areas of Garbutt silt loam, 3 to 7 percent slopes, that make up 10 percent of the acreage.

This soil is used for irrigated alfalfa, corn, small grains, and pasture. (Capability unit IIIe–8, irrigated; windbreak suitability group 2)

Marsing loam, 7 to 12 percent slopes (MgD).— This soil is on alluvial fans and terrace edges. Several inches of the underlying material is mixed into the surface layer, and the surface layer is moderately calcareous in many areas. Runoff is rapid, and erosion is a very severe hazard in irrigated areas.

Included in mapping are areas of Cencove and Garbutt soils that make up about 15 percent of the acreage. Severely eroded and gravelly spots make up as much as 5 percent of some mapped areas.

This soil is suited to pasture, small grains, and hay. (Capability unit IVe–1, irrigated; unit VIe–2, dryland pasture or range; windbreak suitability group 2)

Marsing loam, 12 to 20 percent slopes (MgE).—This soil is on alluvial fans and terrace edges along the Snake River. It is moderately eroded in many areas and severely eroded in places. Runoff is rapid, and erosion is a severe hazard.

This soil is used mostly for irrigated pasture and range. (Capability unit VIe-1, irrigated; unit VIe-2, dryland pasture or range)

Minidoka Series

The Minidoka series consists of well-drained, light-colored, medium-textured soils that have an indurated or strongly cemented layer at a depth of 20 to 40 inches. These soils formed in silty wind-laid materials and silty alluvium underlain by medium-textured or moderately coarse textured alluvium or by lacustrine sediments composed of mixed mineral materials. These soils occur on high terraces in the western and southwestern parts of Canyon County. The vegetation in uncultivated areas is mainly big sagebrush, cheatgrass, bluebunch wheatgrass, Sandberg bluegrass, and annual weeds and grasses. Minidoka soils are associated with Scism soils.

Elevation ranges from about 2,300 to 2,900 feet. The mean annual temperature is 50° to 52° F., and the normal summer temperature is 68° to 75°. The frost-free season is 150 to 160 days. Annual precipitation is 7 to 11 inches, including 1 or 2 feet of snowfall.

Nearly all of the acreage is used for irrigated sugar beets, corn, potatoes, onions, beans, small grains, alfalfa, and improved pasture.

Minidoka-Scism silt loams, 3 to 7 percent slopes (MnC).—This mapping unit is about 60 percent Minidoka silt loam and 40 percent Scism silt loam. These soils occupy similar positions on the landscape. The substratum of Minidoka soils is indurated, but that of Scism soils is weakly cemented.

In a typical profile of Minidoka silt loam the surface layer is light brownish-gray silt loam about 3 inches thick. The subsoil is light brownish-gray to pale-brown silt loam about 12 inches thick. The upper part of the substratum is light-gray and white silt loam about 12 inches thick. Below this is a white indurated hardpan extending to a depth of 40 inches. This layer is underlain by gravel and sand. The Scism soil is described under the heading "Scism Series."

Representative profile of Minidoka silt loam, 3 to 7 percent slopes, 195 feet south and 370 feet east of the northwest corner of the SW¼ sec. 10, T. 2 N., R. 3 W., about 7 miles southwest of Nampa in Canyon County, in native range:

A1—0 to 3 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, fine, granular structure; soft, very friable, slightly sticky and slightly plastic; abundant fine and very fine roots; noncalcareous; mildly alkaline; clear, smooth boundary.

B2—3 to 9 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, medium, subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many very fine and fine roots; many micropores and very fine tubular pores; noncalcareous; moderately alkaline; abrupt, smooth boundary.

B3—9 to 14 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) when moist; massive or very weak, medium, subangular blocky structure; slightly hard; very friable, slightly sticky and slightly plastic; common fine and medium roots and a few coarse roots; common micropores and very fine tubular pores; matrix is strongly calcareous; interior of nodules is slightly calcareous; moderately alkaline; gradual, smooth boundary.

C1ca—14 to 20 inches, light-gray (10YR 7/2) silt loam, pale brown (10YR 6/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; about 5 to 10 percent very weakly cemented nodules ¼ to ¾ inch in diameter; common fine and medium roots and a few coarse roots; common micropores and very fine tubular pores; matrix is strongly calcareous; interior of nodules is slightly calcareous; moderately alkaline; gradual, smooth boundary.

C2ca—20 to 26 inches, white (10YR 8/2) silt loam, pale brown (10YR 6/3) when moist; massive; hard, firm, slightly sticky and slightly plastic; 30 to 40 percent nodules; few fine and medium roots; few micropores and very fine tubular pores; strongly calcareous; moderately alkaline; abrupt, smooth boundary.

IIC3sica—26 to 34 inches, white (10YR 8/2) loam, very pale brown (10YR 7/3) when moist; massive; hard, firm, nonsticky and nonplastic; many fine matted roots and dark-brown organic stains; about 15 percent gravel and rounded pieces of the lime-silica cemented hardpan; strongly calcareous; moderately alkaline; abrupt, wavy boundary.

IIC4sicam—34 inches, white (10YR 8/2), lime-silica cemented hardpan.

The A horizon is dominantly silt loam, but in a few small areas it is very fine sandy loam or loam. When dry, the A horizon ranges from light brownish gray or pale brown to light gray or very pale brown in color; it is dark grayish brown, grayish brown, or brown when moist. In cultivated areas the A and B2 horizons are mixed, and the Ap layer has a weak, very fine and fine, granular structure. The Ap horizon is neutral to moderately alkaline and is calcareous in places. The organic-matter content to a depth of 15 inches is generally 1 or 2 percent.

The B horizon is between depths of about 3 and 14 inches. When dry the B horizon ranges from pale brown and light brownish gray to brown in color; it is dark brown to brown when moist. The B horizon has weak or very weak, medium or coarse, prismatic structure to weak, medium or coarse, subangular blocky structure.

Depth to the strong Cca horizon ranges from about 7 to 15 inches. The Cca horizon contains 15 to 30 percent lime and is moderately or strongly alkaline. The Cca horizon also contains 5 to 40 percent, by volume, of very hard and very firm nodules of soil material or insect krotovinas that are 0.3 to 0.7 inch in diameter and 0.5 inch and 1.2 inches long.

Depth to the duripan ranges from 20 to 40 inches. One layer or more of the duripan is indurated or nearly so. It is cemented mainly by silica, but it has a high content of carbonates. The duripan consists mostly of plates 0.5 to 3 inches thick, but it is massive in places. In most areas the duripan is just above or at the boundary between the silt loam or loam layer and the underlying coarser textured layer.

This Minidoka soil is moderately deep over an indurated layer. Available water capacity is 5 to 7.5 inches. The soil is well drained and free of salts and alkali. Permeability is moderate above the cemented layer. The cemented layer is impermeable except through cracks, fractures, or other openings. The organic-matter content is low to moderately low, and the fertility is high. Runoff is medium to rapid, and erosion is a severe hazard.

Land smoothing to prepare these soils for irrigation has removed surface soil material from high spots and deposited a thick layer of soil material on some low-lying spots. Soils from which surface soil material has been removed through land smoothing or erosion make up as much as 10 percent of some mapped areas. In most areas these included soils are calcareous in the plow layer. Soils in which the cemented layer is at a depth of more than 40 inches make up as much as 10 or 15 percent of some mapped areas. Small, rounded slick spots of Sebree soils make up 2 to 4 percent of some mapped areas.

The soils of this mapping unit are used for irrigated small grains, corn, beans, sugar beets, alfalfa, and improved pasture. (Capability unit IIIe-8, irrigated; windbreak suitability group 2)

Minidoka-Scism silt loams, 7 to 12 percent slopes (MnD).—This mapping unit is about 55 percent Minidoka

silt loam and 45 percent Scism silt loam. These soils occur on terraces and uplands. Runoff is rapid, and erosion is a very severe hazard.

Areas where surface soil material has been removed through land smoothing or erosion make up as much as 15 percent of some mapped areas. In these included areas the soils are calcareous in the plow layer and are slightly less than 20 inches deep over the strongly cemented layer.

The soils of this mapping unit are used for irrigated small grains, corn, alfalfa, and improved pasture. Small areas of uncultivated soils are used for pasture. (Capability unit IVe-1, irrigated; windbreak suitability group 2)

Minidoka silt loam, 0 to 1 percent slopes (MkA).—This soil occurs on uplands and terraces. Depth to the hardpan ranges from 20 to 40 inches, but in most places it is 30 to 40 inches. Runoff is slow or very slow, and erosion is a slight hazard.

Included in mapping are a few areas where the hardpan is at a depth of more than 40 inches. These areas make up as much as 20 percent of some mapped areas. Also included are small, rounded slick spots of Sebree soils that make up as much as 5 percent of some mapped areas.

This soil is used for irrigated alfalfa, clover, small grains, sugar beets, potatoes, corn, onions, beans, garden-crop seeds, and improved pasture. (Capability unit IIs-1, irrigated; windbreak suitability group 1)

Minidoka silt loam, 1 to 3 percent slopes (MkB).—This soil is on uplands and terraces. Depth to the hardpan ranges from 20 to 40 inches, but in most places it is 30 to 40 inches. Runoff is slow to medium, and erosion is a moderate hazard.

Included in mapping is a similar soil in which the cemented layer is at a depth of more than 40 inches. This included soil makes up as much as 10 to 15 percent of some mapped areas. Small, rounded slick spots of Sebree soils and areas of Scism silt loam each make up as much as 5 percent of some mapped areas.

This soil is used for irrigated alfalfa, small grains, sugar beets, corn, potatoes, garden-crop seeds, and improved pasture. (Capability unit IIIe-6, irrigated; windbreak suitability group 1)

Moulton Series

The Moulton series consists of coarse-textured and moderately coarse textured, somewhat poorly drained, nearly level to gently sloping, noncalcareous soils. These soils formed in micaceous alluvium derived from granite, quartz monzonite, quartz diorite, or related intrusive acid igneous rocks. In places the alluvium contains small amounts of basaltic and rhyolitic materials. The Moulton soils occur on bottom lands, alluvial fans, and lake basins, and in areas on very low terraces along the Boise and Snake Rivers and along drainageways. On the terraces drainage is restricted. The vegetation in uncultivated areas is mainly Kentucky bluegrass, redtop, white clover, rushes, sedges, willows, big sagebrush, and herbaceous plants. Moulton soils are associated with Baldock, Falk, and Chance soils.

Elevation ranges from 2,200 to 2,400 feet. Annual precipitation is 9 to 12 inches. The average annual temperature is about 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 165 days.

Moulton soils are used mostly for irrigated sugar beets, corn for silage, small grains, hay, and improved pasture. Nonirrigated areas are used for pasture.

Moulton fine sandy loam, 0 to 1 percent slopes (MtA).—This soil is on stream bottom lands, lake basins, alluvial fans, and very low terraces.

In a typical profile the surface layer is grayish-brown fine sandy loam about 3 inches thick. The subsoil is very friable, grayish-brown fine sandy loam about 17 inches thick. The next layer, extending to a depth of about 30 inches, is pale-brown loamy sand. This is underlain by gravel and coarse sand.

Representative profile, 1,920 feet east and 740 feet south of the northwest corner of sec. 24, T. 4 N., R. 2 W., about 7 miles east of Caldwell in Canyon County, in an irrigated pasture:

A1—0 to 3 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, fine and very fine, granular structure; soft, very friable, slightly sticky and slightly plastic; one-fourth to one-half inch thick root and other vegetative mat covering surface of soil; abundant very fine, fine, and medium roots; neutral; clear, wavy boundary.

B2g—3 to 10 inches, grayish-brown (10YR 5/2) fine sandy loam, broken surfaces dark grayish brown (10YR 4/2) when moist, and dark brown (10YR 3/3) when moist and crushed; few, fine, prominent dark reddish-brown (5YR 2/2) mottles; common, fine, prominent, dark reddish-brown (5YR 3/4) mottles; very weak, medium, subangular blocky and weak, fine, granular structure; soft, very friable, slightly sticky and slightly plastic; abundant very fine and fine roots; mildly alkaline; clear, smooth boundary.

B3g—10 to 21 inches, grayish-brown (10YR 5/2) fine sandy loam, broken and crushed surfaces are dark grayish brown (10YR 4/2) when moist; many, fine, distinct, dark reddish-brown (5YR 3/3) mottles and common fine, distinct brown (7.5YR 4/2) mottles; massive; soft, very friable, slightly sticky and slightly plastic; plentiful very fine, fine, and medium roots; common very fine tubular pores; neutral; gradual, wavy boundary.

IIC1g—21 to 30 inches, pale-brown (10YR 6/3) loamy sand; surfaces are broken and crushed; dark grayish brown (2.5Y 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few very fine tubular pores; neutral; clear, wavy boundary.

IIIC2—30 inches, gravel and coarse sand; sand in the uppermost 4 to 6 inches is light gray (10YR 7/2) and very pale brown (10YR 7/3) when moist.

The A horizon is dominantly fine sandy loam, but in a few small areas it is sandy loam or gravelly sandy loam. In places this soil contains as much as 20 to 50 percent gravel, by volume. Where gravelly this soil has slightly lower available water capacity and is somewhat more difficult to till. The A horizon is very dark grayish brown (2.5Y 3/2 or 10YR 3/2) to dark grayish brown (2.5 Y 4/2 or 10YR 4/2) when moist, and grayish brown (2.5Y 5/2 or 10YR 5/2) to light brownish gray (2.5Y 6/2 or 10YR 6/2) when dry. Below plow depth, the hue is dominantly 10YR, but it ranges to 2.5Y in the B and C horizons. Depth to the water table is 20 to 40 inches.

This soil is moderately deep over sand and gravel. It is somewhat poorly drained. Permeability is moderately rapid, and the available water capacity is 3.75 to 5 inches. Plants draw some water from the water table. Runoff is slow, and there is little hazard of erosion.

Baldock and Falk soils make up as much as 10 percent of some mapped areas, and Chance and Notus soils make up as much as 5 to 10 percent. A soil similar to Moulton fine sandy loam that is 40 to 50 inches deep to loose sand or

gravel makes up as much as 5 to 10 percent of some mapped areas. Slightly saline soils and alkali spots make up less than 5 percent of some mapped areas.

This soil is used for barley, sugar beets, corn, clover, and improved pasture. Wheat, potatoes, and vegetable truck crops are grown in small areas. Alfalfa can be grown in the cropping system where the water table has been lowered. (Capability unit IIIw–1, irrigated; windbreak suitability group 4)

Moulton fine sandy loam, 1 to 3 percent slopes (MtB).—This soil is near the edges of drainageways and in undulating areas. Runoff is slow, and water erosion is a slight hazard.

This soil is used for the same crops as Moulton fine sandy loam, 0 to 1 percent slopes. It is easier to drain, but it is more difficult to smooth for irrigation. (Capability unit IIIw–1, irrigated; windbreak suitability group 4)

Moulton fine sandy loam, saline, 0 to 1 percent slopes (MuA).—This soil is similar to Moulton fine sandy loam, 0 to 1 percent slopes, except that it is slightly saline and has a few alkali spots. The amount of salts and alkali varies considerably from place to place. In most areas the concentration of soluble salts is weak, and the salts are in the uppermost 3 inches. Less than 5 percent of the acreage is affected by alkali.

In the saline-alkali spots, permeability is moderately slow, and plants generally grow poorly, except for alkali-tolerant crops such as tall wheatgrass.

Growth of many crops is restricted on this saline soil. Suitable crops are barley, sugar beets, corn for silage, clover, and improved pasture. (Capability unit IIIw–1, irrigated; windbreak suitability group 4)

Moulton loam, 0 to 1 percent slopes (MvA).—This soil is similar to Moulton fine sandy loam, 0 to 1 percent slopes, except that the surface layer is loam. This unit occurs in association with Baldock or Draper soils in areas that have received a thin overwash of loamy material. In most places the loam surface layer is 9 to 12 inches thick, but in a few places it is about 5 inches thick. Permeability and available water capacity are moderate.

This soil is used for barley, sugar beets, corn, clover, and improved pasture. (Capability unit IIIw–1, irrigated; windbreak suitability group 3)

Moulton loam, saline, 0 to 1 percent slopes (MwA).—This soil is similar to Moulton fine sandy loam, 0 to 1 percent slopes, except that the surface layer is loam and this soil is slightly saline and has a few alkali spots. In most places the loam surface layer is 9 to 12 inches thick, but in a few places it is about 5 to 8 inches thick. The amount of salts and alkali varies considerably from place to place. In most areas the concentration of soluble salts is weak, and the salts are in the uppermost 3 to 5 inches. Less than 5 percent of the area is affected by alkali.

The available water capacity is 5.0 to 7.5 inches. The permeability is moderate, except in the saline-alkali spots where it is moderately slow. Between the saline-alkali spots, crops grow fairly well on this soil although the growth of many crops is restricted. On the saline-alkali spots, plants generally grow poorly, except for alkali-tolerant crops, such as tall wheatgrass.

This soil is used for barley, sugar beets, corn, clover, and improved pasture. (Capability unit IIIw–1, irrigated; windbreak suitability group 3)

Moulton loamy sand, 0 to 1 percent slopes (MoA).—This soil is near rivers and streams. It is similar to Moulton fine sandy loam, 0 to 1 percent slopes, except that the surface layer is recently deposited loamy sand or loamy fine sand overwash material. In most places the overwash is 6 to 9 inches thick, but in a few places it is only 4 or 5 inches thick. Runoff is slow, and the erosion hazard is generally slight. Soil blowing is a moderate hazard, especially on bare soil in spring.

This soil is used for hay, pasture, small grains, corn, and vegetables. (Capability unit IVw–1, irrigated; windbreak suitability group 4)

Nannyton Series

The Nannyton series consists of medium-textured, well-drained soils that formed in alluvium derived mostly from rhyolitic materials. These soils are on weakly dissected alluvial fans and terraces south and southwest of Marsing and Homedale in Owyhee County. Slopes range from 0 to 12 percent, but most are uniform and 1 to 3 percent. The natural vegetation is mainly shadscale, spiny hospage, cheatgrass, squirreltail, horsebrush, and greasewood. Nannyton soils are associated with Marsing and Vanderhoff soils.

Elevation ranges from 2,300 to 2,500 feet. Annual precipitation is 6 to 8 inches. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 160 days.

Nannyton soils are used for irrigated alfalfa, corn, small grains, sugar beets, and improved pasture. They are also used for range.

Nannyton loam, 1 to 3 percent slopes (NaB).—This soil is on alluvial fans and terraces.

In a typical profile the surface layer is light brownish-gray fine gravelly sandy loam about 2 inches thick. The subsurface layer is pale-brown loam about 5 inches thick. The upper part of the subsoil, extending to a depth of about 14 inches, is friable, light-gray clay loam. Below this is very friable, light-gray loam about 3 inches thick. The next layer, extending to a depth of about 23 inches, is very pale brown fine sandy loam. Below this is very pale brown gravelly coarse sandy loam that extends to a depth of about 27 inches. The next layer is very pale brown gravelly loamy coarse sand about 12 inches thick. This is underlain by grayish-brown fine sand and fine gravel.

Representative profile, 1,730 feet west and 1,100 feet north of the southeast corner of sec. 13, T. 1 S., R. 3 W., in Owyhee County, in a native range:

A1—0 to 2 inches, light brownish-gray (10YR 6/2) fine gravelly sandy loam, dark grayish brown (10YR 4/2) when moist; weak, fine, granular structure; soft, very friable, slightly sticky and slightly plastic; abundant very fine and fine roots; slightly calcareous; strongly alkaline; abrupt, broken boundary.

A21—2 to 2.5 inches, light brownish-gray (10YR 6/2) fine gravelly fine sandy loam (25 to 50 percent gravel), dark brownish gray (10YR 4/2) when moist; weak, thin and medium, platy structure; slightly hard, very friable, slightly sticky and nonplastic; many fine and very fine pores and micropores; slightly calcareous; moderately alkaline; abrupt, smooth boundary.

A22—2.5 to 7 inches, pale-brown (10YR 6/3) loam, brown (10YR 4/3) when moist; moderate, thin and very thin, platy structure; slightly hard, very friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many very fine vesicular pores and micro-

pores; few fine pebbles; noncalcareous; moderately alkaline; clear, smooth boundary.

B2t—7 to 14 inches, light-gray (10YR 7/2) light clay loam, brown (10YR 5/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, sticky and plastic; plentiful very fine and fine roots; many very fine tubular pores and micropores; thin patchy clay films on ped surfaces; few fine pebbles; noncalcareous; moderately alkaline; abrupt, wavy boundary.

B3ca—14 to 17 inches, light-gray (10YR 7/2) loam, yellowish brown (10YR 5/4) when moist; weak, medium, subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; plentiful fine and very fine roots; common very fine tubular pores and micropores; few fine pebbles; slightly calcareous; moderately alkaline; clear, wavy boundary.

C1ca—17 to 23 inches, very pale brown (10YR 8/3) fine sandy loam, pale brown (10YR 6/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; plentiful fine and medium roots; few fine tubular pores; few fine pebbles; strongly calcareous; moderately alkaline; clear, smooth boundary.

IIC2ca—23 to 27 inches, very pale brown (10YR 8/3) gravelly coarse sandy loam (20 to 30 percent gravel), light yellowish brown (10YR 6/4) when moist; massive; slightly hard, loose, nonsticky and nonplastic; plentiful fine and very fine roots; strongly calcareous; moderately alkaline; clear, smooth boundary.

IIIC3ca—27 to 39 inches, very pale brown (10YR 8/3) gravelly loamy coarse sand (about 30 percent gravel), dark yellowish brown (10YR 3/4) when moist; massive; loose, very friable, nonsticky and nonplastic; few fine roots; moderately calcareous; moderately alkaline; smooth boundary.

IVC4ca—39 to 60 inches, grayish-brown (10YR 5/2) fine sand and fine gravel, brown (10YR 4/3) when moist in the finer or matrix portion; much black basalt and other dark minerals in fine gravel and sand; single grain; loose dry and moist; few fine roots; slightly calcareous; moderately alkaline.

The solum ranges from about 6 to 17 inches in thickness. The A horizon is mainly loam, fine gravelly sandy loam, or fine gravelly loam, but in places it is fine sandy loam or is stony.

The B2t horizon is light clay loam to heavy loam. It is pale brown to light gray and has weak or moderate, very fine to medium, subangular blocky structure. It is 10 to 35 percent gravel and other coarse fragments.

The A and B horizons are mostly noncalcareous. A strongly calcareous horizon is at a depth of 10 to 17 inches. Sand and gravel are at a depth of 30 to 40 inches. Some areas are stony.

This soil is well drained, is moderately permeable, and has 5 to 7.5 inches available water capacity. It is moderately deep over sand and gravel. The organic-matter content is low, and the fertility is high. Runoff is slow, and erosion is a moderate hazard.

Nearly level soils make up less than 5 percent of the acreage. An unnamed soil that has a coarse sandy loam or gritty light loam surface layer, a sandy clay loam B2t horizon, and a light loam or fine sandy loam substratum is included in mapping and makes up 5 to 10 percent of some mapped areas. Also included are Marsing, Garbutt, and Vanderhoff soils that make up 5 to 10 percent of some mapped areas.

This Nannyton soil is used for irrigated alfalfa, corn, small grains, sugar beets, and improved pasture. Some areas are used for range. (Capability unit IIIe–6, irrigated; unit VIs–1, dryland pasture or range; windbreak suitability group 1)

Nannyton loam, 3 to 7 percent slopes (NaC).—This soil is on alluvial fans and terraces. Runoff is medium to rapid, and erosion is a severe hazard. Soils that have slopes of 7 to 12 percent and soils that have a sandy loam surface layer make up as much as 15 to 20 percent of some mapped areas.

This soil is used for irrigated alfalfa, improved pasture, small grains, and corn. Some areas are used for range. (Capability unit IIIe–8, irrigated; unit VIe–2, dryland pasture or range; windbreak suitability group 2)

Notus Series

The Notus series consists of level to very gently sloping, somewhat poorly drained, moderately coarse textured soils that formed in recent alluvium washed from areas of granitic rocks and other intrusive acid igneous rocks. These soils are shallow over gravel and sand. They are on flood plains and very low terraces near the Boise River. The native vegetation was mainly big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, and willow and cottonwood trees. Notus soils are associated with Moulton, Chance, and Falk soils.

Elevation ranges from 2,200 to 2,400 feet. Annual precipitation is 9 to 12 inches. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 70°. The frost-free season is 145 to 165 days.

Notus soils are used for irrigated small grains, corn, clover, alfalfa, and improved pasture. These soils occur within larger areas of associated soils and are used for the same crops.

Notus soils (No).—These soils are on flood plains and very low terraces. This undifferentiated mapping unit consists of Notus fine sandy loam, 0 to 1 percent slopes; Notus sandy loam, 0 to 1 percent slopes; Notus coarse sandy loam, 0 to 1 percent slopes; Notus gravelly coarse sandy loam, 0 to 1 percent slopes; Notus gravelly loamy coarse sand, 0 to 1 percent slopes; Notus coarse sandy loam, 1 to 3 percent slopes; Notus gravelly coarse sandy loam, 1 to 3 percent slopes; and Notus gravelly loamy coarse sand, 1 to 3 percent slopes. The mapped areas consist of one or all of these phases and types.

Notus fine sandy loam, 0 to 1 percent slopes, is the dominant soil in this unit. In a typical profile the surface layer is very thin, grayish-brown sandy loam. Below this is friable, light brownish-gray fine sandy loam. This is underlain by white and light-gray gravel and coarse sand.

Representative profile, 1,300 feet east and 1,220 feet north of the southwest corner of sec. 12, T. 4 N., R. 3 W., about 3 miles northeast of Caldwell in Canyon County, in a pasture:

A1—0 to 0.5 inch, grayish-brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, very fine, granular structure; slightly hard, very friable, slightly sticky and nonplastic; abundant very fine and fine roots; many very fine interstitial pores; noncalcareous; mildly alkaline; clear, smooth boundary.

C1—0.5 to 14 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, slightly sticky and nonplastic; many, medium, distinct mottles of reddish yellow (7.5YR 6/6); mottles are dark yellowish brown (10YR 4/4) when moist; plentiful very fine and fine roots; many very fine tubular pores; noncalcareous; neutral; clear, wavy boundary.

C2—14 to 60 inches, white (10YR 8/2) and light-gray (10YR 7/2) gravel and coarse sand; single grain; loose; noncalcareous; neutral.

The A horizon ranges from fine sandy loam to very gravelly loamy sand. The uppermost 7 inches, where mixed, has a chroma

of 2 or 3 and a hue of 10YR or 2.5Y. Mottling typically begins at a depth of 4 to 20 inches.

This soil is somewhat poorly drained and shallow over gravel and sand. The organic-matter content generally is low, and fertility is low to moderate. Permeability is moderately rapid or rapid, and the available water capacity is less than 3.75 inches. Soils in lower lying areas have a water table in the underlying sand and gravel. Depth to the water table is determined by runoff from irrigation and by the level of the Boise River. In most years the soil is partly saturated for a period of 3 to 6 months. The soil is seldom entirely dry for more than 3 months. Runoff is slow or very slow, and there is little erosion hazard.

Areas where this soil is cobbly and areas where it is as much as 20 to 50 percent gravel make up about 15 percent of some mapped areas. Included in mapping are Moulton and Falk soils that make up about 15 percent of the acreage.

Notus soils are used for irrigated small grains, corn, clover, alfalfa, and improved pasture. These soils occur within larger areas of associated soils and are used for the same crops. Vegetation in uncultivated areas is mainly Kentucky bluegrass, redtop, cheatgrass, sedges, rushes, and cottonwood and willow trees. (Capability unit IVw–2, irrigated)

Nyssaton Series

The Nyssaton series consists of medium-textured, well-drained, nearly level to strongly sloping soils. These soils formed in old alluvium underlain by moderately calcareous, laminated, medium-textured lacustrine material. The upper part contains loess in places. These soils occur on slightly to moderately dissected, low and moderate terraces in the area of Marsing and Homedale in Owyhee County and in the west-central part of Canyon County. Slopes range from 0 to 20 percent, but most are uniform and less than 3 percent. The vegetation in uncultivated areas is cheatgrass, big sagebrush, Sandberg bluegrass, bluebunch wheatgrass, shadscale, budsage, and annual weeds and grasses. Nyssaton soils are associated with Scism, Garbutt, and Owyhee soils.

Elevation ranges from 2,300 to 2,600 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 69° to 76°. The frost-free season is 145 to 165 days. Annual precipitation is 6 to 9 inches, including 5 to 15 inches of snowfall. Summers are dry.

Nyssaton soils are used mostly for irrigated alfalfa, sugar beets, corn, potatoes, small grains, vegetables, and vegetable seed.

Nyssaton silt loam, 0 to 1 percent slopes (NsA).—This soil is on low and moderate terraces.

In a typical profile the surface layer is light brownish-gray silt loam about 11 inches thick. Below this is white silt loam about 16 inches thick; it is very friable and moderately calcareous in the upper part and friable and strongly calcareous in the lower part. The next layer is light-gray silt loam that extends to a depth of about 41 inches. This is underlain by white silt loam lacustrine sediments.

Representative profile, 80 feet east and 500 feet south of the northwest corner of the SW¼ sec. 35, T. 3 N., R. 5 W., about 5 miles west and ¼ mile north of Marsing, in a cultivated field:

Ap—0 to 11 inches, light brownish-gray (2.5YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, very fine and fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; slightly calcareous; moderately alkaline; abrupt, smooth boundary.

C1ca—11 to 20 inches, white (2.5Y 8/2) silt loam, grayish brown (10YR 5/2) when moist; massive; soft, very friable, slightly sticky and slightly plastic; plentiful fine roots; common very fine tubular pores; moderately alkaline; moderately calcareous; few fine lime veins; clear, smooth boundary.

C2ca—20 to 27 inches, white (2.5Y 8/2) silt loam, grayish brown (2.5Y 5/2) when moist; massive; matrix is soft, friable, slightly sticky and slightly plastic; about 30 percent nodules of soil material formed in cicada or other insect krotovina; nodules are rounded, ¼ to ½ inch in diameter, and ½ to 1½ inches long; interior of nodules is more dense, brittle, slightly darker and less calcareous than the soil matrix; soft white splotches of lime on the surface of the nodules and in veins throughout the horizon; plentiful fine roots and few medium roots are distributed throughout the matrix and are slightly matted on the surface of the nodules; common very fine tubular pores; moderately alkaline; strongly calcareous; abrupt, wavy boundary.

C3ca—27 to 41 inches, light-gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) when moist; laminated lacustrine sediments are massive and occur in moderate, thin and medium plates; slightly hard, firm, slightly sticky and slightly plastic; plentiful fine roots; many very fine tubular pores; moderately alkaline; slightly calcareous; few fine lime veins; clear, smooth boundary.

C4—41 to 60 inches, white (10YR 8/2) silt loam, pale brown (10YR 6/3) when moist; similar to above horizon except plates are strong; few roots and pores; moderately alkaline; few very fine brown (10YR 4/3) iron specks or mottles on surfaces between the plates.

The A horizon is dominantly silt loam, but in small areas it is loam or very fine sandy loam. The hue of the A horizon is 10YR or 2.5Y; value ranges from 6 to 7 dry and from 4 to 5 moist; chroma is dominantly 2 but ranges to 3. In places, undisturbed soil is noncalcareous to a depth of 1 to 6 inches; in cultivated areas the Ap horizon is calcareous.

The Cca horizon is strongly calcareous and commonly has its upper boundary at a depth of 8 to 16 inches. It generally contains common to many, hard, firm, rounded nodules.

Depth to underlying sediments ranges from about 15 to 40 inches, but is commonly 20 to 30 inches. In places the underlying laminations are very weakly cemented and have extremely thin (less than 1 millimeter) dense and brittle lime and silica crusts that are pink, brown, or reddish brown. This cementation is discontinuous. It occurs in the uppermost several inches of the laminations and does not prevent the downward extension of roots. Few fine black manganese-oxide stains or concretions occur in the lower part of the Cca horizon or in the upper part of the laminations.

This soil is well drained and very deep. Permeability is moderate to the laminated sediments, where it is moderately slow. The available water capacity is more than 7.5 inches. The organic-matter content is low to moderately low, and the fertility is high. Runoff is slow, and there is little or no erosion hazard.

Included in mapping are areas where the surface layer is fine sandy loam. Also included northeast of Parma is a soil that has a fine sandy loam subsoil. These included soils make up less than 5 percent of the acreage.

In areas where surface material has been removed to smooth the soil for irrigation, the plow layer is moderately to strongly calcareous and low to very low in organic-matter content. Crops grown in these areas respond well to additions of barnyard manure, green manure, and commercial fertilizer.

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This soil is used for irrigated alfalfa hay and seed, sugar beets, corn, potatoes, onions, and small grains. (Capability unit I–1, irrigated; windbreak suitability group 1)

Nyssaton silt loam, 1 to 3 percent slopes (NsB).—Runoff is slow to medium on this soil, and erosion is a slight to moderate hazard.

Included in mapping are areas where the surface layer is fine sandy loam. Also included northeast of Parma is a soil that has a fine sandy loam subsoil. These included soils make up less than 5 percent of the acreage.

Where surface material has been removed to smooth the soil for irrigation, the plow layer is moderately to strongly calcareous and low or very low in organic-matter content. Crops grown in these areas respond well to additions of barnyard manure, green manure, and commercial fertilizer.

This soil is used for alfalfa, sugar beets, corn, potatoes, onions, and small grains. (Capability unit IIe–2, irrigated; windbreak suitability group 1)

Nyssaton silt loam, 3 to 7 percent slopes (NsC).—This soil is similar to Nyssaton silt loam, 0 to 1 percent slopes, except that depth to the zone of lime accumulation is about 6 inches less. This soil is on terrace edges and along the sides of drainageways. Most areas are long and narrow, and slopes are short. Runoff is medium to rapid, and there is a severe erosion hazard from irrigation water.

In areas northeast of Parma the subsoil is fine sandy loam. Areas where the plow layer is moderately or strongly calcareous make up about 10 percent of the acreage. In these areas, the original surface layer has been removed through erosion or land smoothing. Crops grown in these areas respond well to additions of barnyard manure, green manure, and commercial fertilizer.

This soil is used mostly for irrigated alfalfa, corn, small grains, and improved pasture. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Nyssaton silt loam, 7 to 12 percent slopes, eroded (NsD2).—This soil is on terrace edges and in drainageways. It is similar to Nyssaton silt loam, 0 to 1 percent slopes, except that several inches of the surface layer have been lost through erosion in most of the acreage, and depth to the strongly calcareous layer of lime accumulation is 6 to 10 inches less. The areas of this soil are generally long and narrow, and slopes are 150 to 250 feet long. Runoff is rapid, and the hazard of water erosion in irrigated areas is very severe.

Included in mapping are areas where the surface layer is fine sandy loam. Also included northeast of Parma is a soil that has a fine sandy loam subsoil below a depth of 30 inches. These included soils make up less than 10 percent of the acreage.

This soil is used for irrigated pasture, hay, corn, and small grains. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Nyssaton silt loam, 12 to 20 percent slopes, eroded (NsE2).—This soil is on terrace edges and in drainageways. It is similar to Nyssaton silt loam, 0 to 1 percent slopes, except that several inches of the surface layer have been removed through erosion, and depth to the strongly calcareous layer of lime accumulation is about 6 to 10 inches. The areas of this soil are generally long and narrow, and slopes are 100 to 250 feet long. Severely eroded spots and gullies make up less than 5 percent of the acreage. Runoff is rapid to very rapid, and erosion is a severe hazard. In irrigated areas erosion is an extremely severe hazard.

This soil is well suited to pasture. (Capability unit VIe–1, irrigated; VIe–2, dryland pasture or range)

Oliaga Series

The Oliaga series consists of level to very gently sloping medium-textured soils that are somewhat poorly drained and calcareous. These soils are underlain by sand and gravel at a depth of 20 to 40 inches. The soils formed in micaceous medium-textured alluvium derived from acid igneous rocks, mainly granite. The Oliaga soils are on bottom lands, alluvial fans, and low terraces and in areas where drainage is restricted along the Boise River and along drainageways. The vegetation consists mainly of foxtail barley, redtop, Kentucky bluegrass, cheatgrass, giant wildrye, rabbitbrush, big sagebrush, saltgrass, and forbs. Oliaga soils are associated with Baldock and Moulton soils.

Elevation ranges from 2,200 to 2,600 feet. Annual precipitation is 7 to 11 inches, including 6 to 18 inches of snowfall. Summers are dry. The average annual temperature is 50° to 52° F., and the average summer temperature is 65° to 70°. The frost-free season is 145 to 160 days.

Oliaga soils are used mostly for improved pasture, hay, corn, and small grains. Uncultivated areas are used for pasture.

Oliaga loam, 0 to 1 percent slopes (OgA).—This soil is on bottom lands, alluvial fans, and low terraces.

In a typical profile the surface layer is light brownish-gray loam about 8 inches thick. Below this is mottled, friable, light brownish-gray loam about 22 inches thick; it is slightly calcareous in the upper part and moderately calcareous in the lower part. The next layer is very friable, light-gray fine sandy loam that extends to a depth of about 35 inches. This is underlain by light-gray sand and gravel.

Representative profile, 288 feet east and 145 feet north of the southwest corner of the NE¼ sec. 6, T. 5 N., R. 5 W., about 2 miles northwest of Parma in Canyon County, in a cultivated area on a terrace:

Apca—0 to 8 inches, light brownish-gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) when moist; weak, very fine, granular structure; soft, friable, slightly sticky and slightly plastic; abundant very fine and fine roots; many interstitial micropores; slightly calcareous; moderately alkaline; clear, smooth boundary.

C1ca—8 to 18 inches, light brownish-gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) when moist; few, fine, faint, grayish-brown (10YR 5/2) mottles that are very dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine and medium roots; many very fine tubular pores; slightly calcareous; moderately alkaline; clear, wavy boundary.

C2ca—18 to 30 inches, light brownish-gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) when moist; common, medium, faint, grayish-brown (10YR 5/2) mottles that are very dark grayish brown (10YR 3/2) when moist; few, fine, distinct, brown (10YR 5/3) mottles that are dark brown (10YR 3/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine and medium roots; many very fine and few fine tubular pores; slightly micaceous; moderately calcareous; few, faint, fine lime veins and spots; moderately alkaline; clear, smooth boundary.

IIC3—30 to 35 inches, light-gray (2.5Y 7/2) fine sandy loam,

dark grayish brown (2.5Y 4/2) when moist; few, fine and medium, faint, grayish-brown (10YR 5/2) mottles that are very dark grayish brown (10YR 3/2) when moist; few, fine, distinct, brown (10YR 5/3) mottles that are dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine tublular pores; slightly calcareous; moderately alkaline; gradual, wavy boundary.

IIIC4—35 to 60 inches, light-gray (10YR 7/2) sand and gravel; loose; micaceous; mostly granitic material; noncalcareous.

The A horizon is dominantly loam, but in a few areas it is silt loam or sandy loam. The Ap and A1 horizons are gray, grayish brown, light brownish gray, or light gray when dry and very dark gray, very dark grayish brown, grayish brown, or gray when moist.

The C horizon is dominantly loam to a depth of more than 20 inches. Faint or distinct mottles that have a chroma of 2 or 3 are below a depth of 8 to 18 inches. A layer of loose sand and gravel is at a depth of 20 to 40 inches. In places, a thin layer of sandy loam or loamy sand is between the loam and the sand and gravel.

The A horizon and the upper part of the C horizon are moderately to slightly calcareous, and the lower part of the C horizon is slightly calcareous to noncalcareous. The profile ranges from mildly to strongly alkaline. In places, the soil is somewhat saline.

This soil is moderately deep over sand and gravel and is somewhat poorly drained. Peremability is moderate to the underlying sand and gravel, where it is very rapid. The available water capacity is 3.75 to 7.5 inches. Runoff is slow, and there is little or no erosion hazard.

Included in mapping are gravelly spots and areas of Baldock or Moulton soils that make up as much as 10 to 15 percent of some mapped areas. Small areas where the surface layer is noncalcareous make up about 10 percent of some mapped areas, and alkali spots make up about 5 percent.

This soil is used for sugar beets, small grains, corn for silage, hay, and pasture. (Capability unit IIIw–6, irrigated; windbreak suitability group 3)

Oliaga loam, 1 to 3 percent slopes (OgB).—This soil is similar to Oliaga loam, 0 to 1 percent slopes. It occurs mostly in narrow strips along drainageways and at the edges of low terraces. Included in mapping are areas of gravelly soils and of Baldock and Moulton soils that make up as much as 10 or 15 percent of some mapped areas.

This soil is used for sugar beets, small grains, corn for silage, hay, and pasture. (Capability unit IIIw–6, irrigated; windbreak suitability group 3)

Oliaga loam, saline-alkali, 0 to 1 percent slopes (OlA).—Saline-alkali spots make up about 15 to 40 percent of the acreage of this unit. The surface layer in these spots generally is strongly alkaline. Between the spots the soil is nonsaline to slightly saline and is similar to Oliaga loam, 0 to 1 percent slopes. Included in mapping are small areas where gravel is on the surface and throughout the profile.

During the early stages of reclamation, tall wheatgrass or other alkali-tolerant grasses can be grown on this soil. Reclaimed soil can be used for alfalfa, corn, sugar beets, small grains, and pasture. (Capability unit IVw–3, irrigated)

Owyhee Series

The Owyhee series consists of well-drained, nearly level to strongly sloping, medium-textured soils. These soils formed in moderately calcareous, laminated, medium-textured lacustrine sediments that are overlain by old alluvium in places. In some areas the upper part of the soil contains loess. These soils occur on slightly to moderately dissected low and moderate terraces in the west-central part of Canyon County. Slopes range from 0 to 20 percent, but most are uniform and less than 3 percent. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, cheatgrass, and big sagebrush. Owyhee soils are associated with Greenleaf and Nyssaton soils.

Elevation ranges from 2,200 to 2,500 feet. Annual precipitation is 8 to 11 inches. The average annual temperature is 50° to 52° F., and the average summer temperature is 69° to 71°. The frost-free season is 145 to 160 days.

Owyhee soils are used mostly for irrigated sugar beets, corn, hops, potatoes, small grains, and alfalfa.

Owyhee silt loam, 0 to 1 percent slopes (OwA).—This soil occurs on low and moderate terraces.

In a typical profile the surface layer is light brownish-gray noncalcareous silt loam that is about 10 inches thick. The subsoil, extending to a depth of about 22 inches, is very friable, noncalcareous, light-gray silt loam. The next layer is friable white silt loam that extends to a depth of about 34 inches. Below this is light-gray silt loam that extends to a depth of about 44 inches. This is underlain by light-gray silt loam lacustrine sediments.

Representative profile, 1,300 feet south and 100 feet west of the northeast corner of sec. 14, T. 4 N., R. 5 W., about 1 mile northeast of Wilder in Canyon County, in a cultivated area on a lake terrace:

Ap—0 to 10 inches, light brownish-gray (10YR 6/2) light silt loam, dark grayish brown (10YR 4/2) when moist; weak, fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; plentiful fine roots; few very fine vesicular pores; noncalcareous; moderately alkaline; abrupt, smooth boundary.

B—10 to 22 inches, light-gray (10YR 7/2) light silt loam, dark grayish brown (10YR 4/2) when moist; weak, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; plentiful fine roots; common very fine tubular pores; noncalcareous; moderately alkaline; abrupt, smooth boundary.

C1ca—22 to 34 inches, white (10YR 8/1) silt loam, light gray (10YR 7/2) when moist; laminated lacustrine sediments that are weak, medium, platy in structure and that break to weak, medium, subangular blocky; hard, friable, sticky and slightly plastic; few very fine and fine roots; common micropores and very fine tubular pores; strongly calcareous; moderately alkaline; gradual, smooth boundary.

C2ca—34 to 44 inches, light-gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) when moist; laminated lacustrine sediments that are weak, medium, platy in structure and that break to weak, fine, subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; very few fine roots and pores; strongly calcareous; moderately alkaline; gradual, smooth boundary.

C3—44 to 60 inches, light-gray (10YR 7/2) slit loam, brown (10YR 5/3) when moist; laminated lacustrine sediments that are strong, medium and thick, platy in structure and that break to moderate, fine and medium, angular blocky; slightly hard, friable, slightly sticky and slightly plastic; moderately calcareous; moderately alkaline.

The A horizon is dominantly silt loam, but in small areas it is loam or very fine sandy loam. The A horizon is 10YR in hue; value is 6 to 7 dry and 4 to 5 moist; chroma is dominantly 2 but ranges to 2.8. The soil is noncalcareous to a depth of about 12 to 24 inches. The B horizon ranges from weak blocky to prismatic in structure; it has color values of 5 to 7 when dry and

4 or 5 when moist and chroma of 2 or 3. The strongly calcareous layer of lime accumulation commonly occurs below a depth of 16 inches. It generally contains common to many, hard, firm, rounded nodules.

Depth to the underlying laminated sediments ranges from about 20 to 40 inches, but is dominantly 24 to 36 inches. In places the laminations have a very weakly cemented, extremely thin (less than 1 millimeter) crust of dense and brittle calcium carbonate or silica that is pink, brown, or reddish brown beneath a root mat. This cementation is discontinuous. It occurs in the uppermost several inches of the laminations and does not prevent the downward extension of roots. In places, few, fine, black manganese-oxide stains or concretions are in the lower part of the Cca horizon or in the upper part of the laminations.

This soil is very deep and well drained. Permeability is moderate to the laminated sediments, where it is moderately slow. The available water capacity is more than 7.5 inches. The organic-matter content is low to moderately low, and the fertility is high. Runoff is slow, and there is little or no erosion hazard.

This soil is used for irrigated hops, sugar beets, corn, potatoes, small grains, alfalfa, vegetables, and vegetable seed. (Capability unit I–1, irrigated; windbreak suitability group 1)

Owyhee silt loam, 1 to 3 percent slopes (OwB).—This soil is similar to Owyhee silt loam, 0 to 1 percent slopes, except that runoff is medium, and erosion is a slight to moderate hazard in irrigated areas.

This soil is used for irrigated alfalfa, corn, sugar beets, onions, potatoes, and small grains. (Capability unit IIe–2, irrigated; windbreak suitability group 1)

Owyhee silt loam, 3 to 7 percent slopes (OwC).—This soil is similar to Owyhee silt loam, 0 to 1 percent slopes, except that the depth to the zone of lime accumulation is about 6 inches less. This soil occurs on the edges of terraces and along the sides of drainageways, mostly south and southeast of Wilder. Runoff is medium, and erosion is a severe hazard in irrigated areas. Areas where slopes are 7 to 12 percent make up less than 10 percent of the acreage.

Practically all the acreage is used for irrigated alfalfa, corn, small grains, and pasture. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Potratz Series

The Potratz series consists of moderately deep, medium-textured, nearly level to gently sloping soils. These soils formed in a thin loess mantle over material weathered from basalt. Potratz soils occur on uplands south and southeast of Nampa in Canyon County. The natural vegetation consists mainly of big sagebrush, Sandberg bluegrass, bluebunch wheatgrass, beardless wheatgrass, cheatgrass, Russian-thistle, and wild mustard. Potratz soils are associated with Power and Trevino soils.

Elevation ranges from 2,350 to 2,900 feet. Annual precipitation is 8 to 11 inches, including 6 to 24 inches of snowfall. Summers are dry. The average annual temperature is 50° to 52° F., and the average summer temperature is 66° to 70°. The frost-free season is 145 to 160 days.

Potratz soils are used mostly for irrigated sugar beets, potatoes, corn, small grains, alfalfa, and improved pasture.

Potratz silt loam, 1 to 3 percent slopes (PaB).—This soil is on uplands.

In a typical profile the surface layer is light brownish-gray, noncalcareous silt loam about 3 inches thick. The subsoil, about 7 inches thick, is friable, pale-brown, noncalcareous silt loam. The next layer is very pale brown loam about 5 inches thick. Below this is light-gray loam. Basalt bedrock is at a depth of about 24 inches.

Representative profile, 475 feet west and 785 feet south of the northeast corner of the SE¼ sec. 11, T. 1 N., R. 2 W., about 4 miles north of Melba in Canyon County, in rangeland:

A1—0 to 3 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, thin and very thin, platy structure parting to weak, fine and very fine, granular; slightly hard, very friable, slightly sticky and slightly plastic; abundant very fine and fine roots and few coarse roots; many very fine vesicular and interstitial pores; noncalcareous; neutral; clear, smooth boundary.

B1—3 to 5 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 4/3) when moist; weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots, and few medium roots; common very fine pores; very thin clay films on some pore and ped surfaces; few bleached or uncoated sand grains; noncalcareous; neutral; abrupt, smooth boundary.

B2—5 to 10 inches, pale-brown (10YR 6/3) heavy silt loam, brown (10YR 4/3) when moist; weak prismatic structure parting to weak, medium and fine, subangular blocky; hard, friable, sticky and plastic; plentiful roots; many very fine tubular pores; thin clay films on some ped and pore surfaces; very few uncoated silt and sand grains along vertical cracks; noncalcareous; neutral; abrupt, smooth boundary.

IIC1ca—10 to 15 inches, very pale brown (10YR 7/3) loam, brown (10YR 5/3) when moist; very weak, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; about 20 to 25 percent nodules of soil material that are hard and firm, about ½ to ¾ inch in diameter, and ¾ to 1 inch long; many very fine tubular pores; strongly calcareous; moderately alkaline; clear, smooth boundary.

IIC2ca—15 to 24 inches, light-gray (10YR 7/2) loam that contains about 15 percent basaltic angular gravel, brown (10YR 5/3) when moist; mostly massive, but structure is weak, very thick, platy in places; hard, firm, slightly sticky and slightly plastic; few fine and very fine roots; few very fine pores; about 20 percent nodules of soil material; strongly calcareous; moderately alkaline; abrupt, irregular boundary.

IIRca—24 inches, basalt bedrock coated with lime on upper surface and in pores and fractures in uppermost 1 to 2 feet.

The A horizon is dominantly silt loam, but in small areas it is loam. A few stones are commonly scattered on the surface and throughout the profile. The B horizon is dominantly silt loam that is 2 to 20 percent coarse fragments, mostly of basalt. The B horizon has weak prismatic to weak or moderate subangular blocky structure.

The A and B horizons are normally noncalcareous. The horizon of lime accumulation is at a depth of 8 to 16 inches; it is 15 to 40 percent nodules. The A and B horizons are neutral to moderately alkaline, and the Cca horizon ranges from mildly to strongly alkaline. Hue in all layers is mostly 10YR, but it ranges to 2.5Y.

This soil is moderately deep and well drained. It is moderately permeable and has 5 to 7.5 inches available water capacity. Fertility is high, and organic-matter content is low to moderately low. Runoff is slow to medium, and erosion is a moderate hazard.

Small areas where slopes are less than 1 percent make up about 20 to 25 percent of some mapped areas. Areas of Rock outcrop, Trevino soils, and Power soils make up 5 to 10 percent of the acreage.

This soil is used for irrigated sugar beets, potatoes, corn, small grains, alfalfa, and improved pasture. (Capability unit IIIe–6, irrigated; windbreak suitability group 1)

Potratz-Power silt loams, 3 to 7 percent slopes (PcC).—This mapping unit is about 60 to 80 percent Potratz silt loam and 20 to 40 percent Power silt loam. The Power soil is described under the heading "Power Series." Depth to bedrock varies. Runoff is medium to rapid, and erosion is a severe hazard. Rock outcrop and Trevino soils make up 10 to 15 percent of some mapped areas.

These soils are used for row crops, forage crops, small grains, corn and pasture. (Capability unit IIIe–8, irrigated; windbreak suitability group 2)

Potratz-Power rocky silt loams, 1 to 3 percent slopes (PeB).—This mapping unit is about 70 percent Potratz silt loam, 25 percent Power silt loam, and 5 to 10 percent bedrock outcrops. The Potratz soil is 24 inches deep to bedrock. The surface layer and subsoil of both the Potratz and Power soils range from heavy silt loam to silty clay loam. Runoff is medium, and erosion is a moderate hazard. Small areas where slopes are less than 1 percent make up 20 to 25 percent of some mapped areas.

These soils are used for small grains, alfalfa, clover, improved pasture, and corn. (Capability unit IVe–4, irrigated; windbreak suitability group 1)

Potratz-Power rocky silt loams, 3 to 7 percent slopes (PeC).—This mapping unit is about 75 percent Potratz silt loam, 20 percent Power silt loam, and 5 to 10 percent bedrock outcrops. The Potratz soil is 22 to 24 inches deep over bedrock. The surface layer and subsoil of both the Potratz and Power soils range from heavy silt loam to silty clay loam. The Potratz soil occurs mainly on steep slopes and near bedrock outcrops. Runoff is medium to rapid, and erosion is a very severe hazard.

These soils are used for small grains, forage crops, and hay. Corn can be grown in a cropping system that includes grass and legumes. (Capability unit IVe–10, irrigated; windbreak suitability group 2)

Power Series

The Power series consists of medium-textured, well-drained, nearly level to moderately sloping soils. These soils formed in loess or loesslike alluvium 2.5 to 4 feet thick underlain by loam or moderately coarse textured alluvium. The alluvium was derived mainly from granitic and other intrusive acid igneous rock material. It also contains some sedimentary or basaltic material.

Power soils occur in areas near Nampa and Caldwell in Canyon County. They are on slightly dissected old stream terraces. Slopes range from 0 to 12 percent, but most slopes are uniform and less than 3 percent. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, big sagebrush, and forbs. Power soils are associated with Purdam and Potratz soils.

Elevation ranges from 2,300 to 2,700 feet. Annual precipitation is 8 to 11 inches. The mean annual temperature is 50° to 52° F., and the mean summer temperature is 69° to 71°. The frost-free season is 145 to 155 days.

Power soils are used mostly for irrigated sugar beets, corn, potatoes, alfalfa, small grains, improved pasture, vegetables, and vegetable seed (fig. 5).

Power silt loam, 0 to 1 percent slopes (PhA).—This soil is on alluvial terraces.

In a typical profile the surface layer is light brownish-gray silt loam about 9 inches thick. Below the surface layer is firm, light brownish-gray silty clay 3 inches thick. Below this layer is friable, very pale brown silt loam about 14 inches thick. The next layer is very pale brown and white silt loam about 4 inches thick. Below this, extending to a depth of 38 inches, is light-gray and very pale brown silt loam. Below this layer is very pale brown silt loam about 12 inches thick. It is underlain by very pale brown very fine sandy loam.

Representative profile, 1,300 feet south and 60 feet east of the northwest corner of the NE¼ sec. 2, T. 3 N., R 3 W., about 2 miles south of Caldwell in Canyon County, in a cultivated area:

Ap1—0 to 6 inches, light brownish-gray (10 YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak and moderate, fine and very fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine and medium roots; many interstitial micropores; noncalcareous; mildly alkaline; clear, smooth boundary.

Ap2—6 to 9 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; moderate, medium and coarse, subangular blocky structure; hard, firm, sticky and plastic; thin clay films on material plowed up from the B2t horizon; plentiful fine and medium roots; many very fine interstitial pores; noncalcareous; mildly alkaline; clear, wavy boundary.

B2t—9 to 12 inches, light brownish-gray (10YR 6/2) silty clay loam, brown (10YR 4/3) when moist; moderate, medium, prismatic structure; hard, firm, sticky and plastic; medium continuous films of brown (10YR 5/3) clay on ped and pore surfaces; films are dark brown (10YR 4/3) when moist; plentiful very fine and fine roots; many very fine tubular pores; noncalcareous; mildly alkaline; clear, wavy boundary.

B3ca—12 to 17 inches, very pale brown (10YR 8/3) heavy silt loam, pale brown (10YR 6/3) when moist; moderate, medium, subangular blocky structure; hard, friable, sticky and plastic; thin patchy films of brown (10YR 5/3) clay on ped surfaces and pores; films are dark brown (10YR 4/3) when moist; plentiful medium and coarse roots; many very fine tubular pores; moderately calcareous; mildly alkaline; clear, wavy boundary.

C1ca—17 to 21 inches, very pale brown (10YR 7/3) and white (10YR 8/2) silt loam, pale brown (10YR 6/3) and very pale brown (10YR 7/3) when moist; massive; hard, firm, slightly sticky and slightly plastic; 15 to 20 percent very weakly cemented nodules ½ to ¾ inch in diameter and ¾ to 1¼ inches long; material in the interior of nodules is slightly darker and less calcareous than the material in the matrix; few fine and medium roots; many very fine tubular pores; moderately calcareous; moderately alkaline; clear, wavy boundary.

C2ca—21 to 38 inches, light-gray (10YR 7/2) and very pale brown (10YR 8/3) silt loam, brown (10YR 5/3) when moist; massive; soft, friable, slightly sticky and slightly plastic; about 30 percent weakly cemented nodules commonly coated with organic material; plentiful fine and medium roots and few coarse roots; roots do not penetrate nodules; many very fine tubular pores; strongly calcareous; moderately alkaline; clear, wavy boundary.

IIC3ca—38 to 50 inches, very pale brown (10YR 8/3) light silt loam, brown (10YR 5/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; about 5 percent nodules; few fine and medium roots; many very fine tubular pores; moderately calcareous; moderately alkaline; clear, wavy boundary.

IIIC4ca—50 to 60 inches, very pale brown (10YR 7/3) very fine sandy loam, yellowish brown (10YR 5/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; moderately calcareous; moderately alkaline.

Figure 5.—Onion seed and green onion crops on a Power silt loam.

The Ap horizon is dominantly silt loam, but it is loam in about 5 percent of the acreage. The A horizon is light brownish gray or pale brown when dry. The B2t horizon ranges from weak or moderate prismatic to weak columnar in structure. The B2t horizon is commonly heavy silt loam or light silty clay loam, but it is clay loam in places. In most areas, the depth to calcareous material ranges from 12 to 18 inches.

Small, rounded slick spots that have large amounts of exchangeable sodium in the B horizon make up 5 to 10 percent of some mapped areas. In areas east, northeast, and southeast of Nampa, the surface layer is silty clay loam. These areas should be plowed in fall to help prepare the seedbed. They dry out and warm up about 7 to 10 days later in spring than the typical soil and can be tilled without damage to soil structure only when the moisture content is favorable.

This Power soil is well drained, deep to very deep, and moderately permeable. The available water capacity is more than 7 inches. The organic-matter content is moderately low to low, and the fertility is high. Runoff is slow, and there is little or no erosion hazard.

This soil is used for irrigated sugar beets, corn, potatoes, alfalfa, small grains, improved pasture, vegetables, and vegetable seed. (Capability unit I-1, irrigated; windbreak suitability group 1)

Power silt loam, 1 to 3 percent slopes (PhB).—This soil occurs on stream terraces. Runoff is slow to medium, and erosion is a moderate hazard.

This soil is used for irrigated sugar beets, corn, potatoes, alfalfa, small grains, vegetables, and improved pasture. (Capability unit IIe–2, irrigated; windbreak suitability group 1)

Power silt loam, 3 to 7 percent slopes (PhC).—This soil is similar to Power silt loam, 0 to 1 percent slopes, except that it is gently sloping and occurs on the edges of terraces and drainageways. Most areas are long and narrow. Slopes generally are less than 300 feet long. In most areas, one-fourth to one-half of the original surface layer has been removed through erosion or land smoothing. In about 10 to 15 percent of the acreage, the plow layer consists partly of subsoil material. Runoff is medium to rapid, and erosion is a severe hazard where this soil is irrigated.

Nearly all the acreage is used for irrigated alfalfa, corn, sugar beets, small grains, and improved pasture. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Power silt loam, 7 to 12 percent slopes (PhD).—This soil is similar to Power silt loam, 0 to 1 percent slopes, except that it is moderately sloping and occurs on the edges of terraces and drainageways. Most areas are long and narrow. Slopes generally are less than 250 feet long. Over much of the area, several inches of the surface layer has been removed through erosion. In about 10 to 20 percent of this unit, the plow layer consists partly of subsoil material. Runoff is rapid, and water erosion is a very severe hazard in irrigated areas.

This soil is suited to sugar beets, potatoes, corn, small grains, alfalfa, and improved pasture. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Power-Lankbush silt loams, 7 to 12 percent slopes (PlD).—This mapping unit is about 50 percent Power silt

loam and 50 percent Lankbush silt loam. The Lankbush soil is mostly on steep slopes and at the edges of terraces. It has a silt loam or loam surface layer. It is described under the heading "Lankbush Series." These soils occur mainly in the more dissected areas of the Black Canyon irrigation project and in the northern and northeastern parts of Canyon County. In most places, the areas are long and narrow, and slopes are about 150 to 300 feet long. Runoff is rapid, and water erosion is a very severe hazard in irrigated areas.

These soils are used for irrigated pasture, hay, corn, and small grains. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Power-Potratz silt loams, 0 to 1 percent slopes (PoA).—This mapping unit occurs on uplands south and southeast of Nampa in Canyon County. It is about 70 to 80 percent Power silt loam and 20 to 30 percent Potratz silt loam. The Potratz soil is mostly in elevated and sloping areas and in areas where bedrock crops out. The Potratz and Power soils are similar, but the Potratz soil is underlain by basalt bedrock at a depth of 20 to 40 inches. The Potratz soil is described under the heading "Potratz Series." Runoff is slow or very slow, and there is little erosion hazard.

Included in mapping are slick spots, 5 to 25 feet wide, on which crops grow poorly. The water intake is very slow on these slick spots, and the lower part of the subsoil is saline-alkali. These spots make up less than 5 percent of the acreage. Also included are areas of Purdam soils that make up 5 to 10 percent of some mapped areas.

The soils in this unit are used for irrigated sugar beets, corn, alfalfa, small grains, and improved pasture. (Capability unit IIs–1, irrigated; windbreak suitability group 1)

Power-Potratz silt loams, 1 to 3 percent slopes (PoB).—The soils in this unit occur on uplands south and southeast of Nampa. This unit is about 60 to 80 percent Power silt loam and 20 to 40 percent Potratz silt loam. Surface runoff is slow to medium, and erosion is a moderate hazard. The Potratz soil is mostly in elevated and sloping areas and in areas where bedrock crops out. The Potratz and Power soils are similar, but the Potratz soil is underlain by basalt bedrock at a depth of 20 to 40 inches.

Included in mapping are slick spots, 5 to 25 feet wide, on which crops grow poorly. The water intake is very slow on these slick spots, and the lower part of the subsoil is saline-alkali. These spots make up less than 5 percent of the areas mapped. Also included are areas of Purdam soils that make up about 5 to 10 percent of some mapped areas.

The soils in this unit are used for irrigated crops, sugar beets, alfalfa, small grains, and improved pasture. (Capability unit IIIe–6; windbreak suitability group 1)

Power-Purdam silt loams, 0 to 1 percent slopes (PpA).—This unit is about 60 to 80 percent Power silt loam and 20 to 40 percent Purdam silt loam. These soils are similar, but the Purdam soil has a weakly cemented layer at a depth of 20 to 40 inches; depth to this cemented layer varies within short distances. In places the Power soil also has a cemented layer that is at a depth of 4 to 5 feet. The surface layer of both soils is loam in a few areas. The Purdam soil is described under the heading "Purdam Series."

In places the original surface layer has been removed through land smoothing or leveling and subsoil material is mixed in the plow layer. In these areas the surface layer contains more clay and water intake is slower. Low spots that have been covered with soil material commonly have more rapid water intake.

Included in mapping are areas of Sebree soils that have very slow water intake, very slow permeability, and a saline-alkali subsoil. These soils make up less than 5 percent of the acreage, but they are 5 to 15 percent of some mapped areas.

The soils in this unit are used mainly for irrigated pasture crops, alfalfa, small grains, corn, beans, and sugar beets. (Capability unit I–1, irrigated; windbreak suitability group 1)

Power-Purdam silt loams, 1 to 3 percent slopes (PpB).—This unit is about 60 to 80 percent Power silt loam and 20 to 40 percent Purdam silt loam. Runoff is slow to medium, and erosion is a moderate hazard.

In areas where the soils have been leveled, part or all of the surface soil material has been removed from high spots, and the surface layer consists partly or entirely of subsoil material. Water intake in these spots is slow to moderately slow, and crops grow less well than in other areas. In low spots soil material has been added to the original surface layer. Water intake in these spots commonly is more rapid than typical, and crops grow better.

Included in mapping are areas of Sebree soils that have very slow water intake, very slow permeability, and a saline-alkali subsoil. These soils make up less than 5 percent of the acreage, but they are 5 to 15 percent of a few mapped areas.

The soils in this unit are used for sugar beets, corn, beans, alfalfa, small grains, and improved pasture. Crop growth is uneven, partly because the water intake varies. (Capability unit IIe–2; irrigated; windbreak suitability group 1)

Power-Purdam silt loams, 3 to 7 percent slopes (PpC).—This unit is about 60 percent Power silt loam and 40 percent Purdam silt loam. It occurs mostly north and northwest of Nampa and along sides of drainageways in other parts of the survey area. Most areas are long and narrow. Slopes are short. Runoff is medium to rapid, and erosion is a severe hazard.

In about 5 to 10 percent of the acreage part of the surface soil material has been removed through land smoothing or erosion, and finer textured subsoil material is mixed into the plow layer. In these areas the water intake is slower than typical.

The soils in this unit are used for irrigated pasture, alfalfa, and small grains. Corn can be grown occasionally. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Power-Purdam silt loams, 7 to 12 percent slopes (PpD).—This mapping unit is 40 percent Power silt loam, 50 percent Purdam silt loam, and 10 percent eroded areas of these two soils where the surface layer is calcareous. Several inches of the surface layer have been lost through erosion. These soils occur on the edges of terraces and drainageways. The areas generally are long and narrow. Slopes are about 100 to 250 feet long. Runoff is rapid, and water erosion is a very severe hazard in irrigated areas.

These soils are used for irrigated pasture, alfalfa, and small grains. Corn can be grown occasionally. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Purdam Series

The Purdam series consists of medium-textured, level to moderately sloping soils that have a weakly cemented

duripan at a depth of 20 to 40 inches. These soils formed in a moderately deep loess mantle over medium-textured or moderately coarse textured alluvium or lacustrine sediments derived mainly from acid igneous rock. Purdam soils occur on old stream terraces that are slightly to moderately dissected. They are extensive near Nampa and Caldwell in Canyon County. The native vegetation was mainly bluebunch wheatgrass, Sandberg bluegrass, cheatgrass, and big sagebrush. Purdam soils are associated with Power and Sebree soils.

Elevation ranges from 2,300 to 2,650 feet. Annual precipitation is 8 to 11 inches. The average annual temperature is 50° to 52° F., and the average summer temperature is 69° to 71°. The frost-free season is 145 to 155 days.

Purdam soils are used mostly for irrigated sugar beets, corn, potatoes, beans, alfalfa, small grains, improved pasture, vegetables, and vegetable seed.

Purdam silt loam, 0 to 1 percent slopes (PrA).—This soil is on alluvial terraces.

In a typical profile the surface layer is light brownish-gray silt loam about 10 inches thick. The subsoil is 9 inches thick. The upper part is firm pale-brown silty clay loam; the lower part is friable pale-brown silt loam. The next layer is very pale brown silt loam that extends to a depth of about 24 inches. Below this is a cemented hardpan about 14 inches thick. It is underlain by stratified alluvial sediments.

Representative profile, 320 feet south and 2,050 feet east of the northwest corner of sec. 11, T. 3 N., R. 4 W., about 4 miles southwest of Caldwell in Canyon County, in a cultivated area:

Ap1—0 to 4 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; very weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial pores; noncalcareous; neutral; clear, wavy boundary.

Ap2—4 to 10 inches, light brownish-gray (10YR 6/2) heavy silt loam, dark grayish brown (10YR 4/2) when moist; very weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many fine tubular pores; noncalcareous; neutral; abrupt, smooth boundary.

B2t—10 to 13 inches, pale-brown (10YR 6/3) light silty clay loam, brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; hard, firm, sticky and plastic; moderate nearly continuous films of brown (10YR 5/3) clay on ped and pore surfaces; few very fine, fine, and medium roots; many fine tubular pores; noncalcareous; neutral; clear, wavy boundary.

B3tca—13 to 19 inches, pale-brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) when moist; very weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; thin patchy films of brown (10YR 5/3) clay on ped surfaces; plentiful very fine, fine, and medium roots; many fine tubular pores; about 3 percent nodules of weakly cemented soil material; nodules are about ½ to ¾ inch in diameter and ¾ to 1¼ inches long; interior of nodules is slightly darker and less calcareous than soil material in the matrix; very slightly calcareous; fine veins of lime; moderately alkaline; clear, wavy boundary.

C1ca—19 to 24 inches, very pale brown (10YR 7/3) silt loam, brown (10YR 4/3) when moist; massive; 30 to 50 percent nodules; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common fine tubular pores; slightly calcareous; fine veins of lime; moderately alkaline; clear, smooth boundary.

C2casi—24 to 38 inches, very pale brown (10YR 7/3) strongly cemented duripan, brown (10YR 4/3) when moist; massive breaking to strong, medium, platy laminations; very hard, very firm; moderately calcareous; veins and splotches of lime; moderately alkaline; abrupt, wavy boundary.

IIC—38 to 60 inches, stratified loam, sandy loam, and coarse-textured alluvial sediments; slightly calcareous; moderately alkaline.

The A horizon is dominantly silt loam, but it is loam or light silty clay loam in about 15 percent of the acreage. It is dark grayish brown to dark brown (10YR 4/2 or 4/3) when moist and ranges from 4 to 11 inches in thickness. The B2 horizon is dominantly silt loam, but in places it is loam or light silty clay loam that has weak to moderate prismatic or weak columnar structure. The B3tca horizon and the lower layers commonly have dark manganese stains. Depth to free carbonates ranges from 12 to 24 inches. Depth to the duripan ranges from 18 to 40 inches.

This soil is moderately deep and well drained. Permeability is moderate to the duripan, and the available water capacity is 5 to 7.5 inches. The organic-matter content is low to moderately low, and the fertility is high. Runoff is slow or very slow, and there is little or no erosion hazard. Small rounded slick spots of Sebree soils make up less than 2 percent of the acreage.

This soil is used for irrigated sugar beets, corn, potatoes, beans, alfalfa, small grains, improved pasture, vegetable seed. (Capability unit IIs–1, irrigated; windbreak suitability group 1)

Purdam silt loam, 1 to 3 percent slopes (PrB).—This soil occurs on old stream terraces. Runoff is slow to medium, and erosion is a moderate hazard.

This soil is used for the same crops as Purdam silt loam, 0 to 1 percent slopes. (Capability unit IIIe–6, irrigated; windbreak suitability group 1)

Purdam silt loam, 3 to 7 percent slopes (PrC).—This soil is on the edges of terraces and drainageways. Most areas are long and narrow, and slopes are less than 300 feet long. Runoff is medium to rapid, and erosion is a severe hazard. Over much of the acreage, as much as one-fourth of the original surface layer has been lost through erosion or land smoothing. In about 10 to 15 percent of the acreage, the plow layer contains subsoil material.

This soil is used for small grains, alfalfa, and improved pasture. Small areas are used for sugar beets and corn. (Capability unit IIIe–8, irrigated; windbreak suitability group 2)

Purdam silt loam, water table, 0 to 1 percent slopes (PsA).—This soil occurs in depressions, near small drainageways, and at the lower edge of fields that are overirrigated or inadequately drained. This soil is similar to Purdam silt loam, 0 to 1 percent slopes, except that it has a fluctuating water table and the lower part of the subsoil and the underlying material are mottled with dark yellowish brown to reddish brown. The compactness of the cemented layer varies within short distances. In a few places this layer is weak and occurs below a depth of 40 inches. In areas near Mason Creek, southeast of Nampa, basalt bedrock is below the cemented layer.

Small saline-alkali spots make up less than 3 percent of the acreage. Slopes of slightly more than 1 percent occur in a few small areas near the edges of drainageways. These areas make up about 5 percent of the acreage.

This soil is used mostly for improved pasture and small grains. Small areas are used for corn and sugar beets.

(Capability unit IIIw–6, irrigated; windbreak suitability group 3)

Purdam-Sebree silt loams, 0 to 1 percent slopes (PtA).—This unit consists of about 65 to 85 percent Purdam silt loam and 15 to 35 percent Sebree silt loam. The plow layer is light silty clay loam in about 25 percent of the acreage. The Sebree soil occurs as small rounded slick spots, about 15 to 50 feet wide, that dot the landscape. It is described under the heading "Sebree Series." Water intake and permeability are very slow in the slick spots, and crops grow very poorly. Runoff is slow or very slow on these soils, and there is little erosion hazard.

These soils are used for sugar beets, corn, alfalfa, small grains, and improved pasture. (Capability unit IIs–1, irrigated; windbreak suitability group 1)

Purdam-Sebree silt loams, 1 to 3 percent slopes (PtB).—This mapping unit is about 65 to 85 percent Purdam silt loam and 15 to 35 percent Sebree silt loam. Runoff generally is slow. Included in mapping are sloping areas where the surface layer is silty clay. These areas make up 20 to 30 percent of the acreage.

These soils are used for sugar beets, corn, alfalfa, small grains, and improved pasture. Irrigation runs on these soils should be short to reduce erosion. (Capability unit IIIe–6, irrigated; windbreak suitability group 1)

Quincy Series

The Quincy series consists of nearly level to moderately steep, coarse-textured, excessively drained to somewhat excessively drained, very deep soils. These soils formed in sand hummocks or dunes under a vegetation of shrubs and grasses. The sands were derived from mixed sources and are less than 95 percent quartz, chert, and other forms of silica. Quincy soils occur on medium and high terraces near the Snake River and near old stream channels north of Middleton. The natural vegetation consists mainly of needle-and-thread, thickspike wheatgrass, Indian ricegrass, rabbitbrush, horsebrush, fourwing saltbush, and Russian-thistle. Quincy soils are associated with Feltham and Turbyfill soils.

Elevation ranges from 2,300 to 2,700 feet. Annual precipitation is 7 to 10 inches. The average annual temperature is 50° to 52° F., and the average summer temperature is 65° to 70°. The frost-free season is 145 to 165 days.

Most areas are used for native range or are idle. Small areas are used for irrigated corn, tomatoes, melons, onions, potatoes, small grains, hay, and pasture.

Quincy fine sand, 0 to 3 percent slopes (QcB).—This soil is on uplands.

In a typical profile the surface layer is grayish-brown noncalcareous fine sand, about 9 inches thick. The next layer is soft, noncalcareous, light brownish-gray fine sand that extends to a depth of about 62 inches.

Representative profile, 80 feet east and 800 feet north of the southwest corner of sec. 32, T. 5 N., R. 5 W., about 3 miles northwest of Wilder in Canyon County, in a cultivated area:

Ap—0 to 9 inches, grayish-brown (10YR 5/2) fine sand, dark grayish brown (10YR 4/2) when moist; very weak, medium and fine, granular structure; very friable, soft, nonsticky and nonplastic; plentiful very fine and fine roots; very fine and medium tubular pores; many worm casts; slightly acid; noncalcareous; abrupt, smooth boundary.

C1—9 to 20 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) when moist; single grain; loose, soft, nonsticky and nonplastic; few fine roots; few fine tubular pores; neutral; noncalcareous; gradual, smooth boundary.

C2—20 to 62 inches, light brownish-gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) when moist; single grain; loose, soft, nonsticky and nonplastic; few fine roots; neutral; noncalcareous; clear, smooth boundary.

The A horizon is sand, fine sand, loamy fine sand or loamy sand. It ranges in value from 5 to 7 when dry and 4 to 5 when moist; chroma is 2 or 3, and hue is 10YR or 2.5Y. In some areas the soil is slightly gravelly throughout, and in places it is very gravelly below a depth of about 3 feet. The range of color for the C horizon is similar to that for the A horizon.

This soil is generally free of lime in the uppermost 20 inches, except for small particles brought up by burrowing insects and animals. In places it is slightly calcareous below a depth of 20 inches. Reaction is slightly acid to moderately alkaline in the uppermost 20 inches and neutral to moderately alkaline below this depth.

This soil is very deep and excessively drained to somewhat excessively drained. It is very rapidly permeable. The available water capacity is less than 5 inches. The organic-matter content and fertility generally are low or very low. Runoff is slow or very slow, and soil blowing and water erosion are slight to moderate hazards. Small areas of Feltham soils make up about 10 to 15 percent of some mapped areas.

This soil is used for irrigated corn, small grains, potatoes, tomatoes, onions, melons, hay, and pasture. (Capability unit IVs–1, irrigated)

Quincy fine sand, 3 to 12 percent slopes (QcD).—This soil is on uplands. Hummocks and small dunes are in some areas. Runoff is slow, and soil blowing and water erosion are severe hazards. Feltham soils make up about 10 to 15 percent of some mapped areas.

This soil is used for irrigated hay and pasture. (Capability unit VIe–4, irrigated)

Quincy fine sand, 12 to 30 percent slopes (QcE).—This soil is on steep dunes on uplands. A few shifting sand dunes occur in some areas. Runoff is slow. The hazard of soil blowing is severe. Included in mapping are Feltham soils that occur in the narrow areas between dunes or high ridges; they make up less than 10 percent of the acreage.

This soil is used for limited grazing or is idle. Some areas provide wildlife habitat. (Capability unit VIIe–2, dryland pasture or range)

Quincy-Feltham loamy sands, 1 to 3 percent slopes (QfB).—This unit consists of about 60 percent Quincy loamy sand and about 40 percent Feltham loamy sand. The Quincy soil occupies the higher parts of hummocks and small dunes, and the Feltham soil occupies lower areas. The Feltham soil is described under the heading "Feltham Series." Both soils occur on terraces and uplands near the Black Canyon irrigation project north of Middleton. The Quincy soil is similar to Quincy fine sand, 0 to 3 percent slopes, except that it has a loamy sand surface layer, and the material below the surface layer is brown when moist. Runoff is slow, and soil blowing and water erosion are slight to moderate hazards.

These soils are used for pasture, range, or irrigated small grains and hay. (Capability unit IVs–1, irrigated; unit VIe–3 dryland pasture or range)

Quincy-Feltham loamy sands, 3 to 12 percent slopes (QfD).—This unit is about 60 percent Quincy loamy sand

and 40 percent Feltham loamy sand. Hummocks and small dunes occur in most areas. These soils occur on terraces and uplands generally near the Black Canyon irrigation project north of Middleton. The Quincy soil is similar to Quincy fine sand, 0 to 3 percent slopes, except that the surface layer is loamy sand, and the material below the surface layer is brown when moist. Depth to calcareous material is commonly more than 40 inches in the soils of this mapping unit. Erosion is a severe hazard.

These soils are used for pasture, range, or irrigated crops. Small areas are irrigated to hay, pasture, and small grains. (Capability unit VIe–4, irrigated; unit VIe–2, dryland pasture or range)

Riverwash

Riverwash (Re) consists of bars of mixed sand and gravel along streams or rivers that are flooded by runoff in spring. Weeds and willows grow along the streambanks. In the Snake River are several small islands of unconsolidated alluvium. The soil material on these islands is stratified and varies in texture. The islands are frequently flooded. Vegetation on the islands is mainly willows, rushes, sedges, and some grass. The islands are used as nesting sites by wild geese and ducks.

This land type is suited to wildlife habitat. It is not suited to cultivation or grazing. (Capability unit VIIIw–1)

Rock Outcrop

Rock outcrop (Ro) consists mainly of basalt bedrock, but in parts of Owyhee County it is tuffaceous rhyolite and sandstone. (Capability unit VIIIs–1)

Scism Series

The Scism series consists of well-drained, nearly level to moderately sloping, medium-textured soils. These soils formed in light silty loess or loesslike alluvium derived from calcareous mixed mineral material. They are on medium and high terraces and uplands south of Lake Lowell, near Dry Lake, Lakeview, Bowmont, and Melba. Vegetation in uncultivated areas is mainly cheatgrass, big sagebrush, wild mustard, and Sandberg bluegrass. Scism soils are associated with Minidoka, Bahem, and Purdam soils.

Elevation ranges from 2,300 to 3,000 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 69° to 76°. The frost-free season is 145 to 160 days. Annual precipitation is 7 to 10 inches, including 5 to 15 inches of snowfall. Summers are dry.

Scism soils are used for irrigated alfalfa, clover, small grains, sugar beets, potatoes, corn, onions, beans, garden-crop seeds, and improved pasture.

Scism silt loam, 0 to 1 percent slopes (ScA).—This soil is on terraces. In a typical profile the surface layer is light brownish-gray calcareous silt loam that is about 8 inches thick. The surface layer is underlain by very friable, light-gray silt loam about 13 inches thick; the lower 8 inches has many weakly cemented, strongly calcareous nodules of soil material. The next layer is very weakly cemented, light-gray silt loam about 9 inches thick. Below this layer is very firm, light-gray silt loam about 12 inches thick. This is underlain by pale-brown loam.

Representative profile, 700 feet south and 70 feet west of the northeast corner of sec. 10, T. 1 N., R. 3 W., in Canyon County, in a cultivated area:

Ap—0 to 8 inches, light brownish-gray (10YR 6/2) silt loam dark grayish brown (10YR 4/2) when moist; weak, very fine, granular structure; soft, very friable, slightly sticky and slightly plastic; moderately calcareous; moderately alkaline; abrupt, smooth boundary.

C1ca—8 to 13 inches, light-gray (10YR 7/2) silt loam, brown (10 YR 5/3) when moist; massive; about 5 to 10 percent weakly cemented nodules formed from filled cicada or other krotovina; nodules are rounded, ¼ to ¾ inch in diameter, and ½ to 1¼ inches long; the interior of nodules is slightly calcareous and grayish brown (10 YR 5/2) when moist; the matrix, or soil material between nodules, is slightly hard, very friable, slightly sticky and slightly plastic; abundant very fine, and medium roots; strongly calcareous; moderately alkaline; gradual, smooth boundary.

C2ca—13 to 21 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) when moist; massive; about 30 to 50 percent nodules similar to those in the C1ca layer; matrix is slightly hard, very friable, slightly sticky and slightly plastic; abundant very fine, fine, and medium roots; common tubular micropores; few fine lime veins; strongly calcareous; moderately alkaline, abrupt, smooth boundary.

C3casi—21 to 30 inches, light-gray (10YR 7/2) light silt loam, grayish brown (10YR 5/2) when moist; massive; moderately dense and firm in places; very weakly cemented; hard, very firm, slightly sticky and slightly plastic; about 5 percent nodules that are dark grayish brown (10YR 4/2) when moist; plentiful very fine and fine roots; few tubular micropores; strongly calcareous; moderately alkaline; gradual, smooth boundary.

C4ca—30 to 42 inches, light-gray (10YR 7/2) light silt loam, dark grayish brown (10YR 4/2) when moist; massive; hard, very firm, nonsticky and slightly plastic; few lime veins and common lime splotches; more lime than in horizons above or below; strongly calcareous; few very fine and fine roots; common tubular micropores; strongly alkaline; abrupt, smooth boundary.

C5—42 to 62 inches, pale-brown (10YR 6/3) light loam, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonsticky and slightly plastic; few white lime splotches ¼ to 2 inches in diameter; few fine gravel-size pieces of caliche duripan; few very fine roots; moderately calcareous; moderately alkaline.

The A horizon is dominantly silt loam, but in places it is loam or fine sandy loam. The A horizon ranges in value from 6 to 7 when dry; chroma is 2 or 3.

The C horizon ranges in value from 6 to 7.5 when dry and 4 to 5.5 when moist; chroma is 2 or 3. In nonirrigated or recently developed areas, the C1 and C2 horizons are relatively high in content of soluble salts and exchangeable sodium. Normal irrigation readily leaches these soluble salts and sodium from the root zone.

The entire profile is commonly calcareous, but where undisturbed, the uppermost 2 to 5 inches are noncalcareous. Depth to the strongly calcareous nodular Cca horizon is about 8 to 18 inches. In places, the soil has more than one thin, discontinuous, very weakly cemented layer.

This soil is deep to very deep and well drained. Permeability is moderate, and the available water capacity is more than 7.5 inches. The organic-matter content is low or moderately low, and the fertility is high. Runoff is slow, and there is little or no erosion hazard. Soil blowing is a hazard on bare soil. Included in mapping are small areas of Bahem and Minidoka soils that make up 10 to 15 percent of the acreage.

This soil is used for irrigated alfalfa, clover, small

grains, sugar beets, potatoes, corn, onions, beans, garden-crop seeds, and improved pasture. (Capability unit I–1, irrigated; windbreak suitability group 1)

Scism silt loam, 1 to 3 percent slopes (ScB).—This soil contains sand and gravel below a depth of 40 inches in a few small areas. Runoff is medium and there is a slight to moderate erosion hazard from irrigation water.

This soil is used for irrigated sugar beets, potatoes, corn, onions, beans, garden-crop seed, small grains, and alfalfa. (Capability unit IIe–2, irrigated; windbreak suitability group 1)

Scism silt loam, 3 to 7 percent slopes (ScC).—This soil occurs in long narrow areas at the base of steeper soils. It is similar to Scism silt loam, 0 to 1 percent slopes, except that horizons having concentrations of nodules are not as well defined and the horizons in which nodules are most strongly concentrated are at a depth of 10 to 16 inches. Root penetration is severely restricted by the weakly cemented horizon, especially where this soil grades to Minidoka or Purdam soils. Sand and gravel occur below a depth of 40 inches in some areas. Runoff is medium to rapid, and there is a severe erosion hazard from irrigation water. Areas of Minidoka and Purdam soils make up as much as 20 to 30 percent of some mapped areas.

This soil is used mostly for irrigated alfalfa, corn, small grains, and pasture. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Scism silt loam, 7 to 12 percent slopes (ScD).—This soil is similar to Scism silt loam, 0 to 1 percent slopes, except that horizons having concentrations of nodules are not so well defined, depth to the nodular horizons is commonly 8 to 14 inches, and the upper horizons are thinner because the soil is moderately eroded. Where this soil grades to Minidoka or Purdam soils, the weakly cemented layer severely restricts root penetration. Sand and gravel occur below a depth of 40 inches in a few small areas. Runoff is rapid, and the hazard of water erosion in irrigated areas is very severe. Areas of Bahem, Minidoka, and Purdam soils make up about 10 to 15 percent of the acreage.

This soil is used for irrigated small grains, corn, alfalfa, and improved pasture. Vegetation in uncultivated areas is mainly cheatgrass, wild mustard, big sagebrush, and Sandberg bluegrass. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Scism silt loam, deep over basalt, 0 to 1 percent slopes (SdA).—This soil is similar to Scism silt loam, 0 to 1 percent slopes, except that it is underlain by basalt bedrock at a depth of 40 to 60 inches. Cementation is very weak or is absent where this soil is 60 inches deep. The upper surface of the bedrock has a lime coating that is less than two inches thick and is moderately cemented in places. Depth to bedrock varies within short distances. Small areas where the soil is as shallow as 20 inches are included. These areas make up 5 to 10 percent of the acreage. A few rock outcrops also are included. Where this soil is excessively irrigated, the water table may perch on the bedrock.

This soil is used for irrigated alfalfa, corn, sugar beets, potatoes, small grains, onions, and beans. (Capability unit I–1, irrigated; windbreak suitability group 1)

Scism silt loam, deep over basalt, 1 to 3 percent slopes (SdB).—This soil is on terraces. It is similar to Scism silt loam, 0 to 1 percent slopes, except that it is underlain by basalt bedrock at a depth of 40 to 60 inches. The upper surface of the bedrock has a lime coating that is less than 2 inches thick and is moderately cemented in places. Depth to bedrock varies within short distances. Bedrock crops out in less than 5 percent of the acreage. Small areas where the soil is as shallow as 20 inches make up 10 to 15 percent of some mapped areas. Runoff is medium, and there is a slight to moderate erosion hazard from irrigation water.

This soil is used for irrigated alfalfa, corn, sugar beets, potatoes, onions, beans, and small grains. (Capability unit IIe–2, irrigated; windbreak suitability group 1)

Scism silt loam, deep over basalt, 3 to 7 percent slopes (SdC).—This soil occurs in long narrow areas at the edges of terraces. It is similar to Scism silt loam, 0 to 1 percent slopes, except that it is underlain by basalt bedrock or basaltic cinders. The nodular horizons contain a maximum of 25 to 30 percent nodules. Runoff is medium to rapid, and there is a severe erosion hazard from irrigation water.

Basalt crops out in less than 5 percent of the acreage. Areas of Bahem, Minidoka, and Potratz soils make up 15 to 20 percent of some mapped areas.

This soil is used for irrigated afalfa, corn, small grains, and improved pasture. (Capability unit IIIe–2, irrigated; windbreak suitability group 2)

Scism silt loam, deep over basalt, 7 to 12 percent slopes (SdD).—This soil is similar to Scism silt loam, 0 to 1 percent slopes, except that it is underlain by basalt bedrock or basaltic cinders at a depth of 40 to 60 inches. The nodular horizons contain a maximum of 25 to 35 percent nodules. Depth to the nodular horizons commonly is 8 to 12 inches. Runoff is rapid, and the hazard of water erosion is very severe.

Basalt crops out in less than 5 percent of the acreage, and eroded spots and areas where the plow layer extends into the nodular horizons make up 10 to 15 percent of the acreage. Areas of Bahem, Minidoka, and Potratz soils make up 15 to 20 percent of some mapped areas.

This soil is used for irrigated small grains, alfalfa, corn, and improved pasture. In uncultivated areas the vegetation is cheatgrass, wild mustard, big sagebrush, and Sandberg bluegrass. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Sebree Series

The Sebree series consists of saline-alkali soils that occur as slick spots mainly on uplands in the northern and northeastern parts of Canyon County. In the Canyon Area, Sebree soils are mapped with Elijah and Purdam soils.

Sebree soils are well drained, are fine textured and moderately fine textured, and have an indurated or strongly cemented silica-calcium carbonate duripan at a depth of 20 to 40 inches. These soils formed mainly in a thin layer of wind-laid silts underlain by unconsolidated or very weakly consolidated sediments. These sediments are mostly noncalcareous sands or loamy sands that are high in content of quartz, feldspar, and mica.

Elevation ranges from 2,300 to 3,000 feet. Annual precipitation is 8 to 11 inches. The average annual temperature is about 51° F., and the average summer temperature is about 71°. The frost-free season is 140 to 150 days.

Sebree soils are used in the same way as surrounding associated soils. Most of the acreage is used for irrigated

small grains, corn, clover, sugar beets, alfalfa, and improved pasture. In places Sebree soils are used for range. The range vegetation is mainly cheatgrass, medusahead wildrye, and annual weeds.

In a typical profile the surface layer is light-gray silt loam about 1 inch thick. Below is firm silty clay loam about 10 inches thick; it is pale brown in the upper and lower parts, and brown in the central part. The next layer, extending to a depth of about 18 inches, is pale-brown firm silt loam that has salt veins. Below this is white and very pale brown sandy loam that extends to a depth of about 29 inches. The next layer is an indurated or strongly cemented silica-calcium carbonate hardpan extending to a depth of about 45 inches. It is underlain by very pale brown sand.

Representative profile of Sebree silt loam, 975 feet east and 1,400 feet north of the southwest corner of sec. 4, T. 5 N., R. 3 W., about 7 miles north of Caldwell in Canyon County, in native pasture:

A2—0 to 1 inch, light-gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine roots; many very fine and fine vesicular pores; neutral; abrupt, smooth boundary.

B21t—1 to 3 inches, pale-brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) when moist; strong, very fine, prismatic structure parting to strong, very fine, angular blocky; hard, firm, sticky and plastic; few fine roots; common very fine tubular pores; thin continuous clay films; noncalcareous; neutral; clear, smooth boundary.

B22t—3 to 8 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) when moist; weak, fine, prismatic structure parting to moderate, very fine, subangular blocky; hard, firm, sticky and plastic; few fine roots; common very fine tubular pores; thin continuous clay films; noncalcareous; mildly alkaline; clear, smooth boundary.

B23t—8 to 11 inches, pale-brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) when moist; moderate, very fine and fine, subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few very fine tubular pores; thin continuous clay films; noncalcareous; mildly alkaline; clear, smooth boundary.

B24tsa—11 to 14 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; moderate, fine and medium, subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; thin nearly continuous clay films; common fine salt veins and splotches; noncalcareous; moderately alkaline; abrupt, wavy boundary.

B3sa—14 to 18 inches, similar to B24tsa horizon, except no clay films are present.

IIC1a—18 to 29 inches, white (10YR 8/2) and very pale brown (10YR 8/3) sandy loam, very pale brown (10YR 7/2) and pale brown (10YR 6/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many very fine tubular pores; strongly calcareous; common fine lime splotches and veins; strongly alkaline; abrupt wavy boundary.

IIIC2cam—29 to 45 inches, white (10YR 8/2) and very pale brown (10YR 7/3) strongly cemented silica-calcium carbonate duripan, light gray (10YR 7/2) and pale brown (10YR 6/3) when moist; massive or weak platy; upper part very dense.

IVC3ca—45 to 60 inches, very pale brown (10YR 7/3) sand, pale brown (10YR 6/3) when moist; single grain; loose; nonsticky and nonplastic; noncalcareous; moderately alkaline.

The A2 horizon ranges from light gray to light brownish gray in color and from silt loam to fine sandy loam in texture. It is gravelly in places. The Bt horizon contains more than 15 percent exchangeable sodium. Depth to soluble salts and gypsum ranges from 1 to 12 inches. Depth to calcareous material ranges from 7 to 20 inches. Depth to the duripan ranges from 20 to 40 inches.

Sebree soils are moderately deep over a cemented layer. They have 3.75 to 7.5 inches available water capacity and very slow permeability. The cemented layer is not permeable, except through cracks or other openings. Natural drainage is good, but at times the water table perches above the cemented layer. The organic-matter content and fertility are very low.

Returning crop residues to the soil and turning under green-manure crops help to increase and maintain the organic-matter content. Applications of soil amendments, such as gypsum, improve soil structure. Mixing the profile to a depth of about 3 feet by deep plowing increases water intake.

Terrace Escarpment

Terrace escarpment (Tc) consists of sloping or steep, relatively even fronts of terraces. On the escarpments, the soil texture is coarse, medium, or fine and cobblestones, gravel, or boulders occur in places. The soil is mostly shallow, but depth varies. Erosion is moderate to severe, and vegetation is sparse. These areas are not suited to cultivation or grazing, but they provide some wildlife habitat. (Capability unit VIIIs–1)

Timmerman Series

The Timmerman series consists of well-drained to somewhat excessively drained, nearly level to sloping, moderately coarse textured soils. These soils formed in alluvium derived mostly from basalt. The alluvium is less than 30 percent acid igneous rock material. The sand and gravel in these soils were derived mainly from basalt and other dark mineral material. The Timmerman soils occur on terraces along the Snake River near Melba in the southern part of Canyon County. Vegetation is mainly budsage, shadscale, Russian-thistle, and cheatgrass. Timmerman soils are associated with Garbutt and Turbyfill soils.

Elevation ranges from 2,200 to 2,650 feet. The average annual temperature 50° to 52° F., and the average summer temperature is 70° to 75°. The frost-free season is 145 to 160 days. Annual precipitation is 7 to 9 inches. Summers are dry.

Timmerman soils are used for range, for irrigated crops, and for improved pasture.

Timmerman coarse sandy loam, 1 to 3 percent slopes (TeB).—This soil is on alluvial fans and terraces.

In a typical profile the surface layer is light brownish-gray coarse sandy loam about 3 inches thick. Below the surface layer is very friable, pale-brown coarse sandy loam about 30 inches thick. The next layer, extending to a depth of about 38 inches, is light-gray coarse sandy loam. This is underlain by light-gray coarse sand.

Representative profile, 2,300 feet west and 600 feet north of the southeast corner of sec. 8, T. 1 S., R. 2 W., about 3 miles southwest of Melba in Canyon County, in rangeland:

A1—0 to 3 inches, light brownish-gray (10YR 6/2) coarse sandy loam, dark grayish brown (10YR 4/2) when moist; very weak, fine, granular structure; loose dry and moist, slightly sticky and nonplastic; abundant

very fine and fine roots; slightly calcareous; strongly alkaline; clear, broken boundary.

AB—3 to 6 inches, pale-brown (10YR 6/3) coarse sandy loam, dark grayish brown (10YR 4/2) when moist; very weak, thick, platy structure; slightly hard, very friable, slightly sticky and nonplastic; plentiful very fine and fine roots; noncalcareous; moderately alkaline; clear, smooth boundary.

B—6 to 22 inches, pale-brown (10YR 6/3) coarse sandy loam, dark grayish brown (10YR 4/2) when moist; very weak, coarse, subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; plentiful very fine and fine roots; noncalcareous; moderately alkaline; clear, wavy boundary.

C1—22 to 33 inches, pale-brown (10YR 6/3) coarse sandy loam, brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and nonplastic; plentiful fine roots; this layer is less dense, contains less silt and clay, and is slightly lighter in color than the horizon above; slightly calcareous; moderately alkaline; clear, smooth boundary.

IIC2ca—33 to 38 inches, light-gray (10YR 7/2) coarse sandy loam, grayish brown (10YR 5/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; abundant fine roots and few coarse roots; few fine lime veins; moderately calcareous; moderately alkaline; clear, smooth boundary.

IIIC3ca—38 to 60 inches, light-gray (10YR 7/2) coarse sand, grayish brown (10YR 5/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; moderately calcareous; strongly alkaline.

The A1 horizon is dominantly coarse sandy loam, but in places it is loam, sandy loam, or fine sandy loam. Most profiles contain some very fine gravel, and some areas are gravelly or stony. The uppermost inch or two is slightly calcareous. In places the profile is stratified below a depth of 20 inches. Depth to loose basaltic sand and gravel is 25 to 40 inches.

This soil is moderately deep over sand and gravel, and is well drained to somewhat excessively drained. Permability is moderately rapid, and the available water capacity is 3.75 to 5 inches. The organic-matter content is low, and the fertility is low to moderate. Runoff is slow to medium, and erosion is a moderate hazard.

Included in mapping are small areas of Timmerman gravelly coarse sandy loam, 1 to 3 percent slopes, that make up 15 to 20 percent of some mapped areas. Areas where slopes are less than 1 percent make up 10 percent of the acreage.

This soil is used for irrigated alfalfa, small grains, corn, and improved pasture. (Capability unit IIIe–7, irrigated)

Timmerman coarse sandy loam, 3 to 7 percent slopes (TeC).—This soil occurs along the edges of terraces and drainageways and on alluvial fans. Runoff is medium to rapid, and erosion is a very severe hazard. Included in mapping are small areas of Timmerman gravelly coarse sandy loam that make up 10 to 15 percent of the acreage.

This soil is used for irrigated alfalfa, small grains, and improved pasture. Uncultivated areas are used for pasture or range, and they provide some wildlife habitat. (Capability unit IVe–2, irrigated)

Timmerman gravelly coarse sandy loam, 1 to 3 percent slopes (TgB).—This soil is on low terraces and alluvial fans. The surface layer is commonly fine gravelly coarse sandy loam, but small areas where it is coarse sandy loam or light loam make up about 20 percent of some mapped areas. Depth to sand and gravel is dominantly 18 inches, but in places it is 13 inches. A small amount of silt and clay is in the upper part of the underlying sand and gravel. A moderately calcareous horizon is above the sand and gravel, and it is about 5 to 12 percent calcium carbonate.

This soil is shallow over sand and gravel and is somewhat excessively drained. Permeability is rapid, and the available water capacity is less than 3.75 inches. The organic-matter content and fertility are low or very low. Runoff is slow. Water erosion and soil blowing are moderate to severe hazards. Areas where slopes are less than 1 percent make up as much as 10 to 15 percent of some mapped areas.

This soil is used for irrigated alfalfa, small grains, and improved pasture. (Capability unit VIe-4, irrigated)

Timmerman gravelly coarse sandy loam, 3 to 12 percent slopes (TgD).—This soil is on alluvial fans and terraces. The upper part of the underlying sand and gravel contains a small amount of silt and clay. A moderately calcareous horizon is above the sand and gravel, and it is about 5 to 12 percent calcium carbonate. Depth to sand and gravel is 12 to 17 inches in about 20 percent of the acreage.

This soil is somewhat excessively drained. Permeability is rapid, and the available water capacity is less than 3.75 inches. The organic-matter content and fertility are low or very low. Runoff is slow. Soil blowing and water erosion are moderate to severe hazards.

Most areas are used for dryland pasture, range, or wildlife habitat. Some areas are used for irrigated small grains, alfalfa, and improved pasture. (Capability unit VIe-4, irrigated; unit VIe-2, dryland pasture or range)

Trevino Series

The Trevino series consists of shallow, medium-textured, nearly level to strongly sloping soils. These soils formed in a thin layer of loess and basaltic residuum underlain by basalt. Trevino soils occur mostly on uplands south and southeast of Nampa in Canyon County. The vegetation is mainly big sagebrush, cheatgrass, wild mustard, bluebunch wheatgrass, needle-and-thread, Sandberg bluegrass, and squirreltail. Trevino soils are associated with Scism and Minidoka soils.

Elevation ranges from 2,250 to 2,900 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 67° to 70°. The frost-free season is 145 to 165 days. Annual precipitation is 8 to 11 inches, including 1 to 3 feet of snowfall. Summers are dry.

Trevino soils are used for irrigated small grains, alfalfa, corn, and improved pasture. Uncultivated areas are used for pasture, range, and wildlife habitat.

Trevino silt loam, 1 to 3 percent slopes (TrB).—This soil is on uplands.

In a typical profile the surface layer is friable, light brownish-gray and pale-brown silt loam about 5 inches thick. The subsoil is pale-brown, friable silt loam that has a blocky structure and that extends to a depth of about 8 inches. Below this is moderately calcareous, very pale brown silt loam that extends to a depth of about 13 inches. The next layer is white loam about 5 inches thick. It is underlain by basalt bedrock.

Representative profile, 475 feet west and 1,950 feet south of the northeast corner of sec. 11, T. 1 N., R. 2 W., about 4 miles north of Melba in Canyon County, in native range:

A1—0 to 3 inches, light brownish-gray (10YR 6/2) silt loam (1 to 2 percent fine gravel), dark grayish brown

(10YR 4/2) when moist; weak and moderate, thin, platy structure parting to weak, very fine and fine, granular; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots, and few coarse roots; many very fine interstitial pores; noncalcareous; neutral; abrupt, smooth boundary.

A3—3 to 5 inches, pale-brown (10YR 6/3) silt loam (some fine gravel), dark grayish brown (10YR 4/2 when moist; weak, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots, and few medium and coarse roots; few very fine interstitial pores; noncalcareous; mildly alkaline; clear, smooth boundary.

B2—5 to 8 inches, pale-brown (10YR 6/3) heavy silt loam (some fine gravel), brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to weak and moderate, medium, subangular blocky; hard, friable, slightly sticky and slightly plastic; very thin patchy clay films on vertical ped surfaces; plentiful very fine and fine roots, and few medium and coarse roots; common fine tubular pores; noncalcareous; mildly alkaline; abrupt, smooth boundary.

C1ca—8 to 13 inches, very pale brown (10YR 7/3) silt loam (5 to 8 percent fine gravel and cobblestones), brown (10YR 5/3) when moist; weak, medium and fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few nodules of soil material; few fine, medium, and coarse roots; many fine tubular pores; few chips or fragments of hard, firm, very weakly cemented caliche; moderately calcareous; moderately alkaline; clear, smooth boundary.

IIC2ca—13 to 18 inches, white (10YR 8/2) light loam (10 to 12 percent gravel), pale brown (10YR 6/3) when moist; massive soil material in coarse lenses or plates; matrix is soft, very friable, slightly sticky and slightly plastic; several dense hardpan lenses less than 2 millimeters thick; roots are matted on top of the lenses and soil in immediate area is very pale brown (10YR 8/3) and brown (10YR 5/3) when moist; moderately calcareous; moderately alkaline; clear, wavy boundary.

IIR—18 inches, basalt bedrock; lime coated on upper boundary.

The surface layer is dominantly silt loam, but in a few small areas it is loam or gravelly loam. A few stones commonly are scattered on the surface and in the soil profile. Hue is chiefly 10YR, but it ranges to 2.5Y. The Ap horizon is light brownish gray to pale brown when dry and dark grayish brown to brown when moist. The B horizon is dominantly silt loam, but in places it is loam. Depth to calcareous layers ranges from 8 to 12 inches. The calcium carbonate content of the Cca horizon is commonly less than 15 percent; it is greater where the Cca horizon is less than 6 inches thick. Depth to bedrock ranges from 14 to 20 inches.

This soil is shallow, well drained, and moderately permeable. It has less than 5.0 inches available water capacity. The organic-matter content is low, and the fertility is high. Runoff is medium, and erosion is a moderate hazard.

Areas where slopes are less than 1 percent make up 5 to 10 percent of the acreage. Rock outcrops make up less than 2 percent, and areas of Potratz soils less than 10 percent of the acreage.

This soil is used for irrigated corn, alfalfa, red clover, small grains, and improved pasture. (Capability unit IVe–4, irrigated)

Trevino silt loam, 3 to 12 percent slopes (TrD).—This soil is similar to Trevino silt loam, 1 to 3 percent slopes, except that depth to bedrock ranges from 10 to 20 inches. Runoff is medium to rapid, and erosion is a very severe hazard. Bedrock crops out in less than 2 percent of the acreage, and areas of Potratz soils make up 5 to 10 percent of some mapped areas.

This soil is used for irrigated small grains, improved pasture, and alfalfa hay. Corn can be grown occasionally in a cropping system that includes grass and legumes. (Capability unit IVe–10, irrigated)

Trevino very rocky loam, 0 to 20 percent slopes (TkE).—Depth to basalt bedrock is 5 to 20 inches. Bedrock is exposed in about 10 to 30 percent of the acreage. These areas of exposed bedrock are 30 to 100 feet apart and they make tillage impractical. Runoff is medium to rapid, and erosion is a moderate to severe hazard.

This soil is used for dryland pasture or range. The vegetation is mainly cheatgrass, wild mustard, Russian-thistle, and big sagebrush. (Capability unit VIs–5, dryland pasture or range)

Truesdale Series

The Truesdale series consists of level to sloping, well-drained, moderately coarse textured soils that are moderately deep over a cemented layer. These soils are on slightly dissected high and medium terraces near Sunnyslope and Central Cove in Canyon County. They formed in alluvium or lacustrine sediments that consist of mixed mineral material and that contain wind-laid material in places. The vegetation in uncultivated areas is big sagebrush, cheatgrass, annual weeds, and grasses. Truesdale soils are associated with Jacquith and Turbyfill soils.

Elevation ranges from 2,200 to 2,700 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 70° to 72°. The frost-free season is 150 to 160 days. Annual precipitation is 7 to 11 inches, including 0.5 to 2 feet of snowfall. Summers are dry.

Truesdale soils are used mostly for irrigated small grains, vegetables, corn, sugar beets, alfalfa, pasture grasses, and a few apple and peach orchards. Small areas of nonirrigated soils are used for pasture or range or for wildlife habitat.

Truesdale fine sandy loam, 3 to 7 percent slopes (TsC).—This soil is on slightly dissected upland terraces.

In a typical profile the surface layer is light brownish-gray fine sandy loam about 3 inches thick. The subsoil is very friable, light brownish-gray fine sandy loam about 15 inches thick. The next layer, extending to a depth of about 24 inches, is moderately calcareous, light brownish-gray fine sandy loam. Below this is a layer of weakly cemented, strongly calcareous, light-gray fine sandy loam about 8 inches thick. This is underlain by light-gray sandy loam.

Representative profile 900 feet east and 440 feet north of the southwest corner of the SE¼ sec. 5, T. 3 N., R. 4 W., about 3.5 miles east of Homedale in Canyon County, in a pasture:

A1—0 to 3 inches light brownish-gray (10YR 6/2) light fine sandy loam, dark grayish brown (10YR 4/2) when moist; weak, fine and medium, granular structure; soft, very friable, slightly sticky and nonplastic; abundant very fine and fine roots; noncalcareous; mildly alkaline; abrupt, smooth boundary.

B2—3 to 18 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; very weak, medium, subangular blocky structure; soft, very friable, slightly sticky and nonplastic; abundant very fine and fine roots; slightly calcareous; mildly alkaline; gradual, smooth boundary.

C1ca—18 to 24 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when

moist; massive; slightly hard, firm, slightly sticky and nonplastic; abundant very fine and fine roots; few fine tubular pores; about 5 percent weakly cemented krotovinas that have lime splotches and coatings on surface; few fine lime veins throughout; moderately calcareous; moderately alkaline; abrupt, smooth boundary.

C2casi—24 to 32 inches, light-gray (10YR 7/2) light fine sandy loam, grayish brown (10YR 5/2) when moist; massive; weakly cemented; 3 to 5 thin, less than 2 millimeters thick, horizontal lenses of indurated lime-silica cementation that are 0.5 to 3 inches apart and are concentrated in the upper part of the horizon; layer of brown (7.5YR 5/3) organic staining 2 to 6 millimeters thick above the indurated plates; matrix is very hard, very firm, nonsticky and nonplastic; about 30 to 50 percent krotovinas that are light brownish gray (10YR 6/2) when dry and have a slightly calcareous interior; many lime splotches and veins; strongly calcareous; moderately alkaline; clear, smooth boundary.

C3ca—32 to 50 inches, light-gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) when moist; massive; hard, firm, slightly sticky and nonplastic; few fine tubular pores; strongly calcareous; strongly alkaline.

The A horizon is dominantly fine sandy loam, but in small areas it is sandy loam, loamy fine sand, or gravelly sandy loam. It is light brownish gray, grayish brown, or pale brown when dry and dark grayish brown, very dark grayish brown, or brown when moist. The uppermost 1 to 4 inches commonly has weak, very fine or fine, granular structure, but in a few places it has weak platy structure or is massive.

The B horizon ranges from weak, medium or coarse, subangular blocky or very weak, very fine, granular in structure to nearly massive. The A and B horizons are commonly noncalcareous; where disturbed they are calcareous.

A moderate or strong Cca horizon has its upper boundary at a depth of 12 to 20 inches; it contains some accumulated lime. The Cca horizon is dominantly massive, but it contains 1 to 15 percent hard or very hard nodules. The C horizon above the duripan is dominantly fine sandy loam or sandy loam, but it is coarse sandy loam or gravelly sandy loam in places. The depth to the duripan ranges from 20 to 40 inches, but it is 24 to 36 inches in most areas. The A and C horizons range from neutral to mildly alkaline, and the Cca horizon and the duripan range from moderately to strongly alkaline.

This soil is well drained and moderately deep over a cemented layer. Permeability is moderately rapid to the cemented layer, where it is slow or very slow. The available water capacity is 3.75 to 5 inches. The organic-matter content is low, and the fertility is moderate. Runoff is medium, and erosion is a very severe hazard.

Included in mapping are areas of Turbyfill soils, which do not have a duripan, and of Jacquith soils, which are sandy. These soils make up 10 to 15 percent of some mapped areas.

This soil is used for fruit trees, forage crops, hay, and small grains. Noncultivated areas are used for pasture or range and for wildlife habitat. (Capability unit IVe–2, irrigated; windbreak suitability group 2)

Truesdale fine sandy loam, 0 to 1 percent slopes (TsA).—This soil is similar to Truesdale fine sandy loam, 3 to 7 percent slopes, except that depth to the cemented layer is commonly 36 inches. Runoff is slow, and normally there is little or no erosion hazard. Soil blowing is a severe hazard on bare soil in spring. Included in mapping are areas of Turbyfill and Jacquith soils that make up 10 to 15 percent of some mapped areas.

This soil is used for irrigated alfalfa, corn, vegetables, small grains, and improved pasture. (Capability unit IIIs–1, irrigated; windbreak suitability group 1)

Truesdale fine sandy loam, 1 to 3 percent slopes (TsB).—This soil is on upland terraces. Except for slopes, it is similar to Truesdale fine sandy loam, 3 to 7 percent slopes. Runoff is slow to medium, and erosion is a moderate hazard. Soil blowing is a severe hazard on bare soil in spring. Included in mapping are areas of Turbyfill and Jacquith soils that make up 10 to 15 percent of some mapped areas.

This soil is used for irrigated small grains, corn, red clover, vegetables, and improved pasture. Alfalfa is grown in short rotations, and a few sites are suited to apple and peach orchards. (Capability unit IIIe–7, irrigated; windbreak suitability group 1)

Truesdale fine sandy loam, 7 to 12 percent slopes (TsD)—This soil is on edges of terraces and in drainageways. It is similar to Truesdale fine sandy loam, 3 to 7 percent slopes, but depth to the cemented layer is commonly 24 inches. Runoff is medium to rapid, and erosion is a very severe hazard.

Surface soil has been removed from many areas through erosion and land smoothing and has been deposited in thick layers on some low-lying soils. Spots from which the surface soil has been removed are calcareous in the plow layer. These spots make up 20 percent of some mapped areas.

This soil is used for small grains, improved pasture, and hay crops. A few sites are suited to apple and peach orchards. Noncultivated areas are used for pasture or range and for wildlife habitat. (Capability unit IVe–2, irrigated; windbreak suitability group 2)

Turbyfill Series

The Turbyfill series consists of well-drained, nearly level to strongly sloping, moderately coarse textured soils. These soils formed in alluvium or lacustrine sediments derived mostly from quartzitic, granitic, rhyolitic, and basaltic material. The Turbyfill soils occur near Sunnyslope, Central Cove, and Apple Valley in Canyon County and on low terraces of the Snake River near Marsing and Homedale in Owyhee County. The vegetation in noncultivated areas is big sagebrush, cheatgrass, annual weeds, and grasses. Turbyfill soils are associated with Bahem, Garbutt, and Marsing soils.

Elevation ranges from 2,200 to 3,000 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 70° to 73°. The frost-free season is 145 to 160 days. Annual precipitation is 7 to 11 inches, including 0.5 to 2 feet of snowfall. Summers are dry.

Turbyfill soils are used mostly for irrigated small grains, vegetables, vegetable seed, corn, potatoes, sugar beets, alfalfa hay, pasture grasses, and orchards. Nonirrigated soils are used for pasture or range.

Turbyfill fine sandy loam, 0 to 1 percent slopes (TuA).—This soil is on level terraces.

In a typical profile the surface layer is light brownish-gray fine sandy loam about 3 inches thick. The next layer is very friable, light brownish-gray fine sandy loam that extends to a depth of about 21 inches. Below this is very friable, light-gray fine sandy loam that contains many nodules of soil material. This is underlain by light-gray fine sandy loam.

Representative profile, 900 feet north and 50 feet west of the southeast corner of sec. 15, T. 1 N., R. 3 W., in Canyon County, in rangeland:

A1—0 to 3 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist;

weak, very fine, granular structure; soft, very friable, nonsticky and nonplastic; abundant very fine, fine, and medium roots; very slightly calcareous; moderately alkaline; clear, wavy boundary.

C1—3 to 21 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; abundant very fine, fine, and medium roots; few very fine tubular pores; moderately calcareous; moderately alkaline; gradual, smooth boundary.

C2ca—21 to 32 inches, light-gray (10YR 7/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; soft very friable, nonsticky and nonplastic; abundant very fine and fine roots; common very fine tubular pores; very few hard nodules or cicada krotovinas that have slight segregations of lime on the surface; moderately calcareous; moderately alkaline; clear, smooth boundary.

C3ca—32 to 47 inches, light-gray (10 YR 7/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonstocky and nonplastic; about 40 percent nodules or cicada krotovinas; nodules are hard, ½ to ¾ inch in diameter, and ½ to 1 inch long; abundant very fine and fine roots between nodules; few roots inside the nodules; common very fine tubular pores; moderately calcareous; strongly alkaline; clear, smooth boundary.

IIC4—47 to 60 inches, light-gray (10YR 7/2) light fine sandy loam, brown (10YR 4/3) when moist; massive; soft, very friable; abundant very fine and fine roots; common very fine pores; moderately calcareous; moderately alkaline.

The A horizon is dominantly fine sandy loam and sandy loam, but in some areas it is gravelly sandy loam or loamy fine sand. It is light brownish gray to light gray when dry and grayish brown to dark grayish brown when moist. Where disturbed the profile is commonly mildly to moderately alkaline and calcareous. In places it is noncalcareous in the upper part. The C horizon to a depth of 40 inches is fine sandy loam, sandy loam, coarse sandy loam, or gravelly sand loam.

This soil is well drained, very deep, and moderately permeable. The available water capacity is 5 to 7.5 inches. The organic-matter content is low or moderately low, and the fertility is moderate to high. Runoff is slow. Soil blowing and water erosion are slight hazards. Included in mapping are areas of Feltham and Cencove soils that make up 10 to 15 percent of the acreage.

This soil is used for irrigated alfalfa, corn, small grains, sugar beets, and potatoes. (Capability unit I–1, irrigated; windbreak suitability group 1)

Turbyfill fine sandy loam, 1 to 3 percent slopes (TuB).—This soil is similar to Turbyfill fine sandy loam, 0 to 1 percent slopes, except that it is underlain by bedrock at a depth of 40 inches in areas southwest of Melba in Canyon County. Runoff is slow to medium, and the hazard of erosion from irrigation water or soil blowing is moderate.

This soil is used for irrigated alfalfa, corn, small grains, sugar beets, and potatoes. (Capability unit IIe–3, irrigated; windbreak suitability group 1)

Turbyfill fine sandy loam, 3 to 7 percent slopes (TuC).—This soil is on intermediate terraces and alluvial fans. It is similar to Turbyfill fine sandy loam, 0 to 1 percent slopes, but it is underlain by bedrock at a depth of 40 inches in areas southwest of Melba in Canyon County. Runoff is medium to rapid, and erosion is a severe hazard.

This soil is used for irrigated alfalfa, corn, small grains, and potatoes. Where exposure and air drainage are favorable, this soil is well suited to orchards. (Capability unit IIIe–3, irrigated; windbreak suitability group 2)

Turbyfill fine sandy loam, 7 to 12 percent slopes (TuD).—This soil is on terrace edges and alluvial fans. It is similar to Turbyfill fine sandy loam, 0 to 1 percent slopes, except that it is slightly more coarse textured and has low available water capacity. Runoff is rapid, and erosion is a very severe hazard.

Slightly gravelly areas make up 5 to 10 percent of some mapped areas. Included in mapping are areas of Cencove soils that make up 10 to 15 percent of the acreage.

This soil is used mostly for alfalfa and other legumes, small grains, irrigated pasture, and orchards. (Capability unit IVe–2, irrigated; windbreak suitability group 2)

Turbyfill fine sandy loam, 12 to 30 percent slopes (TuE).—This soil occurs in long narrow strips along the base of terrace escarpments. The profile of this soil is more variable than that of Turbyfill fine sandy loam, 0 to 1 percent slopes. Lenses of gravel are commonly mixed with laminated silts in the underlying material. Depth to laminated silts varies from 40 inches on the upper part of slopes to more than 5 feet on the lower part. The available water capacity is low. Runoff is very rapid, and erosion is a severe hazard, especially in irrigated areas.

This soil is used mostly for range. The vegetation is big sagebrush and cheatgrass. Some areas are irrigated to orchards and to hay crops. (Capability unit VIe–1, irrigated; unit VIe–2, dryland pasture or range)

Turbyfill fine sandy loam, deep over hardpan, 0 to 1 percent slopes (TvA).—This soil is similar to Turbyfill fine sandy loam, 0 to 1 percent slopes, except that it has a cemented layer at a depth of 40 to 60 inches. This layer is about 8 to 10 inches thick, is mostly weakly cemented, and has indurated lenses 1 to 2 millimeters thick. The lenses are about 2 to 10 centimeters apart and are concentrated in the upper part of the cemented layer. The cemented layer is almost impermeable to water, and it prevents the downward extension of roots. Where this soil is excessively irrigated, a perched water table may occur. Growth of deep-rooted fruit trees and alfalfa is somewhat restricted.

This soil is used for irrigated small grains, corn, vegetables, sugar beets, and alfalfa. (Capability unit IIs–2, irrigated; windbreak suitabality group 1)

Turbyfill fine sandy loam, deep over hardpan, 1 to 3 percent slopes (TvB).—This soil is similar to Turbyfill fine sandy loam, 0 to 1 percent slopes, except that it has a cemented layer at a depth of 40 to 60 inches. The cemented layer is underlain by stratified sandy loam and loamy sand sediments. Runoff is slow to medium, and the hazard of erosion from irrigation water or soil blowing is moderate.

This soil is used for irrigated potatoes, sugar beets, corn, small grains, and alfalfa. (Capability unit IIe–3, irrigated; windbreak suitability group 1)

Turbyfill fine sandy loam, deep over hardpan, 3 to 7 percent slopes (TvC).—This soil occurs as long narrow strips at the edges of drainageways and terraces. It is similar to Turbyfill fine sandy loam, 0 to 1 percent slopes, except that it has a duripan at a depth of 40 to 60 inches. Runoff is medium, and erosion is a severe hazard.

This soil is used for irrigated alfalfa, corn, small grains, potatoes and orchards. (Capability unit IIIe–3, irrigated; windbreak suitability group 2)

Vanderhoff Series

The Vanderhoff series consists of moderately deep, well-drained, very gently sloping to very steep, medium-textured soils. These soils formed in residuum and colluvium

derived from consolidated siltstone that are mixed with loess in places. They occur on uplands and on terraces and breaks near the Snake River. The vegetation is sparse and consists mainly of shadscale and cheatgrass. Big sagebrush, budsage, and Indian ricegrass grow in places. Vanderhoff soils are associated with Garbutt, Marsing, and Nannyton soils.

Elevation ranges from 2,200 to 2,900 feet. The average annual temperature is 50° to 52° F., and the average summer temperature is 68° to 75°. The frost-free season is 145 to 160 days. Annual precipitation is 6 to 8.5 inches, including 5 to 15 inches of snowfall. Summers are dry.

Gently sloping Vanderhoff soils are used for irrigated small grains, corn, alfalfa, sugar beets, and improved pasture. Steep, very cobbly, stony, and gravelly soils are used for dryland pasture and range and for wildlife habitat.

Vanderhoff loam, 12 to 30 percent slopes (VaE).—This soil is on uplands.

In a typical profile the surface layer is light-gray loam about 5 inches thick. Below this, extending to a depth of about 16 inches, is friable, slightly calcarcous, light-gray loam. The next layer is firm, moderately calcareous, light-gray loam about 14 inches thick. It is underlain by weakly cemented, white siltstone.

Representative profile, 685 feet south and 75 feet west of the northwest corner of the northeast quarter of the SW¼ sec. 32, T. 3 N., R. 5 W., about 7 miles west of Marsing in Owyhee County, in native range:

A1—0 to 5 inches, light-gray (2.5Y 7/2) loam, dark grayish brown (2.5Y 5/2) when moist; very weak, thin, platy and very weak, very fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; many fine and very fine vesicular pores; slightly calcareous; moderately alkaline; gradual, smooth boundary.

C1—5 to 16 inches, light-gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) when moist; very weak, fine, subangular blocky structure; soft, friable, slightly sticky and nonplastic; plentiful fine roots; common very fine pores; slightly calcareous; moderately alkaline; gradual, smooth boundary.

C2ca—16 to 30 inches, light-gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) when moist; massive lacustrine laminations occur in weak or moderate, medium, plates; hard, firm, slightly sticky and nonplastic; few fine roots; few very fine tubular pores; moderately calcareous; moderately alkaline; gradual, smooth boundary.

IIR—30 inches, white (2.5Y 8/2) siltstone, light yellowish brown (2.5Y 6/3) when moist; siltstone occurs in strong, coarse and very coarse plates; very hard, very firm; no roots; very few, very fine tubular pores; few, fine, black manganese stains and few, faint, pale-yellow mottles in cracks; slightly calcareous; mildly alkaline.

The A horizon is dominantly loam, but in small areas it is silt loam. In places gravel, cobblestones, or stones have been washed onto the surface. The A horizon is light gray to light brownish gray when dry and grayish brown, dark grayish brown, or brown when moist. The C horizon is mostly loam, silt loam, or very fine sandy loam. In places it contains fragments of bedrock. Depth to siltstone ranges from 20 to 40 inches, but is about 24 inches in most areas.

This soil is moderately deep, well drained, and moderately permeable. The available water capacity is 3.75 to 5 inches. The organic-matter content is low or very low, and the fertility is moderate. Runoff is rapid to very rapid, and erosion is a severe hazard, especially where the soil is irrigated.

A few areas at the lower part of slopes are irrigated for pasture and alfalfa. Most areas are used for dryland pasture or range or for wildlife habitat. (Capability unit VIe–1, irrigated; unit VIe–2, dryland pasture or range)

Vanderhoff loam, 1 to 3 percent slopes (VaB)—This soil is on uplands and terraces. It is similar to Vanderhoff loam, 12 to 30 percent slopes, except that it is gently sloping, the underlying material is thicker, and depth to siltstone is about 36 inches.

The available water capacity is 5.0 to 7.5 inches. Fertility is high, and the organic-matter content is low. Runoff is slow to medium, and erosion is a moderate hazard. Included in mapping are areas of Garbutt soils that make up 10 to 15 percent of some mapped areas.

This soil is used for irrigated alfalfa, sugar beets, corn, small grains, and improved pasture. (Capability unit IIIe–6, irrigated; windbreak suitability group 1)

Vanderhoff loam, 3 to 7 percent slopes (VaC).—This soil is on uplands and terraces. It is similar to Vanderhoff loam, 12 to 30 percent slopes, except that the underlying material is thicker, depth to siltstone is about 36 inches, and slopes are gentle.

The available water capacity is 5.0 to 7.5 inches. Fertility is high, and organic-matter content is low. Runoff is medium to rapid, and erosion is a severe hazard.

This soil is used for irrigated alfalfa, small grains, improved pasture, and corn. (Capability unit IIIe–8, irrigated; windbreak suitability group 2)

Vanderhoff loam, 7 to 12 percent slopes (VaD).—This soil is on upland terraces and edges of drainageways in Owyhee County, near the southern boundary of the survey area. Except for slope this soil is similar to Vanderhoff loam, 12 to 30 percent slopes. Gravel, cobblestones, or stones are commonly on the surface and in the profile.

Permeability is moderate, and the available water capacity is 3.75 to 7.5 inches. Runoff is rapid, and erosion is a very severe hazard. Included in mapping are areas of Garbutt and Marsing soils that make up to 10 percent of some mapped areas.

This soil is used for irrigated alfalfa, small grains, and pasture. Corn can be grown occasionally. (Capability unit IVe–1, irrigated; windbreak suitability group 2)

Vanderhoff soils and Badland, 20 to 80 percent slopes (VbG).—This unit consists of Vanderhoff soils that have 30 to 60 percent slopes, and Badland that has 20 to 80 percent slopes. Badland, which is described under that heading, is barren and has very little or no soil over siltstone. The Vanderhoff soils are cobbly, gravelly, or stony in places. They are dominant in this mapping unit, and they make up all of several mapped areas. Badland occurs mainly on steep south-facing slopes, and it also makes up all of some mapped areas.

The Vanderhoff soils are moderately deep, well drained, gravelly, and moderately permeable. The available water capacity is low. Runoff is rapid to very rapid, and erosion is a severe hazard.

The soils of this mapping unit are used for dryland pasture or range. They also provide some wildlife habitat. The soils should be protected to prevent further erosion. (Vanderhoff soils are in Capability unit VIe–2, dryland pasture or range; Badland is in Capability unit VIIIs–1)

Very Stony Land

Very stony land (Ve) consists of areas where 50 to 90 percent of the surface is covered with stones and boulders, mostly of basalt. This land type occurs mainly on low terraces near the Snake River south of Melba. Slopes are generally less than 20 percent. Steeper areas occur on the breaks between upland terraces near Dry Lake.

Included in mapping are a few small areas where stones and boulders cover only 15 to 50 percent of the surface. Also included are steep spots where stones and boulders cover more than 90 percent of the surface. The soils below and between the stones and boulders are similar to soils of the Cencove and Vanderhoff series.

These areas provide some wildlife habitat. The vegetation is mainly cheatgrass, wild mustard, Russian-thistle, big sagebrush, and greasewood. (Capability unit VIIIs-1)

Vickery Series

The Vickery series consists of well-drained, light-colored, medium-textured soils that have an indurated or strongly cemented layer at a depth of 20 to 40 inches. These soils formed in a thin mantle of wind-laid silt deposited over unconsolidated sediments. The sediments derived from intrusive acid igneous rocks. The sediments are high in content of quartz, feldspar, and mica and are mostly noncalcareous. These soils occur on uplands near Lake Lowell and near the Black Canyon irrigation project in the northern and northeastern parts of Canyon County. The native vegetation was mainly bunchgrasses, big sagebrush, and herbaceous plants. Vickery soils are associated with Chilcott, Elijah, and Marsing soils.

Elevation ranges from 2,600 to 3,000 feet. The average annual temperature is about 51° F., and the average summer temperature is about 71°. The frost-free season is 135 to 150 days. Annual precipitation is 9 to 11 inches.

Vickery soils are used mostly for irrigated small grains, corn, clover, sugar beets, alfalfa, and improved pasture. Some areas are used for range or pasture.

Vickery-Marsing silt loams, 3 to 7 percent slopes (VmC).—This mapping unit is about 60 percent Vickery silt loam and 40 percent Marsing silt loam. These soils occupy similar positions on the landscape. They occur on the uplands near Lake Lowell. The Marsing soil does not have a strongly cemented or indurated layer. It is described under the heading "Marsing Series."

In a typical profile the Vickery soil has a surface layer that is light brownish-gray silt loam about 4 inches thick. Below this is friable silt loam about 13 inches thick; it is light brownish gray in the upper part and pale brown in the lower part. The next layer, extending to a depth of 23 inches, is moderately calcareous, friable, very pale brown silt loam. The next layer is firm, very pale brown loam about 7 inches thick. Below this is very pale brown fine sandy loam about 4 inches thick. The next layer, extending to a depth of about 47 inches, is cemented. It is underlain by a very pale brown coarse sand.

Representative profile of Vickery silt loam, 3 to 7 percent slopes, 2,350 feet east and 2,550 feet north of the southwest corner of sec. 5, T. 5 N., R. 2 W., about 6 miles north of Middleton in Canyon County, in native range:

A1—0 to 4 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; moderate, very thin and thin, platy structure parting to weak, very fine, granular; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots; many very fine interstitial pores; noncalcareous; neutral; abrupt, smooth boundary.

B1—4 to 7 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, medium and coarse, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many very fine tubular pores; mildly alkaline; clear, smooth boundary.

B2—7 to 13 inches, pale-brown (10YR 6/3) heavy silt loam, brown (7.5YR 4/2) when moist; weak, medium and coarse, prismatic structure parting to weak, medium, subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many very fine tubular pores; noncalcareous; mildly alkaline; clear smooth boundary.

B3—13 to 17 inches, pale-brown (10YR 6/3), silt loam, dark grayish brown (10YR 4/2) when moist; coarse prismatic structure parting to weak, medium, subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; noncalcareous; mildly alkaline; clear, wavy boundary.

C1ca—17 to 23 inches, very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; moderately calcareous; moderately alkaline; abrupt, wavy boundary.

IIC2ca—23 to 30 inches, very pale brown (10YR 8/3) loam, pale brown (10YR 6/3) when moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; many fine chips of duripan; strongly calcareous; moderately alkaline; clear, wavy boundary.

IIIC3ca—30 to 34 inches, very pale brown (10YR 8/3) fine sandy loam, brown (10YR 5/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; strongly calcareous; many sand-sized bits of duripan; moderately alkaline; abrupt, smooth boundary.

IIIC4casim—34 to 47 inches, very pale brown (10YR 8/3) indurated, silica-calcium carbonate cemented duripan, pale brown (10YR 6/3) and very pale brown (10YR 7/3) when moist; indurated plates and fragments about ¼ to 3 inches thick having a thin, 1 to 5 millimeters, opal-like crust on the upper surface; strongly calcareous; moderately alkaline; abrupt, wavy boundary.

IVC5—47 to 60 inches, very pale brown (10YR 7/3) coarse sand, pale brown (10YR 6/3) when moist; single grain; loose, nonsticky and nonplastic; slightly calcareous; moderately alkaline.

The A horizon is mostly silt loam, but in small areas it is loam or is gravelly. The Ap horizon is light brownish gray when dry and dark grayish brown or grayish brown when moist. The B horizon is typically silt loam, but it ranges to loam and is slightly gravelly in places. The B horizon is dark grayish brown, very dark grayish brown, or brown when moist. It has weak prismatic or weak or moderate, medium or fine, subangular blocky structure. The profile is commonly noncalcareous to a depth of 15 to 25 inches. The duripan is underlain by stratified medium-textured deposits or by sand and gravel that is dominantly granitic.

This soil is moderately deep over a duripan. Permeability is moderate to the duripan, where it is very slow or slow. The available water capacity is 5 to 7.5 inches. The soil is well drained and free of salts and alkali. The duri-

pan is impermeable except through cracks or fractures. The organic-matter content is low or moderately low, and fertility is high. Runoff is medium to rapid, and erosion is a severe hazard.

Included in mapping is a soil similar to Vickery silt loam, 3 to 7 percent slopes, in which depth to calcareous material is 10 to 14 inches and depth to the cemented layer is 14 to 20 inches. In some areas, subsoil material has been mixed into the plow layer, and in places underlying material is also mixed into the plow layer. These areas make up 10 to 15 percent of the acreage.

Through land smoothing, part of the surface layer has been removed from high spots and the material has been deposited on low spots. Spots from which surface soil has been removed make up to 10 percent of some mapped areas. In some of these spots, the plow layer is calcareous. Included in mapping are small rounded slick spots of Sebree soils that make up 2 to 4 percent of the acreage.

The soils of this unit are used for irrigated small grains, corn, sugar beets, alfalfa, and improved pasture. (Capability unit IIIe–8, irrigated; windbreak suitability group 2)

Vickery-Marsing silt loams, 1 to 3 percent slopes (VmB).—This mapping unit is about 60 percent Vickery silt loam and 40 percent Marsing silt loam. The Marsing soil is described under the heading "Marsing Series." Both soils are on uplands near Lake Lowell. Runoff is slow to medium, and erosion is a moderate hazard.

Included in mapping are spots where surface soil has been removed through land smoothing or erosion. In places these spots are calcareous in the plow layer. Also included is a soil in which depth to the cemented layer is 14 to 20 inches. These inclusions make up 10 to 15 percent of the acreage. Small rounded slick spots of Sebree soils make up 5 percent of acreage.

The soils of this unit are used for irrigated small grains, sugar beets, corn, alfalfa, and improved pasture. (Capability unit IIIe–6, irrigated; windbreak suitability group 1)

Vickery-Marsing silt loams, 7 to 12 percent slopes (VmD).—This mapping unit is about 50 percent Vickery silt loam and 50 percent Marsing silt loam. These soils occur on upland terraces near Lake Lowell. They are well drained. The Vickery soil is moderately deep over a cemented layer. The Marsing soil is moderately deep over sand and gravel. The available water capacity is 5 to 7.5 inches. Permeability is moderate in both soils except that it is very slow in the cemented layer of the Vickery soil, and it is very rapid in the underlying sand and gravel of the Marsing soil. Fertility is high, and organic-matter content is low to medium. Runoff is rapid, and erosion is a very severe hazard.

Included in mapping is a soil similar to Vickery silt loam, 7 to 12 percent slopes, in which depth to calcareous material is 10 to 12 inches and depth to the cemented layer is 14 to 20 inches. In about 15 percent of the acreage, subsoil material and, in places, underlying material have been mixed into the plow layer.

The soils of this mapping unit are used for irrigated small grains, corn, alfalfa, and improved pasture. Nonirrigated areas are used for pasture or range. (Capability unit IVe–1, irrigated; unit VIe–2, dryland pasture or range; windbreak suitability group 2)

Use and Management of the Soils

This section discusses management of the soils for crops, explains and describes the capability groups in the Area, gives estimated yields for major crops, groups the soils according to their suitability for windbreaks, and discusses their suitability for wildlife.

Irrigation and Drainage

Approximately 95 percent of the Canyon Area is in irrigated farms. Crops cannot be grown without irrigation and only on the river flood plains is enough water available to support natural vegetation other than range grasses and sagebrush.

Water for irrigation is obtained mainly from the Boise River and the Arrowrock, Lucky Peak, and Anderson Ranch reservoirs along that river. Water from the Payette River is pumped over the divide in the Black Canyon Project to farms in the northern part of the Area. Water from the Snake River is pumped to lowlands and high terraces along its course. Farms in the western part of the Canyon Area obtain water from the Owyhee River and from reservoirs in Oregon. Most recently water has been pumped from the Snake River to irrigate several thousand acres southwest of Nampa.

Lake Lowell serves as a storage reservoir. This lake was constructed in 1908 by means of two earth-filled dams that were built to impound water in a broad channel depression formerly called Deer Flats. The reservoir has a capacity of 169,200 acre feet. The water level is maintained by diverting water from the Boise River through the New York canal. Many thousands of acres are irrigated with water from this reservoir.

Methods used to apply water are wild flooding, corrugations, furrows, graded borders, and sprinklers. In recent years efforts have been made to improve irrigation on individual farms by land smoothing, by lining ditches with concrete, and by installing water-control structures, pipelines, and sprinkler systems. Nevertheless, overirrigation continues to be a serious problem. Because costs of labor for careful irrigation are high and the supply of water is abundant, good water management is not commonly practiced.

Drainage is a problem in much of the Canyon Area. It is especially poor in low areas near the Boise River, in an area southeast of Nampa that is subject to artesian flow, and in the Dixie area west of Caldwell. In these areas, overirrigation and seepage from irrigation canals have caused high water tables to form that restrict farm operations and the choice and growth of crops.

The flood plain and low terraces of the Boise River are underlain by unconsolidated geologic materials several hundred feet thick. These materials are quite porous and absorb water readily. The ground water in this area flows generally west toward the Snake River through what is described as a closed plumbing system. Free-running outlets occur only at the surface and at shallow depth, although the system is leaky at great depth.

Before irrigation was introduced, the water table was at shallow depth in the bottom lands and at a depth of 100 to 200 feet beneath terraces and lowlands. Irrigation water diverted to the terraces has caused the level of ground water to rise. Because the soils in the western, lower lying

parts of the Canyon Area generally are slowly permeable, ground water in soils at higher elevations is not drained off rapidly enough by subsurface flow.

Drains can be installed in most areas, and many miles of main and lateral drains and tile lines have been installed. These drains have improved conditions locally, but they have not solved the problem of generally poor drainage and high water tables in the Area.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, all kinds of soil are grouped at three levels, the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife habitat.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply, or to 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 IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–2 or IIIe–2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by Capability Unit

In the following paragraphs, the capability units in the Canyon Area are described and suggestions for the use and management of the soils are given. The units are not numbered consecutively because not all of the units in the statewide system are represented in this Area. The soil series represented in each unit are named, but this does not mean that all the soils of the series are in the unit. To find the capability unit in which a given mapping unit has been placed, refer to the "Guide to Mapping Units" at the back of this survey.

Capability unit I–1, irrigated

This unit consists of level or nearly level, deep and very deep, medium-textured, well-drained soils of the Bahem, Garbutt, Greenleaf, Harpt, Jenness, Nyssaton, Owyhee, Power, Purdam, Scism, and Turbyfill series. These soils are on bottom lands, terraces, and alluvial fans. They have high available water capacity, high fertility, moderate permeability, and low to moderately low organic-matter content. Runoff is slow, and there is little or no erosion hazard. The frost-free season is about 145 to 165 days.

Generally, the soils have few or no limitations to use for crops. In this unit, however, is Greenleaf silty clay loam, 0 to 1 percent slopes, that differs from the other soils. It has moderate or moderately slow permeability, is finer textured and somewhat more difficult to plow, and has a narrower range of moisture content within which it can be tilled without puddling. Also, the growth of some root crops, such as potatoes, is restricted.

The soils in this unit are suited to irrigated row crops, forage crops, grain, pasture, and orchards. Row crops can

Figure 6.—**Irrigating potatoes on Bahem silt loam, 0 to 1 percent slopes. Capability unit I–1, irrigated.**

be grown continuously where fertility is maintained (fig. 6).

All crops respond to phosphorus fertilizer, and all crops except legumes need nitrogen. Organic-matter content can be maintained or increased by returning all crop residues to the soil, by growing crops for green manure, and by including pasture and hay crops in the cropping system.

A suitable cropping system is alfalfa hay for 4 to 7 years followed by an annual crop, such as potatoes, a small grain, or corn, for 4 or 5 years. Another suitable cropping system is alfalfa, clover, and grass for hay or pasture for 3 to 5 years, then corn, silage crops, or sugar beets for 2 to 4 years, followed by 1 to 3 years of small grain. The last year of small grain serves as a nurse crop for a new seeding of alfalfa. Another suitable cropping system is red clover for 2 years, a row crop for 2 years, and a small grain for 1 year.

Irrigation water can be applied by borders, corrugations, and furrows. Corrugations commonly are used for close-growing crops, and furrows are used for row crops and in orchards. Overirrigation can be prevented by applying only enough water to wet the soils evenly to the rooting depth of the crop. Because these soils are nearly level, preparation for irrigation is not difficult.

Capability unit IIe–2, irrigated

This unit consists of very gently sloping, deep and very deep, medium-textured and moderately fine textured, well-drained soils of the Bahem, Garbutt, Greenleaf, Jenness, Nyssaton, Owyhee, Power, Purdam, and Scism series. The Purdam soil has an indurated layer at a depth of 30 to 36 inches. These soils occur on bottom lands, terraces, alluvial fans, and uplands. Generally they have moderate to high available water capacity, moderate permeability, low to moderately low organic-matter content, and high fertility. Runoff is slow to medium, and erosion is a slight to moderate hazard. The frost-free season is about 145 to 165 days.

In some areas the surface layer is silty clay loam and permeability is slow to moderately slow. Soils in these areas have a more restricted range of moisture content in which they can be tilled without damaging soil structure. The growth of root crops, such as potatoes, is somewhat limited in these areas.

The soils in this unit are suited to irrigated row crops, forage crops, grain, pasture, and orchards. Row crops can be grown continuously where fertility is maintained and erosion is controlled.

All crops respond well to phosphorus fertilizer, and all crops except legumes need nitrogen fertilizer. Organic-matter content can be maintained or increased by returning all crop residues to the soil, by growing crops for green manure, and by including pasture and hay crops in the cropping system.

A suitable cropping system is alfalfa, clover, and grass for hay or pasture for 2 to 5 years, then corn, silage crops, or sugar beets for 2 to 3 years, followed by a small grain for 1 to 3 years. A new seeding of legumes and grass is made in the small grain the last year. Another suitable cropping system is red clover for 2 years, a row crop for 2 years, and a small grain for 1 year.

Irrigation water can be applied by borders, corrugations, or furrows. Borders should be graded on slopes of 2 percent and sodded on slopes of 3 percent. Runs should be short on sloping soils because erosion is a great hazard. Sloping soils commonly can be leveled or smoothed for irrigation without damage.

Capability unit IIe–3, irrigated

This unit consists of deep and very deep, well-drained, moderately coarse textured, very gently sloping soils of the Lolalita and Turbyfill series. These soils are on low terraces and alluvial fans. They have moderate available water capacity, moderate to moderately rapid permeability, low to moderately low organic-matter content, and moderate to high fertility. Runoff is slow to medium, and erosion from irrigation water and natural precipitation is a moderate hazard. The frost-free season is about 145 to 165 days.

The soils in this unit are used mainly for fruit trees. Alfalfa, forage crops, grain, and row crops are also grown. Deep-rooted fruit trees and alfalfa grow especially well. Shallow-rooted crops grow well if irrigation is light and frequent and if adequate amounts of fertilizer are applied.

Erosion can be controlled by applying irrigation water carefully. Soil blowing can be controlled by growing alfalfa and grass for cover and by using crop mulches. Organic-matter content can be maintained by growing crops for green manure and by returning crop residues to the soil. Nitrogen and phosphorus fertilizers are needed for good crop growth.

A suitable cropping system is alfalfa for 2 to 5 years, then a row crop for 2 to 4 years, and a small grain or corn for 1 to 3 years.

Irrigation water can be applied by corrugations, furrows, or borders. Short runs help reduce the loss of water and the leaching of plant nutrients. Moderately deep cuts can be made to level these soils for irrigation without seriously limiting the rooting depth.

Capability unit IIw–1, irrigated

This unit consists of deep or very deep, somewhat poorly drained, medium-textured, level to very gently sloping soils of the Draper and Lankbush series. These soils are on bottom lands and low terraces and fans. They have high available water capacity, moderate permeability, moderate to moderately low organic-matter content, and high fertility. Runoff is slow or very slow, and there is little hazard of erosion. The frost-free season is about 145 to 160 days.

Where drained and properly irrigated, these soils are suited to alfalfa, barley, sugar beets, silage crops, and field corn. Row crops can be grown continuously if fertility is maintained. Ditches and short drains generally provide adequate drainage.

A suitable cropping system is sugar beets for 2 years, a small grain or corn for 1 to 3 years, and a green-manure crop for 1 year.

Capability unit IIs–1, irrigated

This unit consists of well-drained, medium-textured and moderately fine textured, nearly level soils of the Elijah, Marsing, Minidoka, Potratz, Power, Purdam, and Sebree series. These soils are on terraces and uplands. They are moderately deep over bedrock, or a hardpan, or sand and gravel, except for Elijah silt loam, shallow, 0 to 1 percent slopes, which is several inches shallower than the other soils. Generally, these soils have moderate available water capacity, moderate permeability, low to moderately low organic-matter content, and high fertility. The Sebree soils have slow permeability and low available water capacity. The Sebree soils have been included in this unit because they occur in complexes with Elijah and Purdam soils and are managed in a similar manner. Runoff is slow or very slow, and there is little or no erosion hazard. The frost-free season is about 145 to 165 days.

The soils in this unit are well suited to row crops, forage crops, grain, and improved pasture (fig. 7). They are used mostly for alfalfa, sugar beets, potatoes, corn, and small grains.

All crops respond to phosphorus fertilizer, and all crops except legumes need nitrogen. Organic-matter content can be maintained or increased by returning crop residues to the soil, by growing crops for green manure, and by including hay and pasture crops in the cropping system.

A suitable cropping system is alfalfa, clover, and grass for hay or pasture for 2 to 5 years, then corn, silage crops, or sugar beets for 2 to 4 years, followed by a small grain for 1 to 3 years. Alfalfa and grass are reseeded with the small grain the last year. Another suitable cropping system is red clover for 2 years, a row crop for 2 years, and a small grain for 1 year.

Irrigation water can be applied by borders, corrugations, or furrows. Frequent, light irrigation is best for these soils. Only shallow cuts commonly can be made to level these soils for irrigation. Deeper cuts reduce the effective rooting depth.

Capability unit IIs–2, irrigated

Only Turbyfill fine sandy loam, deep over hardpan, 0 to 1 percent slopes, is in this unit. This soil is well drained. It occurs on terraces and alluvial fans. Permeability and available water capacity are moderate. Organic-matter content is low or moderately low, and fertility is moderate to high. Runoff is slow or very slow, and there is little hazard of erosion. The frost-free season is 145 to 160 days.

This soil is well suited to irrigated potatoes, corn, onions, and vegetables for seed. Sugar beets, hops, small grains, and hay also are grown.

Nitrogen and phosphorus fertilizers are required for good crop growth. Organic-matter content can be maintained by returning crop residues to the soil, by growing crops for green manure, and by including hay and pasture crops in the cropping system.

A suitable cropping system is alfalfa and grass for hay for 4 or 5 years, then an annual crop, such as potatoes or corn, for 1 to 3 years, followed by a small grain for 1 to 3 years.

Corrugations, borders, or furrows can be used to apply irrigation water. Corrugations are commonly used for close-growing crops, and furrows are used for row crops and in orchards. Light, frequent irrigation is needed.

Capability unit IIIe–2, irrigated

This unit consists of deep to very deep, well-drained, gently sloping soils of the Bahem, Garbutt, Greenleaf, Jenness, Lankbush, Nyssaton, Owyhee, Power, Purdam, and Scism series. The Lankbush soil is moderately coarse textured, and the other soils are medium textured. The Purdam soil has a duripan at a depth of 30 to 36 inches.

These soils are on alluvial fans, terraces, and uplands. They have moderate or moderately slow permeability, moderate to high available water capacity, low to moderately low organic-matter content, and moderate to high fertility. Runoff is medium to rapid, and erosion is a severe hazard. The frost-free season is about 140 to 165 days.

The soils in this unit are suited to irrigated row crops, forage crops, small grains, corn, and pasture. Fruit trees grow well on south-facing slopes where air drainage is good. Crops respond well to nitrogen and phosphorus fertilizers.

A suitable cropping system is alfalfa and grass for hay for 2 to 5 years, then corn, silage crops, sugar beets, or

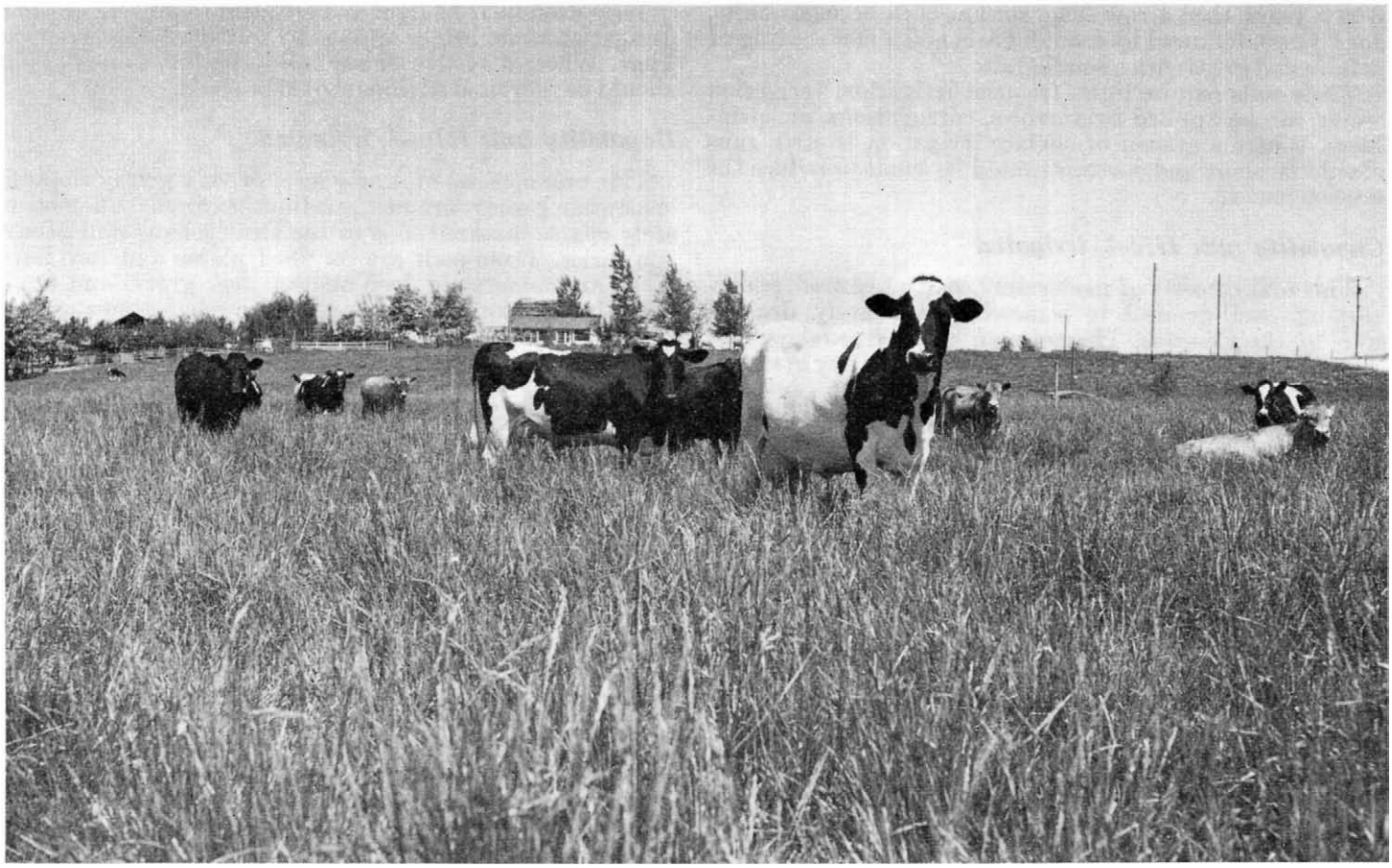

Figure 7.—**Improved pasture on Power-Potratz silt loams, 0 to 1 percent slopes. Capability unit IIs–1, irrigated.**

small grains for 2 years, followed by a new seeding of alfalfa and grass with a small grain.

Sprinkling is the most suitable means of applying irrigation water. Where surface irrigation is used, runs should be short and streams should be small. Erosion can be controlled by light, frequent irrigation and by growing sod or close-growing crops frequently in the cropping system.

Capability unit IIIe–3, irrigated

This unit consists of moderately coarse textured, gently sloping, well-drained, deep to very deep soils of the Lolalita and Turbyfill series. These soils are on alluvial fans and terraces. They have moderate available water capacity, moderate to moderately rapid permeability, low to moderately low organic-matter content, and moderate to high fertility. Runoff is medium to rapid, and erosion is a severe hazard. The frost-free season is 145 to 165 days.

The soils in this unit are well suited to fruit trees and alfalfa. Forage crops, grain, and row crops also are grown.

Nitrogen and phosphorus fertilizers are needed for good crop growth. Soil blowing can be controlled and organic-matter content can be maintained by growing cover crops and by using crop mulches.

A suitable cropping system is alfalfa for 3 to 5 years, then a small grain or corn for 1 or 2 years, followed by alfalfa reseeded with a small grain.

These soils require light, frequent irrigation. Sprinkling is the best means of applying water. Corrugations can be used for surface irrigation, but streams should be small to reduce the erosion hazard.

Capability unit IIIe–6, irrigated

This unit consists of well-drained, medium-textured, very gently sloping soils of the Durargidic Arents, Elijah, Marsing, Minidoka, Nannyton, Potratz, Power, Purdam, Sebree, Vanderhoff, and Vickery series. These soils are on alluvial fans, terraces, and uplands. They are moderately deep over bedrock or a hardpan, or sand and gravel, except for Elijah silt loam, shallow, 1 to 3 percent slopes, which is several inches shallower than the other soils. These soils have slow to moderate permeability, low to moderate available water capacity, low to moderately low organic-matter content, and high fertility. Runoff is slow to medium, and erosion is a moderate hazard. The frost-free season is about 145 to 165 days.

The soils in this unit are suited to irrigated row crops, hay, small grains, and pasture. The main limitations to use are the erosion hazard and the low to moderate available water capacity. Growth of deep-rooted plants, such as alfalfa and fruit trees, is limited by the soil depth. Nitrogen and phosphorus fertilizers are needed for good crop growth.

A suitable cropping system is alfalfa and grass hay for

3 to 5 years, then a row crop, such as corn or sugar beets, for 2 years, followed by a small grain and a new seeding of alfalfa and grass with a small grain.

These soils require light, frequent irrigation. Irrigation water can be applied by furrows, corrugations, or sprinklers. Where a system of surface irrigation is used, runs should be short and streams should be small to reduce the erosion hazard.

Capability unit IIIe–7, irrigated

This unit consists of moderately coarse textured, gently sloping, well-drained to somewhat excessively drained soils of the Cencove, Timmerman, and Truesdale series. These soils are on alluvial fans and terraces. They are moderdately deep over sand and gravel or over a cemented hardpan. They have low available water capacity, moderately rapid permeability, low to moderately low organic-matter content, and low to moderate fertility. Runoff is slow to medium, and erosion is a moderate hazard. The frost-free season is 145 to 165 days.

The soils in this unit are suited to forage crops, grain, and row crops. Deep-rooted plants, such as fruit trees and alfalfa, do not grow well. Shallow-rooted plants grow well where carefully irrigated.

Organic-matter content can be maintained and erosion can be controlled by growing crops for green manure and by returning crop residues to the soil. If the supply of organic matter is maintained, the amount of available water generally increases. Nitrogen and phosphorus fertilizers are needed for good crop growth.

A suitable cropping system is alfalfa and grass for 2 to 5 years, then a row crop for 2 years, followed by a small grain for 1 to 3 years.

These soils require light, frequent irrigation. Irrigation water can be applied by corrugations, furrows, or borders. Borders should be graded and sodded. Where a system of surface irrigation is used, runs should be short to reduce the loss of water and the leaching of plant nutrients. Only shallow cuts can be made to level these soils for irrigation. Deeper cuts reduce the effective rooting depth.

Capability unit IIIe–8, irrigated

This unit consists of well-drained, medium-textured, gently sloping soils of the Durargidic Arents, Elijah, Lankbush, Marsing, Minidoka, Nannyton, Potratz, Power, Purdam, Scism, Vanderhoff, and Vickery series. These soils are on alluvial fans, terraces, and uplands. They are moderately deep over bedrock, or a hardpan, or sand and gravel, except for Elijah silt loam, shallow, 3 to 7 percent slopes, which is several inches shallower than the other soils. These soils have slow to moderate permeability, low to moderate available water capacity, low to moderately low organic-matter content, and high fertility. Runoff is medium to rapid, and the erosion hazard is severe. The frost-free season is about 145 to 165 days.

The soils in this unit are suited to pasture, hay, row crops, and small grains. Growth of deep-rooted fruit trees is limited by the soil depth. Nitrogen and phosphorus fertilizers are needed for good crop growth.

A suitable cropping system is alfalfa and grass hay for 3 to 5 years, then a row crop, such as corn or sugar beets, for 1 or 2 years, followed by a small grain and a new seeding of alfalfa and grass with the small grain.

Irrigation must be light and frequent to prevent erosion. Irrigation water can be applied by corrugations and sprinklers. Where a system of surface irrigation is used, runs should be short and streams should be small.

Capability unit IIIw–1, irrigated

This unit consists of nearly level or very gently sloping, somewhat poorly drained, medium-textured and moderately coarse textured soils of the Cruickshank and Moulton series. These soils are on flood plains and low fans. They are moderately deep or deep over gravel and sand. The Moulton soils are saline-alkali in places, but they are easy to reclaim.

Natural drainage is restricted because the soils occur near streams. These soils have moderate to moderately rapid permeability, low to moderate available water capacity, moderately low to low organic-matter content, and moderate fertility. Runoff is slow or very slow, and there is little or no erosion hazard. The frost-free season is about 145 to 165 days.

The soils in this unit are used for row crops, forage crops, grain, and irrigated pasture. Corn, vegetables, and other shallow-rooted crops grow well, but fruit trees do not. Alfalfa generally is short lived on these soils.

Organic-matter content can be maintained or increased by growing crops for green manure and by returning crop residues to the soil. All crops respond to phosphorus fertilizer, and all crops except legumes need nitrogen fertilizer.

The water table is high, and open ditches or tile drains generally are needed in cultivated areas. Irrigation water must be applied carefully to prevent the formation of a high or perched water table.

Where the soils are drained and the water table is controlled, a suitable cropping system is alfalfa hay for 3 or 4 years, corn or another row crop for 2 to 4 years, and a small grain for 1 to 3 years. Another suitable cropping system is clover and grass for hay or pasture for 3 or 5 years, then silage corn, sugar beets, or a row crop for 2 to 4 years, followed by a small grain for 1 to 3 years.

Irrigation water can be applied by borders, corrugations, furrows, or sprinklers. These soils generally can be leveled for irrigation without seriously reducing the effective rooting depth.

Capabality unit IIIw–6, irrigated

This unit consists of moderately deep to very deep, somewhat poorly drained or moderately well drained, level or very gently sloping soils of the Baldock, Bram, Catherine, Letha, Oliaga, and Purdam series. The Letha soils are moderately coarse textured and the other soils are medium textured. These soils are on flood plains and low terraces. They have low to high available water capacity, moderately slow to moderate permeability, low to high organic-matter content, and moderate fertility. Natural drainage is restricted because the soils are near streams and drainageways. Runoff is slow or very slow, and there is little or no hazard of erosion. The frost-free season is about 145 to 165 days.

The soils in this unit are slightly or moderately saline and alkaline. Alkali spots make up as much as 20 percent of some areas. In these areas, permeability is slow or very slow.

Where drained and leached of salts and alkali, the soils in this unit are well suited to irrigated corn, sugar beets, potatoes, small grains, alfalfa, clover, and grasses. During early stages of reclamation, tall wheatgrass, barley, or sugar beets can be grown. During later stages, alfalfa, corn, small grains, and vegetables can be grown.

Management is needed to drain the soils, to maintain fertility and organic-matter content, and to leach harmful salts and alkali. Crops respond well to nitrogen and phosphorus fertilizers.

A suitable cropping system for reclaimed soils is a small grain for 1 year, alfalfa and grass hay for 3 years, and a row crop for 2 years.

Irrigation water can be applied by borders, corrugations, furrows, or sprinklers. The soils must be smoothed for irrigation and for leaching salts and alkali.

Capability unit IIIs–1, irrigated

This unit consists of well-drained or moderately well drained, level or very gently sloping, moderately coarse textured soils of the Cencove, Falk, and Truesdale series. These soils are on flood plains, alluvial fans, and low terraces. They are moderately deep over sand and gravel or a hardpan. They have low available water capacity, moderate to moderately rapid permeability, low to moderately low organic-matter content, and low to moderate fertility. Runoff is slow, and there is little or no hazard of erosion. The frost-free season is about 145 to 165 days.

The soils in this unit are suited to irrigated corn, small grains, vegetables, hay, and pasture crops. Generally, they are not suited to fruit trees, alfalfa, and other deep-rooted plants.

Nitrogen and phosphorus fertilizers are needed for good crop growth. Organic-matter content can be maintained and the available water capacity can be improved by growing crops for green manure and by returning crop residues to the soil.

A suitable cropping system is red clover for 2 years, then a row crop for 2 years, followed by a small grain and a new seeding of legumes.

Irrigation water can be applied by furrows, corrugations, borders, or sprinklers. Where a system of surface irrigation is used, runs should be short to reduce leaching of plant nutrients from the soil.

Capability unit IVe–1, irrigated

This unit consists of moderately deep to very deep, well-drained, medium-textured, sloping soils of the Bahem, Elijah, Garbutt, Greenleaf, Lankbush, Marsing, Minidoka, Nyssaton, Owyhee, Power, Purdam, Scism, Vanderhoff, and Vickery series. These soils are on uplands, terraces, and alluvial fans. They have moderate or moderately slow permeability, moderate to high available water capacity, low to moderately low organic-matter content, and high fertility. In a few places the soils have low available water capacity. Runoff is rapid, and the hazard of water erosion on irrigated soils is very severe. The frost-free season is about 145 to 165 days.

Where well managed, these soils are suited to irrigated pasture, hay, and small grains. Fruit trees can be grown where the frost hazard is not severe.

All crops respond to phosphorus fertilizer, and all crops except legumes require nitrogen fertilizer. Erosion can be controlled and fertility and organic-matter content can be maintained by growing cover crops and green-manure crops and by returning crop residues to the soil.

A suitable cropping system is legumes and grass for 3 to 8 years followed by a small grain for 1 to 2 years.

Irrigation water can be applied by sprinklers or corrugations. Where a system of surface irrigation is used, runs should be short and streams should be small to reduce the erosion hazard.

Capability unit IVe–2, irrigated

This unit consists of gently sloping to sloping, well-drained to somewhat excessively drained, moderately coarse textured, moderately deep to very deep soils of the Cencove, Timmerman, Truesdale, and Turbyfill series. These soils are on alluvial fans and terraces. They have moderate to moderately rapid permeability, low available water capacity, low or moderately low organic-matter content, and low to moderate fertility. Runoff is medium to rapid, and erosion is a very severe hazard. The frost-free season is about 145 to 165 days.

The soils in this unit are suited to fruit trees, forage crops, hay, and small grains (fig. 8).

All crops respond well to phosphorus fertilizer, and all crops except legumes require nitrogen fertilizer. Organic-matter content can be maintained and erosion can be controlled by growing crops for green manure and by returning crop residues to the soil. Cover crops are needed in orchards to prevent erosion.

A suitable cropping system is alfalfa and grass for hay or pasture for 3 to 8 years, then a small grain for 1 to 2 years, followed by a new seeding of alfalfa and grass with a small grain.

Sprinkling is the best means of applying irrigation water. Corrugations can be used if runs are short and streams are small to reduce the erosion hazard.

Capability unit IVe–3, irrigated

This unit consists of coarse-textured, moderately deep to very deep, well-drained to somewhat excessively drained, gently sloping to moderately sloping soils of the Feltham and Jacquith series. These soils are on alluvial fans, terraces, and uplands. They have low or very low available water capacity, rapid permeability, low or very low organic-matter content, and low fertility. Runoff is medium to rapid, and erosion is a very severe hazard. The frost-free season is about 145 to 165 days.

The soils in this unit are suited to fruit trees, pasture, small grain, and hay crops. Crops grow only fairly well because fertility and the available water capacity are low.

All crops respond well to phosphorus fertilizer, and all crops except legumes need nitrogen fertilizer. Organic-matter content can be maintained by growing crops for green manure and by returning all crop residues to the soil. Cover crops are needed in orchards to reduce the erosion hazard and to maintain the organic-matter content.

A suitable cropping system is a small grain for 1 or 2 years followed by alfalfa and grass for hay or pasture for 3 to 8 years.

Because these soils are rapidly permeable, irrigation should be light and frequent. Sprinkling is the best means of applying irrigation water.

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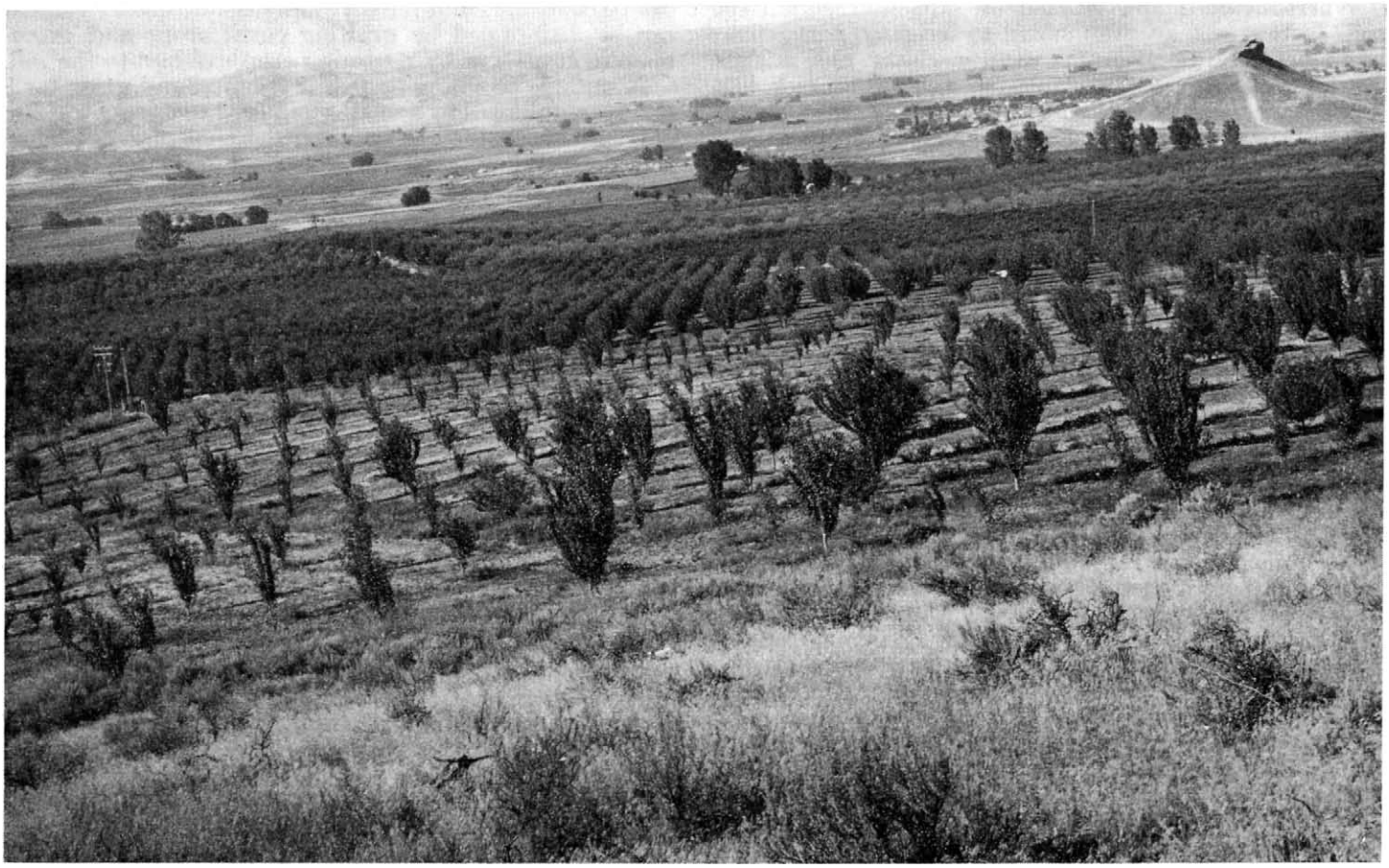

Figure 8.—**Orchard on Turbyfill fine sandy loam, 7 to 12 percent slopes. Capability unit IVe–2, irrigated.**

Capability unit IVe–4, irrigated

This unit consists of very gently sloping, well-drained, medium-textured soils of the Potratz, Power, and Trevino series. These soils are on uplands. Generally they are shallow over bedrock, and they are stony or rocky in places. In places they are moderately deep or deep and rock outcrops make up as much as 10 percent of the area. Permeability is moderate to moderately slow, and the available water capacity is low or very low. The organic-matter content is low or moderately low, and fertility is high. Runoff is slow to medium, and erosion is a moderate hazard. The frost-free season is about 145 to 165 days.

These soils are suited to small grains, pasture, and hay. Corn can be grown if grass and legumes are included in the cropping system. Deep-rooted plants do not grow well on these soils. All crops respond well to nitrogen and phosphorus fertilizers.

A suitable cropping system is red clover for 2 years, corn for 2 years, a small grain for 1 year, and then a new seeding of legumes with a small grain.

Irrigation water can be applied by borders, corrugations, furrows, or sprinklers. These soils require light, frequent irrigation to reduce the erosion hazard.

Capability unit IVe–10, irrigated

This unit consists of sloping to strongly sloping, shallow, well-drained, medium-textured soils of the Potratz, Power, and Trevino series. These soils are on uplands. They are rocky in places. In a few places the soils are moderately deep or deep, and rock outcrops make up as much as 10 percent of the area. The soils in this unit have low or very low available water capacity, moderate to moderately slow permeability, low or moderately low organic-matter content, and high fertility. Runoff is medium to rapid, and erosion is a very severe hazard. The frost-free season is about 145 to 165 days.

The soils in this unit are suited to small grains, forage crops, and hay. Corn can be grown if grass and legumes are included in the cropping system. Crops respond to nitrogen and phosphorus fertilizers.

A suitable cropping system is alfalfa or clover and grass for 4 to 6 years, then corn for 1 year, followed by a small grain for 1 year and a new seeding of alfalfa or clover and grass with a small grain.

Irrigation water can be applied by corrugations, but sprinklers are more suitable. Where corrugations are used, runs should be very short and streams should be very small to reduce the erosion hazard, especially on stronger slopes.

Capability unit IVw–1, irrigated

This unit consists of coarse-textured, somewhat poorly drained, level or very gently sloping soils of the Cruickshank and Moulton series. These soils are on flood plains

and low alluvial fans. They are moderately deep or deep over sand and gravel. They have moderately rapid or rapid permeability, low available water capacity, low to moderate organic-matter content, and low fertility. Runoff is slow or very slow, and there is little or no hazard of water erosion. Soil blowing is a moderate hazard on bare soils, especially in spring when winds are strong. The frost-free season is about 145 to 165 days.

The soils in this unit are suited to hay and pasture crops. Small grains, corn, and vegetables also are grown. Row crops generally should not be grown more than 2 consecutive years.

Organic-matter content can be maintained by growing crops for green manure and by returning crop residues to the soil. Open ditches or tile drains can be used to drain the soils and to lower the water table.

A suitable cropping system is legumes and grass for 2 to 5 years, then a row crop for 1 or 2 years, followed by a small grain for 1 to 3 years.

These soils require light, frequent irrigation.

Capability unit IVw–2, irrigated

Only Notus soils are in this unit. These soils are shallow, moderately coarse textured or coarse textured, somewhat poorly drained, and level or very gently sloping. They commonly occur within larger areas of other soils on alluvial bottom lands and low terraces. In a few places, gravel and cobblestones are on the surface. These soils have very low available water capacity, moderately rapid or rapid permeability, low organic-matter content, and low to moderate fertility. Runoff is slow or very slow, and there is little or no hazard of erosion. The frost-free season is about 145 to 160 days.

The Notus soils are used for alfalfa, small grains, and pasture. Nitrogen and phosphorus fertilizers are needed for good crop growth.

A suitable cropping system is alfalfa and grass hay for 3 to 5 years followed by a small grain for 1 to 2 years.

Light, frequent irrigation is required on these soils. Irrigation water can be applied by corrugations, furrows, borders, or sprinklers. Subirrigation also is suitable.

Capability unit IVw–3, irrigated

This unit consists of medium-textured or moderately coarse textured, level or very gently sloping soils of the Bram, Grandview, Letha, and Oliaga series. The Oliaga soil is moderately deep and somewhat poorly drained, and the other soils are moderately well drained and deep to very deep. All are strongly saline-alkali. All are on low terraces and bottom lands. They have low to high available water capacity, slow or very slow permeability, low organic-matter content, and low to moderate fertility. Runoff is slow or very slow, and there is little or no hazard of erosion. The frost-free season is about 145 to 160 days.

If leached of harmful salts and alkali, these soils can be used for crops. Tall wheatgrass and other alkali-tolerant grasses grow well during the early stages of reclamation. Alfalfa, corn, and sugar beets grow well on soils that have been reclaimed. Crops on reclaimed soils respond well to nitrogen and phosphorus fertilizers.

The soils in this unit are difficult to reclaim, and drainage systems must be carefully maintained once the salts and alkali have been leached.

Capability unit IVs–1, irrigated

This unit consists of coarse-textured, well-drained to excessively drained, moderately deep to very deep, level or very gently sloping soils of the Feltham, Jacquith, and Quincy series. These soils are on flood plains, alluvial fans, and low terraces. They have low or very low available water capacity, rapid or very rapid permeability, and low or very low organic-matter content and fertility. Runoff is slow or very slow, and erosion is a slight to moderate hazard. The frost-free season is about 145 to 160 days.

The soils in this unit are suited to irrigated pasture, hay, small grains, and vegetables.

Organic-matter content can be maintained by growing crops for cover and for green manure. A suitable cropping system is alfalfa and grass for 4 to 6 years, corn for 1 year, and a small grain for 1 year.

Irrigating these soils is difficult because water intake is very rapid and large streams cause erosion. Irrigation water can be applied by sprinklers, borders, corrugations, or furrows. Sprinklers can be used for all crops. Borders are suitable for hay, pasture, and small grains. Where a system of surface irrigation is used, runs should be short and streams should be small to reduce the erosion hazard.

Capability unit Vw–1, dryland pasture or range

This unit consists of poorly drained or very poorly drained, medium-textured or moderately coarse textured, moderately deep to very deep, level soils of the Chance and Baldock series. These soils have moderate to high available water capacity, moderate to moderately rapid permeability, and moderate to high organic-matter content and fertility. The Baldock soil has a water table at a depth of about 10 inches. On all the soils, runoff is slow or very slow and there is little or no erosion hazard. The frost-free season is about 145 to 160 days.

The soils in this unit are too wet to be used for crops, and they generally occur in areas that are not practical to drain. Most areas are used for native pasture. Reed canarygrass, alsike clover, and meadow foxtail can be seeded in areas dry enough to permit the use of farm equipment.

Capability unit VIe–1, irrigated

This unit consists of strongly sloping to moderately steep, medium-textured to moderately coarse textured, moderately deep to very deep, well-drained soils of the Bahem, Elijah, Greenleaf, Lankbush, Lolalita, Marsing, Nyssaton, Owyhee, Power, Turbyfill, and Vanderhoff series. These soils are on alluvial fans, terraces, and uplands. In places they are stony. They have moderately slow to moderately rapid permeability, generally high available water capacity, low to moderately low organic-matter content, and moderate to high fertility. Runoff is rapid to very rapid, and erosion is a moderate to extremely severe hazard. The frost-free season is about 145 to 160 days.

These soils are suited to irrigated pasture and hay. Where air drainage is good and the frost hazard is low,

fruit trees can be grown. They are not suited to cultivated crops, but a small grain can be grown occasionally to re-establish cover vegetation, hay, or pasture. Crops respond well to nitrogen and phosphorus fertilizers.

Permanent cover crops are needed to control erosion. Cover vegetation in orchards can be mowed and the residue left on the ground to help maintain organic-matter content.

Only sprinklers should be used to irrigate these soils.

Capability unit VIe–2, dryland pasture or range

This unit consists of gently sloping to steep, moderately deep to very deep, well-drained, medium-textured and moderately coarse textured soils of the Bahem, Elijah, Feltham, Greenleaf, Jenness, Lankbush, Lolalita, Marsing, Nannyton, Nyssaton, Owyhee, Power, Quincy, Timmerman, Turbyfill, Vanderhoff, and Vickery series. These soils are on uplands, on high terraces, and along breaks at the edges of these areas. They have low to high available water capacity, moderately slow to moderately rapid permeability, low to moderately low organic-matter content, and moderate to high fertility. The annual precipitation is about 8 to 11 inches. Runoff is medium to very rapid, and erosion is a severe hazard where these soils are not protected by permanent plant cover. The frost-free season is about 145 to 160 days.

The soils in this unit are too dry for farming. They are used for range. In some areas the vegetation is bluebunch wheatgrass, beardless wheatgrass, prairie junegrass, needle-and-thread, Sandberg bluegrass, Indian ricegrass, and squirreltail. In most areas it is mainly cheatgrass, medusahead wildrye, needlegrass, wild mustard, and sagebrush. The soils can be seeded to Whitmar beardless wheatgrass, pubescent wheatgrass, Ladak alfalfa, Siberian wheatgrass, bulbous bluegrass, and crested wheatgrass.

Practices needed to maintain range condition are proper use, deferred grazing, control of brush and weeds, and protection from fire.

Capability unit VIe–3, dryland pasture or range

This unit consists of level to moderately sloping, coarse-textured to moderately coarse textured, well-drained to excessively drained, shallow to very deep soils of the Feltham, Lolalita, and Quincy series. These soils are mostly on high terraces and alluvial fans. They have low or very low available water capacity, rapid or very rapid permeability, and low or very low organic-matter content and fertility. The annual precipitation is 8 to 11 inches. Runoff is slow or very slow. Erosion, mainly soil blowing, is a slight to severe hazard. The frost-free season is about 145 to 160 days.

The soils in this unit are too dry for farming. They are used mostly for range. The vegetation is mainly cheatgrass, wild onion, sagebrush, fiddleneck, and wild mustard. Tillage implements can be used to prepare seedbeds for crested wheatgrass, Whitmar beardless wheatgrass, Siberian wheatgrass, and Indian ricegrass. The vegetation on range sites in poor condition is mainly big sagebrush, rabbitbrush, and annual weeds and grasses.

Practices needed to maintain range condition are proper use, deferred grazing, control of brush and weeds, and protection from fire.

Capability unit VIe–4, irrigated

This unit consists of well-drained to excessively drained, shallow to very deep, coarse-textured to moderately coarse textured, gently sloping to sloping soils of the Feltham, Quincy, and Timmerman series. These soils are on uplands and terraces. They have rapid or very rapid permeability, low or very low available water capacity, and low or very low organic-matter content and fertility. Runoff is slow, and erosion, mainly soil blowing, is a moderate to severe hazard. The frost-free season is about 145 to 160 days.

The soils in this unit are not suited to cultivated crops, but they are suited to irrigated pasture and hay. Response to phosphorus and nitrogen fertilizer is good. Permanent cover is needed to control erosion.

A suitable cropping system is alfalfa and grass for 6 to 10 years, then a small grain for 1 to 2 years to reestablish a new seeding of alfalfa and grass. Alfalfa for seed can be grown for 3 or 4 years followed by a small grain. Growth of alfalfa for seed generally is fair or poor.

Only sprinklers should be used to apply irrigation water. The soils are too porous and too steep for surface irrigation.

Capability unit VIs–1, dryland pasture or range

This unit consists of level to very gently sloping, well-drained, moderately deep to very deep, medium-textured soils of the Elijah, Jenness, Nannyton, and Sebree series. These soils are on bottom lands, alluvial fans, terraces, and uplands. The available water capacity generally is moderate in level soils and high in very gently sloping soils. It is high in some areas of level Jenness soils and it is low to moderate in the Sebree soils. All the soils have slow to moderate permeability, low or moderately low organic-matter content, and high fertility. Annual precipitation is 8 to 11 inches. Runoff is slow to medium, and erosion is a slight to moderate hazard. The frost-free season is about 145 to 160 days.

Some of the soils in this unit are not suited to cultivated crops. They are used mostly for range. In places the vegetation is bluebunch wheatgrass, prairie junegrass, needle-and-thread, Sandberg bluegrass, and squirreltail. In most areas it is mainly cheatgrass, big sagebrush, rabbitbrush, yellowbrush, and wild mustard.

These soils can be tilled to prepare seedbeds for Whitmar beardless wheatgrass, Ladak alfalfa, Siberian wheatgrass, and crested wheatgrass. These plants grow best on bottom land where the soils receive runoff from higher soils. Sherman big bluegrass and tall wheatgrass also are well suited to soils on bottom land.

Practices needed to maintain range condition are proper use and deferred grazing.

Capability unit VIs–5, dryland pasture or range

Only Trevino very rocky loam, 0 to 20 percent slopes, is in this unit. This soil is on uplands. It is well drained, shallow, and moderately permeable. It has low or very low available water capacity, low or moderately low organic-matter content, and moderate to high fertility. Annual precipitation is less than 10 inches. Runoff is medium to rapid, and erosion is a moderate to severe hazard. The frost-free season is about 145 to 160 days.

This soil is used for range. The native vegetation is mainly cheatgrass, wild mustard, Russian-thistle, and big sagebrush. Most sites can be improved by broadcast seed-

ing of Whitmar beardless wheatgrass, Siberian wheatgrass, crested wheatgrass, and other pasture plants. In some areas, the vegetation is dominantly bluebunch wheatgrass, needle-and-thread, Sandberg bluegrass, and Indian ricegrass. Where sites are overgrazed or trampled, the vegetation is mainly big sagebrush, rabbitbrush, and annual weeds and grasses.

Practices needed to maintain range condition are deferred grazing, proper use, control of brush and weeds, and protection from fire.

Capability unit VIIe–2, dryland pasture or range

This unit consists of coarse-textured to moderately coarse textured, nearly level to steep, shallow to very deep, well-drained to excessively drained soils of the Feltham and Quincy series. These soils are on uplands and terraces. They have rapid permeability, very low available water capacity, and low or very low organic-matter content and fertility. Annual precipitation is about 7 to 12 inches. Runoff is slow to rapid, and erosion is a severe hazard. The frost-free season is about 145 to 160 days.

These soils have very severe limitations to use for crops. They are used mostly for limited grazing and wildlife habitat. The vegetation is mainly cheatgrass, sagebrush, fiddleneck, wild mustard, and budsage. Indian ricegrass, crested wheatgrass, and Siberian wheatgrass can be seeded. Vegetation on overgrazed or trampled sites is mainly rabbitbrush and annual weeds and grasses. Erosion is a very severe hazard on overgrazed sites.

Practices needed to maintain range condition are deferred grazing, proper use, control of brush and weeds, and protection from fire.

Capability unit VIIIs–1

Badland, Gravel pit, Rock outcrop, Terrace escarpment, and Very stony land are in this unit. These miscellaneous land types can be used as wildlife habitat. They also provide a source of material for highway and other construction and a source of water.

Capability unit VIIIw–1

This unit consists of Marsh and Riverwash. Both of these land types are too wet for crops. They can be managed as wildlife habitat.

Estimated Yields

Table 2 gives estimated yields of irrigated crops grown in the Area under two levels of management. Table 3 gives estimated yields per tree for the principal orchard crops under two levels of management. The estimates in tables 2 and 3 are based on observations of soil scientists who surveyed the Area and on information furnished by farmers, by companies that process agricultural products, by local offices of the Agricultural Conservation and Stabilization Service, by the Farmers Home Administration, and by the U.S. Census of Agriculture. If no information could be obtained for a particular soil, estimates were made on the basis of information pertaining to a similar soil.

The yields of crops shown in columns A are based on the management most common in the Area. Under this level of management, the cropping system is alfalfa hay grown for 2 to 4 years; a row crop, such as potatoes, sugar beets, beans, or corn for 2 to 4 years; and then a small grain with a new seeding of legumes. The kinds and amounts of fertilizer used are based on general experience and knowledge of the requirements of the soils and crops in the Area. Generally fertilizers are not applied consistently or uniformly on all fields for the same crops on similar soils. Irrigation water is applied carefully. Additional leveling or smoothing generally is needed. Drainage systems commonly are inadequate.

Some farmers in the Canyon Area obtain higher yields of irrigated crops. These yields are shown in columns B. To obtain these yields, more intensive management is required. A systematic cropping system is followed. Legumes, grasses, and green-manure crops are grown regularly, and manure and crop residues are utilized as much as possible to maintain organic-matter content, fertility, and soil structure. Fertilizers and soil amendments are applied as needed according to soil tests and field or plot trials. The land generally has been leveled, and irrigation systems have been installed to apply the water uniformly over each field. Drainage systems have been installed to remove excess water, and toxic salts or alkali have been leached. Harmful insects and weeds are controlled. On well-managed soils, more specialty crops, such as vegetables or vegetable seed, are grown. The added income from these crops helps pay for intensive management on the rest of the farm.

About the same varieties of irrigated crops are grown under both levels of management. The Ranger, Lahontan, or common varieties of alfalfa are grown. The Idaho Russett is the principal variety of potato. Yields of wheat were obtained for Lemhi and Federation varieties. Most of the corn grown is an adapted hybrid. Yields of hay and pasture can be increased primarily by seeding improved grasses and legumes, by proper application of fertilizer, and by good water management. Suitable grasses for hay and improved pasture are Latar orchardgrass, alta fescue, and tall wheatgrass.

The yield estimates in tables 2 and 3 are averages that may be expected over a period of years. In any given year, the yield may be considerably higher or lower than the average. Variations in the characteristics of the soils, such as content of salts and alkali, were considered in making the estimates.

The information on yields and on management practices given here will be modified by new developments in crop breeding, control of insects and diseases, fertilizers, tillage, irrigation, and drainage. For example, since the Gaines variety of wheat was introduced, average yields are more than 100 bushels per acre on the better soils. Nevertheless, the dependence of high yields on high levels of management and soil quality remains constant. The State, Federal, and commercial farm advisory services can provide information about new plant varieties and the latest management practices.

Windbreaks [2]

Only a few parts of the Canyon Area support a natural growth of trees. Native species of cottonwood and willow trees originally grew only on streambanks and on the flood plains of larger streams. Sagebrush and grasses grew on

[2] MELVIN R. CARLSON, woodland specialist, Soil Conservation Service, helped prepare this section.

TABLE 2.—*Estimated average yields per acre of*

[Yields in columns A are obtained under average management; those in columns B are obtained under improved management; absence of
Soils and land types omitted from

Soil	Sugar beets		Alfalfa			
			Hay		Seed	
	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*
Bahem silt loam, 0 to 1 percent slopes	25	28	4. 0	7. 0	11	15
Bahem silt loam, 1 to 3 percent slopes	24	28	4. 0	7. 0	9	15
Bahem silt loam, 3 to 7 percent slopes	21	24	3. 5	6. 0	5	10
Bahem silt loam, 7 to 12 percent slopes	16	19	3. 0	5. 0	3	7
Bahem silt loam, 12 to 30 percent slopes			1. 5	2. 5		
Baldock loam, 0 to 1 percent slopes	19	23	2. 5	4. 5		
Baldock loam, 1 to 3 percent slopes	17	21	2. 5	4. 5		
Bram silt loam, 0 to 1 percent slopes	15	20	2. 5	4. 7		
Bram silt loam, 1 to 3 percent slopes	15	19	2. 5	5. 0		
Bram silt loam, saline-alkali, 0 to 1 percent slopes	13	18	. 7	2. 5		
Bram silt loam, saline-alkali, 1 to 3 percent slopes	13	17	. 7	2. 5		
Catherine silt loam	14	23	3. 0	5. 5		
Cencove fine sandy loam, 0 to 1 percent slopes	16	22	2. 0	4. 5	4	9
Cencove fine sandy loam, 1 to 3 percent slopes	15	19	2. 2	4. 0	4	9
Cencove fine sandy loam, 3 to 7 percent slopes	14	18	2. 0	4. 0	3	7
Cencove fine sandy loam, 7 to 12 percent slopes	13		2. 0	3. 5	2	6
Cruickshank loamy fine sand			1. 5	4. 0		
Cruickshank fine sandy loam	15	22	2. 5	4. 5		
Draper loam, 0 to 1 percent slopes	25	27	4. 0	6. 2		
Draper loam, 1 to 3 percent slopes	24	26	4. 0	6. 5		
Durargidic Arents, 1 to 3 percent slopes	21	25	3. 6	6. 2	6	11
Durargidic Arents, 3 to 7 percent slopes	15	19	2. 8	4. 7	5	9
Elijah silt loam, 0 to 1 percent slopes	22	26	3. 6	6. 0	6	11
Elijah silt loam, 1 to 3 percent slopes	15	21	2. 8	5. 0	5	10
Elijah silt loam, shallow, 0 to 1 percent slopes	18	23	3. 2	5. 2	5	9
Elijah silt loam, shallow, 1 to 3 percent slopes	17	21	3. 1	5. 0	5	8
Elijah silt loam, shallow, 3 to 7 percent slopes	13	17	2. 8	4. 5	4	8
Elijah-Sebree silt loams, 0 to 1 percent slopes	17	22	3. 4	5. 7	5	9
Elijah-Sebree silt loams, 1 to 3 percent slopes	14	20	2. 5	4. 6	5	9
Elijah-Vickery silt loams, 3 to 7 percent slopes	13	17	2. 5	4. 4	4	8
Elijah-Vickery silt loams, 7 to 12 percent slopes	12	14	2. 2	3. 8	3	6
Falk fine sandy loam, 0 to 2 percent slopes	16	24	2. 0	4. 7		
Feltham loamy fine sand, 0 to 3 percent slopes	12	17	2. 0	3. 5	3	6
Feltham loamy fine sand, 3 to 7 percent slopes			1. 5	3. 0	2	5
Feltham loamy fine sand, 7 to 12 percent slopes			1. 5	2. 8	2	5
Garbutt silt loam, 0 to 1 percent slopes	25	28	4. 0	7. 0	11	15
Garbutt silt loam, 1 to 3 percent slopes	24	28	4. 0	7. 0	9	15
Garbutt silt loam, 3 to 7 percent slopes	21	24	3. 5	6. 0	5	10
Garbutt silt loam, 7 to 12 percent slopes	16	19	3. 0	4. 8	3	7
Garbutt silt loam, deep over basalt, 1 to 3 percent slopes	24	28	4. 0	7. 0	8	12
Garbutt silt loam, deep over basalt, 3 to 7 percent slopes	21	24	3. 5	6. 0	5	10
Grandview loam	11	17	. 7	1. 3		
Greenleaf silty clay loam, 0 to 1 percent slopes	28	32	4. 5	7. 2	7	11
Greenleaf silt loam, 0 to 1 percent slopes	25	29	4. 2	6. 8	9	14
Greenleaf silt loam, 1 to 3 percent slopes	19	24	3. 7	6. 2	8	14
Greenleaf-Owyhee silt loams, 0 to 1 percent slopes	27	31	4. 2	7. 2	9	15
Greenleaf-Owyhee silt loams, 1 to 3 percent slopes	25	29	4. 2	7. 0	9	15
Greenleaf-Owyhee silt loams, 3 to 7 percent slopes	21	24	4. 0	6. 5	5	10
Greenleaf-Owyhee silt loams, 7 to 12 percent slopes	13	17	3. 0	4. 2	3	7
Greenleaf-Owyhee silt loams, 12 to 20 percent slopes			1. 7	2. 8		
Harpt loam	23	28	4. 0	6. 2	7	11
Jacquith loamy fine sand, 1 to 3 percent slopes	12	17	2. 0	3. 5	3	6
Jacquith loamy fine sand, 3 to 7 percent slopes			1. 5	3. 0	2	5
Jenness loam, 0 to 1 percent slopes	23	26	4. 2	6. 5	8	14
Jenness loam, 1 to 3 percent slopes	21	25	4. 2	6. 5	8	14
Jenness loam, 3 to 7 percent slopes	18	22	3. 5	5. 5	5	10
Lankbush sandy loam, 3 to 7 percent slopes	17	21	3. 2	5. 3	5	10
Lankbush sandy loam, 7 to 12 percent slopes	11	15	2. 2	3. 8	3	6
Lankbush sandy loam, 12 to 30 percent slopes			1. 3	2. 2		
Lankbush-Elijah silt loams, 12 to 30 percent slopes			1. 5	2. 4		
Lankbush-Power complex, 12 to 30 percent slopes			1. 4	2. 3		
Lankbush-Vickery silt loams, 3 to 7 percent slopes	14	18	2. 7	4. 4	5	9
Lankbush-Vickery silt loams, 7 to 12 percent slopes	13	17	2. 4	4. 0	3	7
Lankbush loam, dark variant, 0 to 1 percent slopes	26	29	4. 0	7. 0	6	11

See footnote at end of table.

principal irrigated crops under two levels of management

yield indicates that the soil is not suited to the crop or that the crop is not generally grown on the soil at the level of management specified. the table normally are not suited to crops]

Potatoes		Wheat		Field corn				Sweet corn		Pasture	
				Grain		Silage					
A	B	A	B	A	B	A	B	A	B	A	B
Cwt.	*Cwt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*AUM*[1]	*AUM*[1]
250	400	65	80	90	110	20	25	5. 0	7. 2	15	20
250	380	65	78	80	105	18	25	5. 0	7. 2	15	20
220	325	58	75	72	94	15	20	4. 2	6. 4	12	16
190	295	40	58	58	72	10	17	2. 6	4. 2	10	14
		35	50	45	55	7	12			7	10
		35	55	55	80	14	23	4. 0	6. 2	14	18
		38	60	52	76	12	21	3. 8	6. 0	14	18
		38	60	60	90	15	23	3. 8	5. 5	14	18
		40	65	55	85	12	20	3. 6	5. 2	14	18
		20	35	30	45	8	14			4	9
		25	40	30	50	9	15			4	9
220	360	40	70	58	95	18	26			14	22
175	260	40	60	55	75	14	21	3. 5	5. 8	7	11
160	240	34	47	42	60	11	18	3. 3	5. 6	6	9
140	225	32	45	38	52	9	14	2. 8	5. 2	5	9
130	210	30	42	35	45	7	12			4	8
130	225	35	45	45	70	12	19			10	15
130	205	45	65	55	75	14	23	5. 0	6. 5	13	17
230	365	60	82	82	110	17	27	6. 0	7. 5	15	20
230	375	65	85	80	105	15	26	5. 0	7. 0	15	20
225	350	65	85	76	98	14	21	4. 2	6. 5	11	17
175	270	42	64	65	87	12	18	4. 0	6. 2	9	14
240	345	60	82	80	100	15	24	3. 8	5. 8	12	19
200	290	48	64	65	82	13	19	4. 0	5. 8	10	16
180	275	52	68	62	83	11	18	3. 0	4. 5	9	14
170	260	45	57	55	78	9	15	3. 2	4. 8	7	11
160	255	38	54	58	76	11	17	2. 6	4. 4	8	12
185	280	55	70	55	80	11	17	3. 5	5. 3	9	16
178	265	43	58	57	77	11	17	3. 5	5. 2	9	16
160	248	40	55	60	76	11	16	3. 0	5. 0	8	13
140	200	30	46	50	67	8	14			7	10
165	245	42	65	58	82	14	21	3. 5	5. 8	8	12
135	215	28	42	35	50	8	12			4	7
		25	35	28	42					3	6
		25	35	28	40					3	6
265	390	68	82	87	110	18	26	5. 0	7. 2	14	20
265	385	68	80	83	105	18	25	5. 0	7. 2	14	20
215	330	56	72	70	87	14	19	4. 2	6. 4	12	16
185	290	38	56	58	75	10	17	2. 6	4. 2	10	14
265	385	68	80	83	105	18	25	5. 0	7. 2	14	20
215	330	56	72	70	87	14	19	4. 2	6. 4	12	16
		23	48	34	52	10	16			5	9
235	375	72	88	94	117	23	30	4. 2	7. 0	16	20
215	360	65	82	86	95	17	26	5. 0	7. 2	12	17
215	370	56	76	74	92	16	23	5. 0	7. 2	12	17
255	385	80	95	90	115	22	29	5. 0	7. 2	16	20
245	380	70	90	85	105	18	27	5. 0	7. 2	15	20
235	350	62	84	72	92	14	20	4. 5	6. 8	12	16
150	235	45	57	62	80	9	16	2. 8	4. 0	9	12
		38	54	48	62	7	12			7	10
250	375	68	87	84	110	19	27	4. 5	7. 5	15	20
140	235	33	44	34	52	8	12			4	7
110	165	25	38	28	45					4	7
235	360	72	86	87	115	17	28	5. 5	8. 0	15	20
225	360	67	84	78	105	16	26	5. 2	7. 8	15	20
215	325	56	80	68	87	14	20	4. 8	6. 5	12	16
210	305	48	72	67	84	12	17	4. 2	6. 2	11	15
135	215	31	46	51	68	8	14			8	11
		28	42	38	47	6				6	9
		34	47	42	54	7	12			7	10
		30	45	40	50	6				6	9
170	260	42	58	65	82	12	18	3. 8	6. 0	9	14
140	210	35	50	55	72	9	15			9	12
230	375	75	90	85	100	17	24			12	18

TABLE 2.—*Estimated average yields per acre of*

Soil	Sugar beets		Alfalfa			
			Hay		Seed	
	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*
Letha fine sandy loam, 0 to 1 percent slopes	17	21	2. 0	4. 0		
Letha fine sandy loam, 1 to 3 percent slopes	15	19	1. 8	3. 4		
Letha fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes	12	16	. 7	1. 2		
Lolalita sandy loam, 1 to 3 percent slopes	17	21	4. 0	6. 2	6	10
Lolalita sandy loam, 3 to 7 percent slopes	12	15	2. 7	4. 2	4	7
Lolalita sandy loam, 12 to 30 persent slopes			1. 2	2. 0		
Marsing loam, 0 to 1 percent slopes	24	28	3. 8	6. 5	7	12
Marsing loam, 1 to 3 percent slopes	21	26	3. 4	6. 0	7	12
Marsing loam, 3 to 7 percent slopes	15	19	2. 9	5. 0	5	9
Marsing loam, 7 to 12 percent slopes	12	16	2. 5	4. 0	3	7
Marsing loam, 12 to 20 percent slopes			1. 5	2. 5		
Minidoka silt loam, 0 to 1 percent	23	27	4. 0	6. 2	6	11
Minidoka silt loam, 1 to 3 percent slopes	21	26	4. 0	6. 2	6	11
Minidoka-Scism silt loams, 3 to 7 percent slopes	16	19	3. 0	4. 8	5	9
Minidoka-Scism silt loams, 7 to 12 percent slopes	13	17	2. 5	4. 2	3	7
Moulton loamy sand, 0 to 1 percent slopes			1. 5	4. 0		
Moulton fine sandy loam, 0 to 1 percent slopes	17	22	3. 0	5. 2		
Moulton fine sandy loam, 1 to 3 percent slopes	16	21	3. 0	5. 2		
Moulton fine sandy loam, saline, 0 to 1 percent slopes	15	19	2. 7	4. 5		
Moulton loam, 0 to 1 percent slopes	18	24	3. 2	5. 2		
Moulton loam, saline, 0 to 1 percent slopes	16	20	2. 5	5. 0		
Nannyton loam, 1 to 3 percent slopes	19	24	3. 2	5. 8	6	11
Nannyton loam, 3 to 7 percent slopes	14	17	2. 6	4. 4	5	9
Notus soils	11	16	1. 5	3. 0		
Nyssaton silt loam, 0 to 1 percent slopes	26	30	4. 0	6. 7	9	15
Nyssaton silt loam, 1 to 3 percent slopes	25	30	3. 8	6. 5	9	15
Nyssaton silt loam, 3 to 7 percent slopes	22	26	3. 2	5. 6	5	10
Nyssaton silt loam, 7 to 12 percent slopes, eroded	13	17	2. 2	3. 8	3	7
Nyssaton silt loam, 12 to 20 percent slopes, eroded			1. 5	2. 5		
Oliaga loam, 0 to 1 percent slopes	18	25	3. 0	5. 1		
Oliaga loam, 1 to 3 percent slopes	19	23	3. 0	5. 0		
Oliaga loam, saline-alkali, 0 to 1 percent slopes	17	22	2. 2	4. 7		
Owyhee silt loam, 0 to 1 percent slopes	26	32	4. 0	7. 0	9	15
Owyhee silt loam, 1 to 3 percent slopes	25	31	4. 0	7. 0	9	15
Owyhee silt loam, 3 to 7 percent slopes	22	26	3. 2	5. 3	5	10
Potratz silt loam, 1 to 3 percent slopes	15	21	3. 0	5. 2	5	9
Potratz-Power silt loams, 3 to 7 percent slopes	14	18	2. 8	4. 8	5	9
Potratz-Power rocky silt loams, 1 to 3 percent slopes			2. 5	4. 8	5	9
Potratz-Power rocky silt loams, 3 to 7 percent slopes			2. 2	3. 5	4	8
Power silt loam, 0 to 1 percent slopes	26	30	4. 4	7. 0	8	14
Power silt loam, 1 to 3 percent slopes	24	28	4. 4	7. 0	8	14
Power silt loam, 3 to 7 percent slopes	21	25	3. 0	5. 5	5	10
Power silt loam, 7 to 12 percent slopes	3	19	2. 5	3. 8	3	7
Power-Lankbush silt loams, 7 to 12 percent slopes	12	18	2. 3	3. 6	3	7
Power-Potratz silt loams, 0 to 1 percent slopes	24	28	4. 2	6. 8	7	11
Power-Potratz silt loams, 1 to 3 percent slopes	22	26	4. 0	6. 5	6	10
Power-Purdam silt loams, 0 to 1 percent slopes	26	30	4. 4	7. 0	8	12
Power-Purdam silt loams, 1 to 3 percent slopes	23	28	4. 2	6. 8	8	12
Power-Purdam silt loams, 3 to 7 percent slopes	20	24	3. 0	5. 5	5	10
Power-Purdam silt loams, 7 to 12 percent slopes	13	19	2. 5	3. 8	3	7
Purdam silt loam, 0 to 1 percent slopes	24	28	4. 2	6. 7	7	11
Purdam silt loam, 1 to 3 percent slopes	21	26	3. 7	5. 9	6	11
Purdam silt loam, 3 to 7 percent slopes	17	21	2. 8	4. 7	5	9
Purdam silt loam, water table, 0 to 1 percent slopes	17	22	2. 0	3. 8		
Purdam-Sebree silt loams, 0 to 1 percent slopes	18	22	3. 0	5. 2	5	9
Purdam-Sebree silt loams, 1 to 3 percent slopes	16	20	2. 8	5. 0	4	8
Quincy fine sand, 0 to 3 percent slopes			2. 0	3. 5	3	6
Quincy fine sand, 3 to 12 percent slopes			1. 2	2. 3		
Quincy-Feltham loamy sands, 1 to 3 percent slopes			2. 0	3. 8	2	4
Scism silt loam, 0 to 1 percent slopes	26	30	4. 2	6. 9	9	15
Scism silt loam, 1 to 3 percent slopes	24	29	4. 0	6. 5	9	15
Scism silt loam, 3 to 7 percent slopes	19	24	3. 2	5. 5	5	10
Scism silt loam, 7 to 12 percent slopes	13	18	2. 5	4. 2	3	7
Scism silt loam, deep over basalt, 0 to 1 percent slopes	26	30	4. 2	6. 8	8	13
Scism silt loam, deep over basalt, 1 to 3 percent slopes	22	28	4. 0	6. 2	8	13
Scism silt loam, deep over basalt, 3 to 7 percent slopes	17	23	3. 0	5. 2	5	9

See footnote at end of table.

principal irrigated crops under two levels of management—Continued

Potatoes		Wheat		Field corn				Sweet corn		Pasture	
				Grain		Silage					
A	B	A	B	A	B	A	B	A	B	A	B
Cwt.	*Cwt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*AUM*[1]	*AUM*[1]
		35	60	45	70	13	20			9	14
		37	64	47	74	13	19			9	14
		20	45	30	45	10	16			4	8
275	380	56	78	64	87	13	22	3. 5	5. 2	11	15
215	285	46	57	62	78	10	16	2. 8	4. 5	9	13
		26	38	36	45	6				6	9
235	365	65	85	82	110	16	25	5. 5	7. 2	14	20
215	340	58	78	76	105	15	21	5. 3	7 2	14	20
180	275	44	62	65	85	12	18	4. 2	6. 4	10	16
150	230	35	50	58	68	9	16	2. 6	4. 2	9	12
		28	42	37	46	7	12			7	10
245	355	65	85	85	110	15	25	5. 2	7. 0	12	18
225	340	56	70	73	96	14	20	5. 0	6. 8	12	18
195	290	45	65	67	87	13	18	4. 0	6. 2	10	15
155	235	36	50	56	74	9	16	2. 3	3. 8	9	12
130	225	32	47	45	65	12	17	4. 5	6. 2	10	15
140	275	45	65	65	90	16	27	4. 5	5. 5	16	19
150	270	42	64	60	84	15	25	4. 2	5. 5	16	19
130	260	40	56	58	78	14	22	3. 8	5. 3	12	17
140	285	45	70	72	95	18	30	4. 5	6. 2	16	20
135	245	40	54	56	74	15	23	4. 0	5. 4	12	18
225	340	56	70	73	96	14	20	5. 3	7. 2	11	17
170	265	38	56	65	87	12	18	4. 2	6. 4	9	14
		20	30	38	57	8	14			5	8
265	390	72	94	85	115	17	28	5. 5	7. 2	15	20
240	385	67	92	82	110	16	26	5. 4	7. 2	15	20
225	335	52	78	68	94	14	20	4. 2	6. 4	12	16
150	235	35	55	52	74	9	16	3. 0	4. 5	9	12
		26	45	42	54	6	10			5	8
140	235	45	78	70	95	18	29	4. 0	6. 2	16	19
130	205	35	65	45	75	15	25	3. 8	6. 0	8	14
120	195	30	60	40	70	13	23	3. 0	5. 2	6	12
295	425	85	105	90	120	18	32	5. 0	7. 2	15	20
275	395	78	98	85	105	17	30	5. 0	7. 2	15	20
245	345	58	84	72	92	14	20	4. 5	6. 8	12	16
215	335	48	64	68	92	13	19	4. 4	6. 4	10	17
180	285	45	65	66	86	12	18	3. 8	5. 8	9	15
		42	58	62	80	12	18			8	16
		35	48	45	62	10	17			7	14
275	395	70	95	85	110	18	27	6. 2	8. 7	15	20
265	375	60	90	80	105	16	26	5. 7	8. 2	15	20
230	335	54	68	68	92	14	20	4. 2	6. 2	9	12
165	245	40	58	62	87	9	16	3. 4	4. 6	9	12
150	240	38	56	60	85	9	16			8	12
260	385	65	90	82	105	17	25	6. 0	8. 4	14	19
255	360	60	85	75	100	15	24	5. 5	8. 0	14	18
270	385	70	92	83	108	17	26	6. 0	8. 6	14	20
260	365	60	88	80	105	16	26	5. 6	8. 2	14	20
220	330	50	65	68	90	14	20	4. 2	6. 2	9	16
165	245	40	58	62	87	9	16			9	12
245	365	65	85	78	105	15	24	5. 4	7. 8	12	18
235	355	56	74	76	97	14	24	5. 0	7. 6	12	18
175	315	46	59	65	87	12	18	3. 5	5. 6	9	14
		35	60	45	70	14	22			7	14
185	285	50	70	60	85	12	18			10	16
180	280	45	65	60	80	12	18			10	16
135	215	28	42	35	50	8	12			4	7
										2	5
145	225	35	50	45	60	10	16			5	9
285	415	76	95	87	115	18	30	6. 2	8. 6	5	20
265	390	68	92	84	105	17	28	5. 8	8. 0	15	20
215	335	54	85	74	92	14	22	4. 0	6. 0	12	16
145	225	35	48	52	71	9	16	3. 5	4. 4	9	12
275	395	72	92	86	110	18	30	6. 2	8. 4	15	20
245	380	64	87	78	94	16	27	5. 8	7. 8	15	20
215	315	52	81	70	89	12	21	3. 8	5. 6	11	16

TABLE 2.—*Estimated average yields per acre of*

Soil	Sugar beets		Alfalfa			
			Hay		Seed	
	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*
Scism silt loam, deep over basalt, 7 to 12 percent slopes	12	16	2. 2	4. 0	3	7
Timmerman coarse sandy loam, 1 to 3 percent slopes	13	18	2. 0	3. 6	3	8
Timmerman coarse sandy loam, 3 to 7 percent slopes	11	16	1. 8	3. 4	3	6
Timmerman gravelly coarse sandy loam, 1 to 3 percent slopes			1. 5	2. 9		
Timmerman gravelly coarse sandy loam, 3 to 12 percent slopes			1. 2	2. 3		
Trevino silt loam, 1 to 3 percent slopes			2. 6	3. 8	3	7
Trevino silt loam, 3 to 12 percent slopes			2. 3	3. 4	2	6
Truesdale fine sandy loam, 0 to 1 percent slopes	15	22	2. 0	4. 2	4	8
Truesdale fine sandy loam, 1 to 3 percent slopes	14	18	2. 0	4. 0	4	7
Truesdale fine sandy loam, 3 to 7 percent slopes	12	16	1. 7	3. 4	3	6
Truesdale fine sandy loam, 7 to 12 percent slopes	11	15	1. 7	3. 2	3	6
Turbyfill fine sandy loam, 0 to 1 percent slopes	22	26	4. 3	6. 5	6	10
Turbyfill fine sandy loam, 1 to 3 percent slopes	20	24	4. 2	6. 5	6	10
Turbyfill fine sandy loam, 3 to 7 percent slopes	13	18	2. 8	4. 4	4	8
Turbyfill fine sandy loam, 7 to 12 percent slopes	10	17	2. 2	3. 8	3	7
Turbyfill fine sandy loam, 12 to 30 percent slopes			1. 5	2. 5		
Turbyfill fine sandy loam, deep over hardpan, 0 to 1 percent slopes	21	25	4. 1	6. 2	5	10
Turbyfill fine sandy loam, deep over hardpan, 1 to 3 percent slopes	18	22	4. 0	6. 2	5	10
Turbyfill fine sandy loam, deep over hardpan, 3 to 7 percent slopes	12	17	2. 6	3. 8	3	7
Vanderhoff loam, 1 to 3 percent slopes	19	24	3. 2	5. 8	6	11
Vanderhoff loam, 3 to 7 percent slopes	14	19	2. 8	4. 7	5	9
Vanderhoff loam, 7 to 12 percent slopes	12	16	2. 5	4. 2	3	7
Vanderhoff loam, 12 to 30 percent slopes			1. 5	2. 5		
Vickery-Marsing silt loams, 1 to 3 percent slopes	22	26	3. 2	5. 8	6	12
Vickery-Marsing silt loams, 3 to 7 percent slopes	16	19	2. 8	4. 8	5	9
Vickery-Marsing silt loams, 7 to 12 percent slopes	10	14	2. 2	3. 6	2	6

[1] Animal unit month. The number of months 1 acre will provide grazing for 1 animal unit without injury to the pasture. One animal

the uplands of the Snake River, and mainly saltgrass and greasewood grew on strongly saline and alkaline soils. Near the Snake River was a desert vegetation mostly of shadscale, whereas sedges, rushes, and aquatic grasses grew in small areas of peat and muck.

Approximately 95 percent of the Canyon Area is now in irrigated farms. The upland and desert areas are used almost entirely for crops, and most of the low-lying soils along flood plains and streams have been cleared or drained and also are cultivated.

The soils in the Canyon Area generally are well suited to trees and shrubs planted for windbreaks. The windbreaks are of two general types: field windbreaks and farmstead windbreaks. Field windbreaks consist of trees and shrubs planted in a strip or belt within or around a field. Farmstead windbreaks generally consist of a narrow belt of trees or shrubs planted next to a farmstead or feedlot.

The soils suitable for trees and shrubs have been placed in five windbreak suitability groups. To find the group in which a soil has been placed, refer to the "Guide to Mapping Units" at the back of this survey.

Each group consists of soils that have about the same suitability for trees and shrubs and that require about the same management. In the following paragraphs the windbreak suitability groups are described, species of trees and shrubs suitable for planting on the soils of the groups are named, and the major hazards and limitations of the soils for windbreak plantings are mentioned.

Windbreak suitability group 1

This group consists of moderately deep to very deep, well-drained, moderately coarse textured, medium-textured, and moderately fine textured soils that are level to very gently sloping. These soils occur on medium and high terraces and on uplands adjacent to the major rivers. They have moderate to moderately rapid permeability, moderate to high available water capacity, low or moderately low organic-matter content, and medium to high fertility. These soils are normally neutral to moderately alkaline. Runoff is slow to medium, and erosion is a slight to moderate hazard.

Once established, trees grow very well. The soils have few limitations to use for windbreaks.

Deciduous trees suited to the soils in this group are Russian-olive, golden willow, black locust, green ash, and hybrid poplar. Suitable evergreens are Douglas-fir, Austrian pine, Scotch pine, Norway spruce, ponderosa pine, blue spruce, and Rocky Mountain juniper. Because Rocky Mountain juniper trees are hosts to the cedar-apple rust disease, they should not be planted near apple orchards. Suitable shrubs are caragana, Nanking cherry, lilac, southernwood, mulberry, cotoneaster, clearwater rose, Tatarian honeysuckle, common privet, and mugo pine.

Windbreak suitability group 2

This group consists of moderately deep to very deep, moderately coarse textured, medium-textured, and mod-

principal irrigated crops under two levels of management—Continued

Potatoes		Wheat		Field corn				Sweet corn		Pasture	
				Grain		Silage					
A	B	A	B	A	B	A	B	A	B	A	B
Ctw.	*Cwt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*AUM*[1]	*AUM*[1]
135	215	35	46	48	67	8	15	3. 3	4. 2	11	16
145	225	32	45	43	56	10	17			5	9
120	195	28	42	36	48	8	12			4	8
		28	42							4	7
										2	5
		38	62	65	86	12	18	3. 8	6. 2	11	17
		32	56	58	72	10	16	3. 0	4. 5	8	15
160	235	38	58	52	73	12	19	3. 5	5. 5	6	10
145	215	32	45	42	57	10	17	3. 5	5. 2	5	9
125	195	30	42	40	52	9	14	2. 6	4. 2	4	8
115	165	27	38	35	47	8	13			4	7
315	415	70	88	82	110	16	27	4. 2	6. 4	14	19
305	410	65	85	75	100	15	25	3. 8	5. 0	14	17
235	345	52	68	70	86	12	18	2. 8	4. 4	10	15
145	215	35	50	46	58	9	14			7	11
		28	43	38	47	7	12			6	10
305	395	67	86	78	100	14	26	4. 0	6. 2	13	18
290	380	62	78	73	94	13	23	3. 6	4. 8	13	17
225	315	48	65	67	82	12	18	2. 8	4. 2	10	15
225	340	56	70	76	98	14	20	5. 0	7. 2	11	17
175	285	46	58	65	85	12	18	4. 2	6. 4	9	14
150	245	38	54	56	78	9	16	2. 6	4. 2	8	12
		35	50	45	55	7	12			7	10
210	335	56	76	75	100	15	21	5. 0	7. 0	14	20
175	275	45	65	65	85	12	18	4. 0	6. 0	10	16
130	210	32	45	50	62	8	14			7	12

[1] unit is defined as 1 cow, steer, or horse; 5 pigs; or 7 sheep or goats.

erately fine textured, well-drained soils that are gently sloping to moderately sloping. These soils are on the sides of drainageways and near the edges of terraces and uplands. They have moderate to moderately rapid permeability, low to high available water capacity, low or moderately low organic-matter content, and medium to high fertility. The soils normally are neutral to moderately alkaline. Runoff is medium to rapid, and erosion is a severe to very severe hazard.

Careful irrigation is required to prevent erosion on these soils, especially while the windbreak is being established. Small streams and short runs, contour furrows, or sprinklers provide adequate control of irrigation water. Once established, trees grow very well.

Deciduous trees suited to the soils in this group are Russian-olive, golden willow, black locust, green ash, and hybrid poplar. Suitable evergreens are Douglas-fir, Austrian pine, Scotch pine, Norway spruce, ponderosa pine, and blue spruce. Suitable shrubs are caragana, Nanking cherry, lilac, southernwood, mulberry, cotoneaster, clearwater rose, Tatarian honeysuckle, common privet, and mugo pine.

Windbreak suitability group 3

This group consists of somewhat poorly drained or moderately well drained, medium-textured, moderately deep to very deep soils that are level to very gently sloping. These soils are on low terraces and alluvial fans near rivers and drainageways. They have slow to moderate permeability, low to high available water capacity, and low to moderately low organic-matter content. These soils generally are slightly to moderately saline and alkali. Runoff is slow, and erosion is a slight hazard.

A high water table and toxicity caused by salts and alkali limit the species of trees and shrubs that can grow on these soils. Drainage generally is needed before desirable trees and shrubs can be established.

Deciduous trees suitable for planting are hybrid poplar, golden willow, and Russian-olive. Suitable evergreens are lodgepole pine and Norway spruce. Suitable shrubs are clearwater rose and cotoneaster.

Windbreak suitability group 4

This group consists of somewhat poorly drained or moderately well drained, coarse-textured and moderately coarse textured, moderately deep to very deep soils that are level to very gently sloping. These soils are on low terraces, alluvial fans, and bottom lands. They have moderate to rapid permeability, low to moderate available water capacity, and low organic-matter content and fertility. The soils range from nonsaline to moderately saline-alkali. Permeability is poorer in some saline-alkali soils. Runoff is slow, and erosion is a slight hazard.

A fluctuating water table and the content of salts and alkali limit the species of trees and shrubs that can grow on these soils. Drainage generally is needed before desirable species can be established.

Deciduous trees suitable for planting are green ash and

TABLE 3.—*Estimated yields per tree of selected fruit crops under two levels of management*

[Yields in columns A are obtained under average management; those in columns B are obtained under improved management. Absence of yield indicates that the tree generally is not grown on the soil at the level of management specified. Soils and land types omitted from the table normally are not suited to or are not used for fruit trees]

Soil	Apples						Peaches		Pears		Plums or prunes		Sweet cherries	
	Delicious		Jonathon		Rome beauty									
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*	*Lb.*
Bahem silt loam, 1 to 3 percent slopes	22	26	15	18	24	28			2. 5	3. 8	2. 6	3. 0		
Bahem silt loam, 3 to 7 percent slopes	25	32	17	21	26	34	2. 6	4. 2	2. 8	4. 4	2. 8	3. 4		
Bahem silt loam, 7 to 12 percent slopes	24	30	16	20	26	32	2. 4	4. 2	2. 5	4. 0	2. 6	3. 2		
Feltham loamy fine sand, 0 to 3 percent slopes	22	28	15	19	22	30	2. 5	3. 8	2. 4	3. 6	3. 0	3. 6	300	375
Feltham loamy fine sand, 3 to 7 percent slopes	25	32	17	22	24	34	3. 2	4. 5	3. 0	4. 2	3. 2	3. 8	325	400
Feltham loamy fine sand, 7 to 12 percent slopes	25	32	17	22	24	34	3. 2	4. 5	3. 0	4. 2	2. 6	3. 2	300	400
Greenleaf-Owyhee silt loams, 1 to 3 percent slopes	22	28	15	19	24	28			2. 2	4. 0	2. 8	3. 4		
Greenleaf-Owyhee silt loams, 3 to 7 percent slopes	25	32	17	22	25	34	2. 6	4. 2	2. 4	4. 4	3. 0	3. 6	200	240
Greenleaf-Owyhee silt loams, 7 to 12 percent slopes	24	30	18	20	24	32	2. 4	4. 2	2. 5	4. 4	2. 9	3. 4	200	240
Greenleaf-Owyhee silt loams, 12 to 20 percent slopes	20	28	13	18	22	30	1. 6	3. 4	1. 8	3. 6	2. 4	3. 2	175	220
Jacquith loamy fine sand, 1 to 3 percent slopes	20	26	13	18	22	28	2. 6	4. 0	2. 4	3. 8	3. 0	3. 6	300	375
Jacquith loamy fine sand, 3 to 7 percent slopes	24	30	18	22	26	32	3. 2	4. 2	2. 8	4. 0	3. 2	3. 8	325	400
Lolalita sandy loam, 1 to 3 percent slopes	32	38	22	26	34	40	2. 8	3. 8	2. 6	3. 6	3. 0	4. 0	300	375
Lolalita sandy loam, 3 to 7 percent slopes	34	40	23	27	36	42	3. 2	4. 5	3. 0	4. 2	2. 7	3. 5	325	425
Lolalita sandy loam, 12 to 30 percent slopes	25	32	17	22	26	34	2. 4	3. 4	2. 2.	3. 2	2. 5	3. 2	285	350
Minidoka silt loam, 1 to 3 percent slopes	22	26	15	18	23	28					2. 6	3. 2		
Minidoka-Scism silt loams, 3 to 7 percent slopes	24	30	18	21	25	32			2. 2	3. 8	3. 8	3. 4		
Minidoka-Scism silt loams, 7 to 12 percent slopes	22	28	15	19	23	30			2. 0	3. 8	2. 7	3. 2		
Nyssaton silt loam, 3 to 7 percent slopes	25	32	17	22	26	34	2. 3	4. 0	2. 2	4. 2	2. 6	3. 2		
Nyssaton silt loam, 7 to 12 percent slopes, eroded	24	30	18	20	25	32	2. 2	3. 8	2. 2	4. 0	2. 2	2. 8		
Nyssaton silt loam, 12 to 20 percent slopes, eroded	18	26	12	18	20	28	1. 8	3. 2	1. 8	3. 4	1. 8	2. 6		
Owyhee silt loam, 1 to 3 percent slopes	22	28	15	19	23	30			2. 2	4. 0	2. 6	3. 0		
Owyhee silt loam, 3 to 7 percent slopes	25	32	17	22	26	34	2. 6	4. 2	2. 4	4. 4	2. 6	3. 2	215	260
Power silt loam, 1 to 3 percent slopes	24	30	16	20	25	32			2. 2	4. 0	2. 6	3. 2		
Power silt loam, 3 to 7 percent slopes	26	32	18	22	28	34	2. 6	4. 2	2. 4	4. 4	2. 6	3. 2	230	285
Power silt loam, 7 to 12 percent slopes	24	28	16	19	25	30	2. 4	4. 2	2. 5	4. 4	2. 2	2. 8	230	285
Scism silt loam, 3 to 7 percent slopes	25	30	18	21	26	32	2. 8	4. 2	2. 2	4. 2	2. 4	2. 8		
Scism silt loam, 7 to 12 percent slopes	23	28	15	19	24	30	2. 6	4. 2	2. 2	4. 2	2. 2	2. 6		
Truesdale fine sandy loam, 1 to 3 percent slopes	28	34	18	22	29	36	2. 8	3. 9	2. 6	3. 6	3. 0	3. 6	475	600
Truesdale fine sandy loam, 3 to 7 percent slopes	30	36	20	24	32	38	3. 2	4. 4	3. 0	4. 2	3. 2	3. 8	500	650
Truesdale fine sandy loam, 7 to 12 percent slopes	30	36	20	24	32	38	3. 2	4. 4	3. 0	4. 2	2. 6	3. 3	500	650
Turbyfill fine sandy loam, 1 to 3 percent slopes	32	38	21	25	32	40	3. 0	4. 2	2. 8	4. 0	3. 2	3. 8	500	650

TABLE 3.—*Estimated yields per tree of selected fruit crops under two levels of management*—Continued

Soil	Apples						Peaches		Pears		Plums or prunes		Sweet cherries	
	Delicious		Jonathon		Rome beauty									
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lb.*	*Lb.*
Turbyfill fine sandy loam, 3 to 7 percent slopes	34	40	23	27	35	42	3. 4	4. 6	3. 0	4. 2	3. 4	4. 0	550	700
Turbyfill fine sandy loam, 7 to 12 percent slopes	34	40	23	27	35	42	3. 4	4. 6	3. 0	4. 2	2. 8	3. 5	550	700
Turbyfill fine sandy loam, 12 to 30 percent slopes	25	32	17	22	26	34	2. 8	4. 0	2. 6	3. 8	2. 5	3. 2	450	600
Vanderhoff loam, 3 to 7 percent slopes	25	32	17	22	26	34	------	------	2. 2	3. 8	2. 2	2. 8	------	------
Vanderhoff loam, 7 to 12 percent slopes	20	28	13	19	22	30	------	------	2. 2	3. 8	2. 0	2. 6	------	------

black locust. Suitable evergreens are Norway spruce and Rocky Mountain juniper. Because Rocky Mountain junipers are hosts to the cedar-apple rust disease, they should not be planted near apple orchards. Suitable shrubs are cotoneaster, lilac, and Tartarian honeysuckle.

Windbreak suitability group 5

This group consists of well-drained to somewhat excessively drained, coarse textured or moderately coarse textured, moderately deep to very deep soils that are nearly level to moderately sloping. These soils are on terraces and uplands. They have moderately rapid or rapid permeability, low or very low available water capacity, and low or very low organic-matter content and fertility. Runoff is slow to rapid. Erosion is a severe hazard, especially on bare soils in spring when strong winds blow.

Careful irrigation is needed for establishment of trees and shrubs because the water capacity is low and the water intake is rapid. Sites for windbreak plantings should be prepared by adding barnyard manure or by growing a crop for green manure to reduce the hazards of soil blowing and water erosion and to increase the supply of nutrients.

Deciduous trees suited to these soils are black locust, hybrid poplar, green ash, and Russian-olive. A suitable evergreen is Rocky Mountain juniper. Because Rocky Mountain junipers are hosts to the cedar-apple rust disease, they should not be planted near apple orchards. Suitable shrubs are caragana, southernwood, Nanking cherry, and lilac.

Wildlife [3]

Game birds and fish are the only significant wildlife in the Canyon Area. Because the Area is densely populated and the land is intensively cultivated, habitat suitable for game, such as moose or bear, is not available. A very small number of deer live on the bottom land along the Boise River and in sparsely wooded areas near Lake Lowell. Some deer migrate in winter from outside the Area to uplands in the northeastern part of Canyon County and in Owyhee County.

Most soils in the Canyon Area are suited to habitat for game birds, mainly bobwhite, chukar, mourning dove, ducks, geese, gray partridge, ring-necked pheasant, and California quail. Many nongame birds also live in the Area. Wild ducks, geese, and muskrat live on bottom land near the Boise and Snake Rivers and in drainageways throughout the Area. Wild geese nest on river islands and in the Deer Flat National Wildlife Refuge. Many farms have sites suitable for fish ponds.

Most species of wildlife cannot be related directly to an individual soil or groups of soils. Wildlife generally lives where food, cover, and water are available in favorable combination. The development of these elements of habitat depends on the suitability of the soils and the willingness of the owner to manage his land primarily for wildlife. Landowners can obtain help in planning and establishing habitat for the kinds of wildlife or fish they wish to favor from the local office of the Soil Conservation Service.

In the following paragraphs, the major kinds of wildlife in the Area are discussed and the suitability of the major soil associations for wildlife is indicated. These soil associations are described in the section "General Soil Map" and are shown on the colored map at the back of this survey.

Bobwhite.—All the soil associations provide habitat suitable for bobwhite. The most favorable habitat is on associations 2 and 5. Soils along streams and in steep, rocky, and stony areas provide cover, food, and nesting ground. Suitable food plants grow primarily in areas adjacent to cultivated fields. Food must be close to vegetation that will protect bobwhite from predators and provide shelter in inclement weather. Generally, food plants also provide some cover.

Choice food plants for bobwhite are barley, barnyardgrass, Kentucky bluegrass, chokecherry, clover, corn, currants, millet, oats, pigweed, raspberry, Indian ricegrass, serviceberry, grain sorghum, sunflower, and wheat. Fair food plants are alfalfa, bristlegrass, cheatgrass, dandelion, black locust, rose, Russian-olive, teasel, and timothy. Bobwhite also eat many kinds of insects.

[3] CLYDE A. SCOTT and VERNE E. DAVISON, biologists, Soil Conservation Service, helped prepare this section.

California quail.—This native game bird is also known as valley quail. It roosts in shrubs and trees and uses shrubby thickets for daytime cover. Soils throughout the Area provide habitat suitable for California quail. Choice food is mainly seeds, tender green forage, and berries. Choice food plants are barley, barnyardgrass, Kentucky bluegrass, chokecherry, corn, millet, oats, pigweed, raspberry, Indian ricegrass, grain sorghum, sunflower, teasel, and wheat. Fair food plants are alfalfa, bristlegrass, cheatgrass, clover, dandelion, black locust, wildrose, Russian-olive, and timothy.

Canada geese.—A large number of Canada geese nest on islands in the Boise and Snake Rivers in associations 2 and 5. Soils in all parts of the Area provide grain and green forage food plants for geese. Choice food is the tender green forage of alfalfa, barley, Kentucky bluegrass, clover, dandelion, sago potamogeton, rye, timothy, and wheat. Also choice are seeds of alfalfa, barley, barnyardgrass, corn, millet, rye, grain sorghum, and wheat. Fair food plants are bulrush, cheatgrass, oats, pigweed, and smartweed.

Chukar.—This game bird was introduced from southern Asia. Association 5 provides habitat suitable for large numbers of chukar. Chukar find cover in rocky, steep, and grassy areas. Choice food plants are barley, bristlebrush, cheatgrass, clover, corn, currants, dandelion, oats, pigweed, Indian ricegrass, serviceberry, grain sorghum, sunflower, teasel, timothy, and wheat. Fair food plants are alfalfa, barnyardgrass, Kentucky bluegrass, chokeberry, millet, and wildrose. Chukar also eat many kinds of insects.

Ducks.—The main kinds of ducks in the Area are mallard, pintail, and widgeon. They generally feed on field grain, seeds, and green forage. They nest in marshes and near lakes and ponds. Suitable habitat occurs on associations 1, 2, 3, and 8, mainly along the Boise River and near sloughs, streams, and drainageways. Sites suitable for shallow water impoundments and feeding areas occur along the Snake River in association 5.

All of the associations provide grain food for ducks. Choice food plants are barley, barnyardgrass, bulrush, corn, millet, sago potamogeton, smartweed, grain sorghum, and wheat. Fair food plants are clover, dandelion, peas, and oats. Ducks generally favor aquatic seed plants.

Gray partridge.—The gray partridge, or Hungarian partridge, was introduced from Europe in about 1930. Grainfields and rangeland throughout the Area provide habitat for this game bird. Gray partridge nest mainly in alfalfa, along grassy fencerows, and in patches of weeds. Choice food plants are barley, barnyardgrass, bristlegrass, millet, grain sorghum, teasel, and wheat. Fair food plants are alfalfa, cheatgrass, corn, dandelion, oats, pigweed, Indian ricegrass, wildrose, rye, sunflower, and timothy. Gray partridge also eat insects.

Mourning dove.—Habitat suitable for mourning dove can be maintained or developed in all parts of the Canyon Area. Doves favor black locust trees and orchard trees for nesting, but they do nest in other kinds of trees. They also nest on the ground in well-drained areas. This migratory game bird eats only seeds and must have drinking water daily. Choice food plants are barnyardgrass, bristlegrass, corn, millet, pigweed, Indian ricegrass, grain sorghum, sunflower, and wheat. Fair food plants are barley, oats, and rye.

Ring-necked pheasant.—This game bird, native of China, was introduced in the 1930's. Soils throughout the Area provide habitat well suited to pheasant. The best habitat is cattails, shrubs, and trees that grow along ditches and fencerows and near streams adjacent to cropland. Pheasants eat seeds as well as grasshoppers and other insects. Choice food plants are barley, barnyardgrass, bristlegrass, corn, millet, oats, pigweed, Indian ricegrass, grain sorghum, teasel, and wheat. Fair food plants are alfalfa, Kentucky bluegrass, chokecherry, clover, currants, dandelion, raspberry, wildrose, Russian-olive, serviceberry, and sunflower.

Nongame birds.—All parts of the Canyon Area provide habitat for nongame birds, such as robins, swallows, flycatchers, hawks, and herons. Small birds eat seeds, insects, worms, and fruit. Some large birds feed mainly on fish, frogs, rodents, and snakes.

Fish.—The principal game fish in ponds and streams are bass, bullhead and channel catfish, crappie, sturgeon, and trout. Ponds, lakes, and permanent streams, are suitable for fish. Associations 1, 2, 3, and 8 have many sites suitable for ponds.

Engineering Uses of the Soils [4]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, and systems for storing water, controlling erosion, draining soils, and disposing of sewage. The soil properties most important in engineering are permeability, shear strength, density, shrink-swell potential, water-holding capacity, grain-size distribution, plasticity, and reaction.

Information concerning these and related properties of the soils is given in tables 4, 5, and 6. The estimates and interpretations of soil properties in these tables can be used to:

1. Make studies that will aid in selecting and developing sites for industrial, business, residential, and recreational uses.
2. Make preliminary evaluations that will aid in selecting locations for highways and airports and in planning detailed surveys of the soils at the site.
3. Develop information for the design of drainage systems, farm ponds, diversion terraces, and other structures for soil and water conservation.
4. Locate possible sources of sand and gravel.
5. Correlate performance of engineering structures with soil mapping units to develop information that can be useful in designing and maintaining such structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from published maps, reports, and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to a particular area.

[4] THOMAS H. CURTIS and VERL G. KING, engineering specialists, Soil Conservation Service, helped prepare this section.

With the soil map for identification of soil areas, the engineering interpretations reported here can be useful for many purposes. It should be emphasized, however, that these interpretations may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depth of layers here reported.

Some terms used by soil scientists have a special meaning in soil science that may not be familiar to engineers. These terms are defined in the Glossary.

Engineering Classification Systems

Two systems of soil classification are in general use by engineers. They are the system adopted by the American Association of State Highway Officials (AASHO) (*1*), and the Unified system (*11*) developed by the Water Experiment Station, Corps of Engineers, now used by the U.S. Department of Defense.

The AASHO system is used to classify soils according to those properties that affect use in highway construction. In this system, all soil material is classified in seven principal groups. The groups range from A–1, which consists of soils that have the highest bearing strength and are the best soils for subgrade, to A–7, which consists of soils that have the lowest strength when wet and are the poorest soils for subgrade. Within each group the relative engineering value of a soil material is indicated by a group index number given in parentheses. The numbers range from 0, for the best material, to 20, for the poorest. The group index number is shown in parentheses following the soil group symbol (see table 4). The AASHO classification for tested soils is shown in table 4. The estimated classification for all soils mapped in the survey area is given in table 5.

In the Unified system, soils are classified as coarse grained, fine grained, or organic according to particle-size distribution, plasticity, liquid limit, and organic-matter content.

There are eight classes of coarse-grained soils. Each class consists of soils in which more than half the particles are larger than 0.074 millimeter. Symbols for these classes are G for gravel and S for sand combined with W for well graded, P for poorly graded, M for silty, or C for clayey.

There are 6 classes of fine-grained soils. More than half the particles in these soils are smaller than 0.074 millimeter. These classes are designated M for silts, C for clays, and O for organic soils combined with L for low liquid limit or H for high liquid limit. Highly organic, or peaty, soils are designated by the symbol Pt.

A significant difference between the Unified system and the system used by the U.S. Department of Agriculture (USDA) is the definition of silt and clay. The Unified system divides fine-grained soils into silt or clay depending upon their physical behavior at various moisture content. In the USDA system, silt and clay soils are determined by particle size.

Engineering Test Data

Table 4 shows the results of engineering tests of samples of several soils taken in the Canyon Area. The table shows the specific location where samples were taken, the depth to which sampling was done, and the results of tests to determine particle-size distribution and other properties significant in soil engineering. Some terms used in table 4 are explained in the following paragraphs.

Mechanical analysis shows the percentage, by weight, of soil particles that pass sieves of specified sizes. Sand and other coarser materials do not pass the No. 200 sieve, but silt and clay do. In the AASHO system, silt is identified as material finer than 0.074 millimeter yet coarser than 0.005 millimeter. Clay is material finer than 0.005 millimeter. The particle-size distribution of materials passing the No. 200 sieve was determined by the hydrometer method.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. The plastic limit is the moisture content at which the soil passes from semisolid to plastic. If the moisture content is further increased, the material changes from a plastic to a liquid state. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Estimated Soil Properties

Table 5 provides estimates of soil properties important in engineering. The estimates are based on field classification and descriptions, on physical and chemical tests of selected representative samples, on test data from comparable soils in adjacent areas, and on experience in working with the soils in the Canyon Area.

Each kind of soil that is given a separate rating is listed in alphabetical order. The mapping units are shown by placing the map symbols after the name of the soil series. Where important differences in engineering properties occur between mapping units of a series, these phases are rated separately. Gravel pit, Marsh, Riverwash, Rock outcrop, Terrace escarpment, and Very stony land are not rated because their properties are too variable.

USDA texture is determined by the relative proportions of sand, silt, and clay material less than 2.0 millimeters in diameter. Sand, silt, clay, and other terms used in the USDA textural classification are defined in the Glossary.

Permeability, as used in table 5, refers only to the movement of water downward through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on the structure and porosity of the soil. Plowpans and surface crusts caused by land use are not considered.

Available water capacity is the capacity of a soil to hold water available for use by most plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH value, and related terms used to describe soil reaction, are explained in the Glossary.

Soil salinity is estimated by measuring the electrical conductivity of a saturated soil extract at 25° C. The electrical conductivity is expressed in millimhos per centimeter. Salinity affects the suitability of a soil for crops, its stability when used as a construction material, and its corrosivity.

TABLE 4.—*Engineering*

[Tests performed by the Bureau of Public Roads in accordance with standard

Soil name and location	Parent material	Bureau of Public Roads report number S44–	Depth	Mechanical analysis[1]				
				Percentage passing sieve				
				2-in.	1½-in.	1-in.	¾-in.	⅜-in.
			Inches					
Elijah silt loam:								
1,350 feet east and 1,840 feet south of the northwest corner of section 13, T. 3 N., R. 2 W., Canyon County. (Modal)	Mixed loess over alluvium.	936	0–9					
		937	9–15		100	99	99	99
		938	15–19		100	99	98	97
Garbutt silt loam:								
1,800 feet west and 1,350 feet north of the southeast corner of section 19, T. 2 N., R. 4 W., Owyhee County. (Modal)	Alluvium derived from lacustrine sediments.	948	3–9					100
		949	9–22					100
		950	22–40					100
Greenleaf silt loam:								
1,340 feet north and 60 feet east of the southwest corner of section 32, T. 5 N., R. 3 W., Canyon County. (Modal)	Loess over laminated lacustrine sediments.	958	0–8					
		959	8–13					
		960	22–46					
Minidoka silt loam:								
195 feet south and 370 feet east of the northwest corner of SW¼ sec. 10, T. 2 N., R. 3 W., Canyon County. (Modal)	Mixed loess over alluvium.	930	3–9					
		931	20–26				100	99
		932	26–34	100	99	98	97	94
		933	34–40	63	48	35	32	28
Moulton fine sandy loam:								
1,920 feet east and 740 feet south of the northwest corner of section 24, T. 4 N., R. 2 W., Canyon County. (Modal)	Alluvium	967	3–10	100	99	98	96	94
		968	10–21			100	99	98
Nyssaton silt loam:								
80 feet east and 500 feet south of the northwest corner of SW¼ sec. 35, T. 3 N., R. 5 W., Owyhee County. (Modal)	Finely laminated lacustrine sediments.	971	0–6					
		972	11–20					
		973	20–27					
		974	27–41					
Quincy fine sand:								
80 feet east and 800 feet north of the southwest corner of section 32, T. 5 N., R. 5 W., Canyon County. (Modal)	Alluvial sand deposits reworked locally by wind.	978	0–9					
		979	20–62					
Scism silt loam:								
700 feet south and 70 feet west of the northeast corner of section 10, T. 1 N., R. 3 W., Canyon County. (Modal)	Mixed loess or loesslike alluvium.	980	0–8					
		981	13–21					
		982	21–30					
Turbyfill fine sandy loam:								
900 feet north and 50 feet west of the southeast corner of section 15, T. 1 N., R. 3 W., Canyon County. (Modal)	Eolian material or alluvial material reworked by wind.	989	3–21					
		990	32–47					

[1] Mechanical analyses according to AASHO Designation T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm. in diameter. In the SCS soil survey procedure, the fine material is analysed by the pipette method and the material coarser than 2 mm. in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

test data

procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis [1]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—						AASHO	Unified [2]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
								Percent			
----------	100	99	92	88	67	39	33	38	14	A–6(10)	ML–CL
99	99	98	94	90	71	44	38	42	20	A–7–6(12)	CL
96	96	95	87	84	60	36	28	33	12	A–6(9)	CL
99	98	96	81	74	43	22	15	30	4	A–4(8)	ML
99	97	94	80	72	48	25	16	31	2	A–4(8)	ML
99	97	93	70	61	38	19	15	29	3	A–4(7)	ML
----------	100	99	94	91	67	37	26	32	9	A–4(8)	ML–CL
----------	----------	100	98	96	80	50	37	48	21	A–7–6(14)	ML–CL
----------	100	92	85	83	62	21	13	38	7	A–4(8)	ML
----------	100	97	87	77	44	23	17	25	5	A–4(8)	ML–CL
98	96	93	86	78	48	22	15	22	2	A–4(8)	ML
92	88	66	44	40	29	15	10	36	5	A–4(2)	SM
26	25	22	13	11	8	4	3	33	4	A–1–a(0)	GM
94	93	86	37	31	21	13	10	[3] NP	NP	A–4(0)	SM
98	98	92	34	28	18	10	8	NP	NP	A–2–4(0)	SM
----------	100	99	90	82	46	24	17	26	3	A–4(8)	ML
----------	----------	100	93	87	50	24	16	25	3	A–4(8)	ML
----------	100	94	90	84	43	16	9	NP	NP	A–4(8)	ML
----------	----------	----------	98	87	40	14	8	NP	NP	A–4(8)	ML
----------	----------	100	16	12	11	11	8	NP	NP	A–2–4(0)	SM
----------	----------	100	22	13	8	6	6	NP	NP	A–2–4(0)	SM
----------	100	99	88	80	40	17	12	26	3	A–4(8)	ML
----------	100	99	88	79	36	11	6	26	2	A–4(8)	ML
----------	100	97	79	66	27	6	4	NP	NP	A–4(8)	ML
----------	100	99	58	43	23	12	9	NP	NP	A–4(5)	ML
----------	100	99	78	67	29	10	7	NP	NP	A–4(8)	ML

[2] SCS and BPR have agreed to consider all soils having plasticity indexes within 2 points from A-line are to be given a borderline classification. For example, ML–CL.

[3] Nonplastic.

TABLE 5.—*Estimated engineering*

[Absence of data means no estimate was made because classification

Soil series and map symbols	Depth to—		Depth from surface	Classification		
	Bedrock or hardpan	Seasonal high water table		Dominant USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Bahem: BaA, BaB, BaC, BaD, BaE, BaF.	>5		0–60	Silt loam and very fine sandy loam.	ML	A–4
Baldock:						
BdA, BdB	>5	3–4	0–56	Loam	ML	A–4
			56–65	Fine sandy loam	SM or ML	A–4
BhA	>5	1–2	0–56	Loam	ML	A–4
			56–65	Fine sandy loam	SM or ML	A–4
Bram: BrA, BrB, BsA, BsB	>5	3–6	0–52	Silt loam, loam	ML	A–4
Catherine: Ca	>5	1½–4	0–23	Silt loam	ML	A–4
			23–42	Silty clay loam	CL	A–6
			42–61	Loam	ML	A–4
Cencove: CcA, CcB, CcC, CcD	>5		0–35	Fine sandy loam, sandy loam, and loamy sand.	SM	A–2 or A–4
			35–60	Gravelly sand	SM or GM	A–1
Chance: Ch	>5	0–1	0–23	Fine sandy loam and sandy loam.	SM	A–4
			23–60	Gravel and sand	GP	A–1
Chilcott	1½–3½		0–10	Silt loam	ML	A–4
Mapped only in association with Elijah, Lankbush, and Vickery soils.			10–26	Silty clay loam	CH	A–7
			26–31	Loam	ML	A–4
			31–46	Duripan		
Cruickshank: Cr, Cu	>5	1–2	0–60	Fine sandy loam	SM or ML	A–4
Draper: DrA, DrB	>5	2–3	0–55	Loam, silt loam, and sandy clay loam that contains some gravel.	ML	A–4
Durargidic Arents: DuB, DuC	1½–3½		0–31	Loam	ML or CL	A–4
			31–50	Duripan		
Elijah: EhA, EhB, E1A, E1B, E1C, EsA, EsB, EvC, EvD.	1–3½		0–22	Silt loam and silty clay loam	CL	A–6
(For Sebree soil in EsA and EsB, refer to Sebree series. For Vickery soil in EvC and EvD, refer to Vickery series.)			22–40	Duripan		
Falk: FaA	>5	3–4	0–33	Fine sandy loam	SM	A–4
			33–60	Gravel and sand	GP, GW, SP or GM	A–1
Feltham: FeB, FeC, FeD, FeE, FuD.	>5		0–32	Loamy fine sand	SM	A–2
(For Quincy soil in FuD, refer to Quincy series.)			32–64	Very fine sandy loam, fine sandy loam, and loam.	ML	A–4
Garbutt: GaA, GaB, GaC, GaD, GdB, GdC.	>5		0–60	Silt loam and fine gravelly loam.	ML	A–4
Grandview: Gn	>5	3–5	0–5	Loam	ML	A–4
			5–45	Silty clay loam and clay loam	CL	A–6
			45–60	Loam	ML	A–4

See footnotes at end of table.

properties of the soils

is impossible, material is variable, or information is insufficient]

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity [1]	Shrink-swell potential	Soil corrosivity for uncoated steel [2]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hour	*Inches per inch of soil*	*pH value*			
100	95–100	75–85	0. 63–2. 00	0. 17–0. 19	7. 4–8. 4	None	Low	Low.
95–100	90–100	65–75	0. 63–2. 00	0. 16–0. 18	7. 4–9. 0	None to moderate	Moderate	High.
95–100	90–100	40–55	2. 00–6. 30	0. 13–0. 15	7. 9–8. 4	None	Low	Low.
95–100	90–100	65–75	0. 63–2. 00	0. 16–0. 18	7. 4–9. 0	None to moderate	Moderate	High.
95–100	90–100	40–55	2. 00–6. 30	0. 13–0. 15	7. 9–8. 4	None	Low	Low.
95–100	95–100	80–90	0. 06–0. 20	0. 10–0. 18	7. 9–9. 6	Moderate to very high.	Low	High.
95–100	95–100	75–85	0. 63–2. 00	0. 18–0. 20	7. 9–8. 4	None to low	Low to moderate	High.
95–100	95–100	85–95	0. 63–2. 00	0. 18–0. 20	7. 9–8. 4	None	Moderate	High.
95–100	95–100	65–75	0. 63–2. 00	0. 16–0. 18	7. 4–7. 8	None	Low to moderate	High.
95–100	95–100	30–40	2. 00–6. 30	0. 12–0. 14	7. 9–8. 4	None	Low	Low.
55–75	50–70	5–15	>20. 0	0. 04–0. 06	7. 9–8. 4	None	Low	Low.
95–100	90–100	40–50	2. 00–6. 30	0. 13–0. 15	6. 1–7. 3	None	Low	High.
10–40	5–10	0–5	>20. 0	0. 03–0. 05	6. 6–7. 3	None	Very low	High.
95–100	95–100	85–95	0. 63–2. 00	0. 18–0. 20	6. 1–7. 3	None	Low to moderate	Low.
95–100	95–100	90–100	0. 06–0. 20	0. 18–0. 20	7. 4–8. 4	None	High	High.
95–100	90–100	65–75	0. 63–2. 00	0. 16–0. 18	7. 9–8. 4	None	Moderate	Low
			<0. 06		7. 9–8. 4			
95–100	95–100	40–55	2. 00–6. 30	0. 13–0. 15	7. 9–9. 6	None to low	Low	Moderate.
95–100	90–100	60–70	0. 63–2. 00	0. 16–0. 18	7. 4–7. 8	None	Moderate	High.
95–100	95–100	65–75	0. 63–2. 00	0. 16–0. 18	7. 4–9. 0	None to low	Moderate	Low to moderate.
			<0. 06				Low	Low.
100	95–100	85–95	0. 63–2. 00	0. 18–0. 20	6. 6–7. 8	None	Moderate	Low.
			<0. 06		7. 9–8. 4			
90–100	75–95	35–50	2. 00–6. 30	0. 13–0. 15	6. 1–7. 3	None	Low	Moderate.
30–40	25–35	0–15	<20. 0	0. 05–0. 07	7. 4–7. 8	None	Low	Moderate.
100	95–100	25–35	6. 30–20. 0	0. 09–0. 11	6. 6–8. 4	None	Low	Low.
95–100	85–95	70–85	0. 63–2. 00	0. 16–0. 18	7. 4–9. 0	Low	Low	Low.
95–100	95–100	80–90	0. 63–2. 00	0. 18–0. 20	7. 9–8. 4	None	Low	Low.
95–100	90–100	60–70	0. 20–0. 63	0. 12–0. 14	7. 9–9. 6	Moderate to very high.	Low to moderate	High.
95–100	90–100	75–85	0. 06–0. 20	0. 14–0. 16	7. 9–9. 6	Moderate to very high.	Moderate	High.
85–95	80–95	65–75	0. 06–0. 20	0. 12–0. 14	7. 9–8. 4	Moderate to very high.	Moderate	High.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface	Classification		
	Bedrock or hardpan	Seasonal high water table		Dominant USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Greenleaf; GrA, GsA, GsB, GwA, GwB, GwC, GwD, GwE. (For Owyhee soil in GwA, GwB, GwC, GwD, and GwE, refer to Owyhee series.)	>5		0–13	Silt loam	ML or CL	A–4 or A–7
			13–60	Silt loam and silt	ML	A–4
Harpt: Ha	>5		0–22	Loam	ML	A–4
			22–44	Sandy clay loam	SC or ML	A–6
			44–60	Coarse sandy loam	SM	A–2
Jacquith: JaB, JaC	1½–3½		0–27	Loamy fine sand	SM	A–2
			27–36	Fine sandy loam	SM	A–4
			36–50	Duripan		
Jenness: JeA, JeB, JeC	>5		0–43	Loam and silt loam	ML	A–4
			43–60	Coarse sand	SM	A–1
Lankbush: LaC, LaD, LaE, LaF, LeE, LhE, LkC, LkD. (For Elijah soil in LeE, refer to Elijah series. For Power soil in LhE, refer to Power series. For Vickery soil in LkC and LkD, refer to Vickery series.)	>5		0–14	Sandy loam or silt loam	SM or ML	A–2 or A–4
			14–50	Sandy clay loam	SC or CL	A–6
			50–65	Sand	SP or SM	A–3
Lankbush, dark variant: LnA	>5	2–4	0–60	Loam, silt loam and silty clay loam.	ML or CL	A–4 or A–6
Letha: LsA, LsB, LtA	>5	2½–4	0–40	Fine sandy loam and sandy loam.	SM	A–4
			40–58	Sand	SP or SM	A–3
Lolalita: LuG, LvB, LvC, LvE	>5		0–36	Sandy loam and fine sandy loam.	SM	A–4
			36–60	Loamy fine sand	SM	A–2
Marsing: MgA, MgB, MgC, MgD, MgE.	>5		0–23	Loam	ML	A–4
			23–60	Gravelly coarse sand	SP or GP	A–1
Minidoka: MkA, MkB, MnC, MnD (For Scism soil in MnC and MnD, refer to Scism series.)	1½–3½		0–34	Silt loam and loam	ML	A–4
			34	Duripan		
Moulton: MoA, MtA, MtB, MuA, MvA, MwA.	>5	2–3	0–30	Fine sandy loam, loam, and loamy sand.	SM	A–2 or A–4
			30	Gravel and coarse sand	GP or SP	A–1
Nannyton: NaB, NaC	>5		0–27	Loam, gravelly loam, clay loam, or fine sandy loam.	ML or GM	A–4
			27–60	Sand and gravel	SP or GP	A–1
Notus: No	>5	1–3	0–14	Fine sandy loam to gravelly loamy sand.	SM or GM	A–2 or A–4
			14–60	Sand and gravel	SP or GP	A–1
Nyssaton: NsA, NsB, NsC, NsD2, NsE2.	>5		0–27	Silt loam	ML	A–4
			27–60	Silt loam	ML	A–4
Oliaga: OgA, OgB	>5	2–3	0–35	Loam and fine sandy loam	ML	A–4
			35–60	Sand and gravel	GM	A–1
OlA	>5	1–3	0–35	Loam	ML	A–4
			35–60	Sand and gravel	GM	A–1

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity [1]	Shrink-swell potential	Soil corrosivity for uncoated steel [2]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	*Inches per hour*	*Inches per inch of soil*	*pH value*			
100	100	90–100	0. 63–2. 00	0. 18–0. 20	6. 6–7. 8	None	Moderate	Low.
100	100	85–100	0. 20–0. 63	0. 18–0. 20	7. 4–8. 4	None	Moderate	Low.
95–100	95–100	65–80	0. 63–2. 00	0. 16–0. 18	6. 1–6. 5	None	Moderate	Low.
95–100	95–100	40–50	0. 63–2. 00	0. 14–0. 16	7. 9–8. 4	None	Moderate	Moderate.
90–100	90–100	25–35	2. 00–6. 30	0. 10–0. 12	8. 5–9. 0	None	Low	Low.
95–100	90–100	25–35	6. 30–20. 0	0. 09–0. 11	7. 4–8. 4	None	Low	Low.
90–100	90–100	40–50	6. 30–20. 0	0. 13–0. 15	7. 9–8. 4	Low	Low	Moderate.
			0. 06–0. 20		8. 5–9. 0			
100	95–100	70–80	0. 63–2. 00	0. 17–0. 19	6. 6–7. 8	None	Low	Low.
100	85–95	5–15	>20. 0	0. 04–0. 06	7. 4–7. 8	None	Very low	Low.
95–100	85–95	30–60	0. 63–2. 00	0. 11–0. 20	6. 6–7. 3	None	Low	Low.
95–100	85–95	40–60	0. 20–0. 63	0. 14–0. 16	7. 4–8. 4	None	Moderate	Moderate.
95–100	85–95	0–10	6. 30–20. 0	0. 04–0. 06	7. 9–8. 4	None	Low	Low.
100	100	80–90	0. 63–2. 00	0. 18–0. 20	7. 9–8. 4	None	Moderate	High.
90–100	90–100	35–50	0. 06–0. 20	0. 08–0. 10	8. 5–9. 6	Moderate to very high.	Low	High.
90–100	85–95	0–10	0. 63–2. 00	0. 04–0. 06	8. 5–9. 0	Moderate	Low	High.
95–100	95–100	35–50	0. 63–2. 00	0. 12–0. 14	6. 1–8. 4	None	Low	Low.
95–100	95–100	25–35	6. 30–20. 0	0. 09–0. 11	7. 9–8. 4	None	Low	Low.
90–100	90–100	65–80	0. 63–2. 00	0. 15–0. 19	7. 9–8. 4	None	Low	Low.
55–85	50–80	0–5	6. 30–20. 0	0. 03–0. 05	7. 9–8. 4	None	Low	Low.
95–100	95–100	80–90	0. 63–2. 00	0. 18–0. 20	6. 6–8. 4	None	Low	Low.
			<0. 06		7. 9–8. 4			
95–100	90–100	30–50	0. 63–6. 30	0. 13–0. 15	6. 6–7. 8	None to low or moderate.	Low	Moderate.
10–50	5–30	0–5	<20. 0	0. 03–0. 05			Low	Moderate.
55–95	50–90	35–60	0. 63–2. 00	0. 10–0. 16	7. 9–8. 4	None to low	Low to moderate	Low to moderate.
30–60	10–30	0–10	<20. 0	0. 03–0. 05	7. 9–8. 4	Low	Low	Moderate.
55–100	50–100	20–50	2. 00–20. 0	0. 08–0. 14	6. 6–7. 8	None	Low	Moderate.
30–60	10–30	0–10	<20. 0	0. 30–0. 05	6. 6–7. 3	None	Low	Moderate.
100	100	85–95	0. 63–2. 00	0. 18–0. 20	7. 9–8. 4	None	Low	Low.
100	100	90–100	0. 20–0. 63	0. 18–0. 20	7. 9–8. 4	None	Low	Low.
100	90–100	65–75	0. 63–2. 00	0. 16–0. 18	7. 4–8. 4	None to moderate	Low	High.
30–60	10–30	5–15	<20. 0	0. 03–0. 05		None	Low	Moderate.
100	90–100	65–75	0. 63–2. 00	0. 10–0. 12	7. 9–9. 4	High to very high	Low	High.
30–60	10–30	5–15	<20. 0	0. 03–0. 05		None	Low	Moderate.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface	Classification		
	Bedrock or hardpan	Seasonal high water table		Dominant USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Owyhee: OwA, OwB, OwC	>5		0–22	Silt loam	ML	A–4
			22–60	Silt loam	ML	A–4
Potratz: PaB, PcC, PeB, PeC	2–3		0–24	Silt loam and loam	ML	A–4
(For Power soil in PcC, PeB, and PeC, refer to Power series.)			24	Basalt.		
Power: PhA, PhB, PhC, PhD, PlD, PoA, PoB, PpA, PpB, PpC, PpD. (For Lankbush soil in PlD, refer to Lankbush series. For Potratz soil in PoA and PoB, refer to Potratz series. For Purdam soil in PpA, PpB, PpC, and PpD, refer to Purdam series.)	>5		0–65	Silt loam and very fine sandy loam.	ML	A–4
Purdam:						
PrA, PrB, PrC, PtA, PtB	1½–3½		0–24	Silt loam	ML	A–4
(For Sebree soil in PtA and PtB, refer to Sebree series.)			24–38	Duripan		
			38–60	Stratified loam, sand, and gravel.		
PsA	1½–3½	2–3	0–24	Silt loam	ML	A–4
			24–38	Duripan		
			38–60	Stratified loam, sand, and gravel.		
Quincy: QcB, QcD, QcE, QfB, QfD	>5		0–60	Fine sand	SM	A–2
(For Feltham soil in QfB and QfD, refer to Feltham series.)						
Scism:						
ScA, ScB, ScC, ScD	>5		0–42	Silt loam	ML	A–4
			42–62	Loam	ML	A–4
SdA, SdB, SdC, SdD	3½–5		0–42	Silt loam	ML	A–4
			42–60	Loam	ML	A–4
Sebree	1½–3½		0–11	Silty clay loam	CL	A–7
Mapped only in complexes with Elijah and Purdam Soils.			11–18	Silt loam	ML	A–4
			18–29	Sandy loam	SM	A–4
			29–45	Duripan		
			45–60	Sand	SM	A–1
Timmerman:						
TeB, TeC	>5		0–38	Coarse sandy loam	SM	A–2
			38–60	Coarse sand	SM	A–1
TgB, TgD	>5		0–16	Gravelly coarse sandy loam	GM	A–1
			16–33	Coarse sandy loam	SM	A–2
			33–60	Coarse sand	SM	A–1
Trevino: TkE, TrB, TrD	1–2		0–18	Silt loam	ML	A–4
			18	Basalt.		
Truesdale: TsA, TsB, TsC, TsD	1½–3½		0–24	Fine sandy loam	SM	A–4
			24–32	Duripan		
			32–50	Sandy loam	SM	A–2 or A–4
Turbyfill: TuA, TuB, TuC, TuD, TuE, TvA, TvB, TvC.	>5		0–62	Fine sandy loam	SM or ML	A–4

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity [1]	Shrink-swell potential	Soil corrosivity for uncoated steel [2]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	*Inches per hour*	*Inches per inch of soil*	*pH value*			
100	90–100	85–95	0. 63–2. 00	0. 18–0. 19	7. 9–8. 4	None	Low	Low.
100	90–100	85–95	0. 20–0. 63	0. 18–0. 19	7. 9–8. 4	None	Low	Low.
90–100	85–100	70–80	0. 63–2. 00	0. 17–0. 19	6. 6–9. 0	None	Low to moderate	Low.
100	100	85–95	0. 63–2. 00	0. 18–0. 20	7. 4–8. 4	None	Moderate	Low.
100	100	85–95	0. 63–2. 00	0. 18–0. 20	6. 6–8. 4	None	Moderate	Low.
			0. 06–0. 20		7. 9–8. 4	Low to moderate		High.
			0. 63–6. 30	0. 05–0. 15	7. 9–8. 4	Low to moderate	Low	High.
100	100	85–95	0. 63–2. 00	0. 18–0. 20	6. 6–8. 4	None	Moderate	Low.
			0. 06–0. 20		7. 9–8. 4	Low to moderate		High.
			0. 63–6. 30	0. 05–0. 15	7. 9–8. 4	Low to moderate	Low	High.
95–100	90–100	15–25	>20. 0	0. 05–0. 07	6. 1–6. 5	None	Low	Low.
95–100	95–100	80–90	0. 63–2. 00	0. 18–0. 20	7. 9–9. 0	None	Low	Low.
90–100	90–100	60–70	0. 63–2. 00	0. 16–0. 18	7. 9–8. 4	Low to moderate	Low	High.
95–100	95–100	80–90	0. 63–2. 00	0. 18–0. 20	7. 9–9. 0	None	Low	Low.
90–100	90–100	60–70	0. 63–2. 00	0. 16–0. 18	7. 9–8. 4	Low to moderate	Low	High.
95–100	90–100	85–95	<0. 06	0. 08–0. 18	6. 6–7. 8	High	Moderate	High.
95–100	90–100	75–90	<0. 06	0. 08–0. 18	7. 9–8. 4	Very high	Low to moderate	High.
95–100	90–100	35–50	0. 06–0. 20	0. 05–0. 15	8. 5–9. 0	High	Low	High.
			<0. 06		8. 5–9. 0	High		
90–100	85–100	5–15	6. 30–20. 0	0. 04–0. 06	7. 9–8. 4	High	Low	High.
85–100	85–100	20–35	2. 00–6. 30	0. 10–0. 12	7. 4–9. 0	Low to moderate	Low	High.
90–100	85–100	5–10	>20. 0	0. 04–0. 06	8. 5–9. 0	Moderate to high	Low	High.
65–80	60–75	15–25	6. 30–20. 0	0. 06–0. 08	7. 4–9. 0	Low to moderate	Low	High.
85–100	85–100	20–35	6. 30–20. 0	0. 09–0. 11	7. 9–8. 4	Moderate	Low	High.
90–100	85–100	5–10	>20. 0	0. 04–0. 06	8. 5–9. 0	Moderate to high	Very low	High.
95–100	90–100	75–85	0. 63–2. 00	0. 18–0. 20	6. 6–8. 4	None	Low	Low.
95–100	90–100	35–50	2. 00–6. 30	0. 13–0. 15	6. 6–8. 4	None	Low	Low.
			0. 06–0. 20		7. 9–9. 0			
95–100	90–100	30–40	2. 00–6. 30	0. 11–0. 13	8. 5–9. 0	Low	Low	Moderate.
100	95–100	40–60	0. 63–2. 00	0. 13–0. 15	7. 4–8. 4	None	Low	Low.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface	Classification		
	Bedrock or hardpan	Seasonal high water table		Dominant USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Vanderhoff:						
VaB, VaC, VaD, VaE	2–3		0–30	Loam	ML	A–4
			30	Siltstone		
VbG	2–3		0–23	Gravelly loam	GM	A–4
(Properties of Badland in VbG are too variable to rate.)			23	Siltstone		
Vickery: VmB, VmC, VmD	1½–3½		0–34	Silt loam and loam	ML	A–4
(For Marsing soil in VmB, VmC, and VmD, refer to Marsing series.)			34–47	Duripan		
			47–60	Coarse sand	SM	A–1

[1] Ratings based on conductivity of the saturation extract at 25° C.
None: 0–2 mmhos/cm
Low: 2–4 mmhos/cm
Moderate: 4–8 mmhos/cm
High: 8–16 mmhos/cm
Very high: >16 mmhos/cm

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Bahem: BaA, BaB, BaC, BaD, BaE, BaF.	Poor: thin topsoil; nearly level to steep slopes.	None present	Fair: moderate shear strength; high frost-action potential.	High frost-action potential; relief is nearly level to steep.	Moderate resistance to shearing; low resistance to piping and cracking.
Baldock:					
BdA, BdB	Poor: thin topsoil.	Poor to unsuitable: deep overburden.	Fair: seasonal high water table at a depth of 3 to 4 feet; moderate shear strength.	Seasonal high water table at a depth of 3 to 4 feet; high frost-action potential.	Moderate shrink-swell potential; low resistance to piping and cracking.
BhA	Poor: seasonal high water table at a depth of 1 or 2 feet; salt and alkali in the surface layer.	Unsuitable: deep overburden.	Fair: seasonal high water table at a depth of 1 to 2 feet; moderate shrink-swell potential.	Seasonal high water table at a depth of 1 to 2 feet; many small ponds and seeped areas.	Moderate shrink-swell potential; low resistance to piping and cracking.

properties of the soils—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity [1]	Shrink-swell potential	Soil corrosivity for uncoated steel [2]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hour	*Inches per inch of soil*	*pH value*			
95–100	90–100	70–80	0. 63–2. 00	0. 16–0. 18	7. 9–8. 4	None	Low	Low.
			<0. 06		7. 4–7. 8			
70–85	65–80	35–50	0. 63–2. 00	0. 12–0. 14	7. 9–8. 4	None to low	Low	Low.
			<0. 06		7. 4–7. 8			
95–100	90–100	85–95	0. 63–2. 00	0. 17–0. 19	6. 6–8. 4	None	Low	Low.
			<0. 06		7. 9–8 4			
95–100	85–100	5–15	>20. 0	0. 04–0. 06	7. 9–8. 4	Low	Low	Moderate.

[2] Ratings based on conductivity of the saturation extract at 25° C.
Low: 0–1 mmhos/cm
Moderate: 1–4 mmhos/cm
High: >4 mmhos/cm

interpretations of the soils

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Moderate permeability; relief is nearly level to steep.	Poor stability; poor compaction characteristics; low resistance to piping.	Good drainage	Relief is nearly level to steep; slow intake rate.	Slight to moderate compressibility.	Moderate: moderate permeability; high silt content; severe if slope is greater than 10 percent.	Moderate to severe: moderate permeability; relief is nearly level to steep.
Moderate permeability; seasonal high water table at a depth of 3 to 4 feet.	Poor stability; poor compaction characteristics; low resistance to piping.	Moderate permeability; seasonal high water table at a depth of 3 to 4 feet.	Somewhat poor drainage; seasonal high water table at a depth of 3 to 4 feet.	Somewhat poor drainage; moderate compressibility.	Moderate: seasonal high water table at a depth of 3 to 4 feet.	Moderate: moderate permeability; seasonal high water table at a depth of 3 to 4 feet.
Seasonal high water table at a depth of 1 to 2 feet.	Poor stability; poor compaction characteristics; low resistance to piping.	Suitable outlets difficult to establish because of low position of soil in landscape.	Somewhat poor drainage; seasonal high water table at a depth of 1 to 2 feet; susceptibility to salt accumulation.	Seasonal high water table.	Severe: seasonal high water table at a depth of 1 to 2 feet.	Moderate: moderate permeability; seasonal high water table at a depth of 1 to 2 feet.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Bram: BrA, BrB	Poor: thin topsoil; moderate to high salinity and alkalinity; seasonal high water table at a depth of 3 to 5 feet.	Unsuitable: deep overburden.	Fair: moderate shear strength; good to poor compaction characteristics.	Seasonal high water table at a depth of 3 to 5 feet; high frost-action potential; a few seeped areas.	Moderate resistance to shearing; low resistance to piping and cracking.
BsA, BsB	Poor: high to very high salinity and alkalinity; seasonal high water table at a depth of 3 to 5 feet.	Unsuitable: deep overburden.	Fair: moderate shear strength; good to poor compaction characteristics.	Seasonal high water table at a depth of 3 to 5 feet; high frost-action potential; a few seeped areas.	Moderate resistance to shearing; low resistance to piping and cracking.
Catherine: Ca	Fair: fluctuating water table and finer textures in lower layers.	Unsuitable: deep overburden; seasonal high water table hinders excavation.	Poor: seasonal high water table at a depth of 1½ to 4 feet; moderate to low shear strength; high organic-matter content.	Seasonal high water table at a depth of 1½ to 4 feet; high frost-action potential; a few seeped areas.	Low to moderate shrink-swell potential; low resistance to piping and cracking; high organic-matter content.
Cencove: CcA, CcB, CcC, CcD	Poor: thin topsoil.	Fair: 20- to 40-inch overburden; good below a depth of 40 inches.	Good	Moderate frost-action potential; relief is nearly level to sloping.	Low resistance to piping and cracking.
Chance: Ch	Poor: thin topsoil; seasonal high water table at a depth of less than 1 foot.	Fair: 20- to 40-inch overburden; seasonal high water table at a depth of less than 1 foot.	Good to fair: seasonal high water table.	Seasonal high water table near the surface; a few seeped areas in drainageways.	Low resistance to piping; moderate resistance to cracking.
Chilcott. Mapped only in association with Elijah, Lankbush, and Vickery soils.	Poor: thin topsoil; high clay content and duripan in subsoil; nearly level to gently sloping.	Unsuitable: deep overburden; none present in many areas.	Poor: very low shear strength; high shrink-swell potential.	High frost-action potential; duripan at a depth of 20 to 40 inches.	High shrink-swell potential; moderate to low resistance to shearing; surface soil has low resistance to piping and cracking; duripan at a depth of 20 to 40 inches.

interpretations of the soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Seasonal high water table at a depth of 3 to 5 feet.	Poor stability; poor compaction characteristics; low resistance to piping.	Slow permeability; outlets may not be available.	Slow intake rate; seasonal high water table at a depth of 3 to 5 feet; susceptibility to salt accumulation.	Moderately good drainage; moderate compressibility.	Severe: seasonal high water table at a depth of 3 to 5 feet; slow permeability.	Moderate: very silty soil material.
Seasonal high water table at a depth of 3 to 5 feet.	Poor stability; poor compaction characteristics; low resistance to piping.	Slow permeability; outlets may not be available; highly corrosive for metal.	Slow to very slow intake rate: seasonal high water table at a depth of 3 to 5 feet; susceptibility to salt accumulation.	Seasonal high water table at a depth of 3 to 5 feet; highly corrosive for uncoated steel; moderate compressibility.	Severe: seasonal high water table at a depth of 3 to 5 feet; slow permeability.	Moderate: very silty soil material.
Seasonal high water table at a depth of 1½ to 4 feet; organic deposits; danger of water contamination.	High organic-matter content in upper part; poor to good stability and low to moderate resistance to piping in subsoil.	Moderate permeability; outlets difficult to establish.	Somewhat poor drainage; seasonal high water table at a depth of 1½ to 4 feet.	Seasonal high water table; low to moderate shrink-swell potential.	Moderate to severe: seasonal high water table at a depth of 1½ to 4 feet; moderate permeability.	Moderate to severe: moderate permeability; 2 to 15 percent organic-matter content; very silty surface soil material.
Moderately rapid permeability; rapid permeability in substratum; relief is nearly level to sloping.	Fair to poor stability; low resistance to piping.	Good drainage	Low available water capacity; moderate depth; hazard of erosion on sloping soils.	Features generally favorable.	Slight: moderate if slope is greater than 5 percent.	Moderate to severe: slope; silt or fine sand material.
Seasonal high water table near the surface; moderately rapid permeability.	Low resistance to piping; fair to poor stability.	Moderately rapid permeability; outlets very difficult to establish; seasonal high water table near the surface.	Poor or very poor drainage; seasonal high water table near the surface; moderate depth over sand and gravel.	Poor or very poor drainage; subject to flooding.	Severe: seasonal high water table near the surface.	Severe: moderately rapid permeability in substratum; seasonal high water table.
Duripan at a depth of 20 to 40 inches; relief is nearly level to gently sloping.	Surface soil has poor stability, poor compaction characteristics, and low resistance to piping; subsoil has fair to poor stability and compaction characteristics.	Good drainage	Slow intake rate; moderate depth; hazard of erosion on sloping soils.	High shrink-swell potential in subsoil; moderate to very high compressibility; duripan at a depth of 20 to 40 inches.	Severe: slow permeability; duripan at a depth of 20 to 40 inches; moderate to rapid permeability below duripan.	Slight to moderate: silty and clayey soil material; sloping in some areas.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Cruickshank: Cr, Cu	Poor: thin topsoil; seasonal high water table at a depth of 1 to 2 feet.	Unsuitable: deep overburden; water table hinders excavation.	Fair: sandy and silty soil material.	Seasonal high water table at a depth of 1 to 2 feet.	Moderate resistance to shearing; low resistance to piping.
Draper: DrA, DrB	Poor: thin topsoil; seasonal high water table.	Unsuitable: deep overburden; fair material below a depth of 55 inches; seasonal high water table hinders excavation.	Fair: seasonal high water table at a depth of 2 to 3 feet; moderate shear strength.	Seasonal high water table at a depth of 2 to 3 feet.	Moderate shrink-swell potential; low resistance to piping and cracking.
Durargidic Arents: DuB, DuC.	Poor: thin topsoil; duripan at a depth of 20 to 40 inches.	Unsuitable: deep overburden; none present in many areas.	Fair: moderate shrink-swell potential; moderate shear strength; silty or clayey material.	High frost-action potential; duripan at a depth of 20 to 40 inches.	Moderate shrink-swell potential; moderate to low resistance to shearing, piping, and cracking.
Elijah: EhA, EhB, EsA, EsB, EvC, EvD. (For Sebree soil in EsA and EsB, refer to Sebree series. For Vickery soil in EvC and EvD, refer to Vickery series.)	Poor: thin topsoil; high lime content in subsoil; duripan at a depth of 20 to 40 inches; some slopes of 4 percent.	Fair: well-rounded, well-sorted deposits as much as 50 feet thick below a depth of 2 to 4 feet; basalt bedrock underlies some soils southeast of Nampa.	Poor: moderate compressibility; moderate shear strength; clayey soil material.	High frost-action potential; duripan at a depth of 20 to 40 inches; bedrock at a depth of 3 to 5 feet in areas southeast of Nampa.	Moderate shrink-swell potential; moderate resistance to shearing; low resistance to piping and cracking.
EIA, EIB, EIC	Poor: thin topsoil; duripan at 14 to 20 inches; some slopes of 7 percent.	Fair: well-rounded, well-sorted deposits as much as 50 feet thick below a depth of 2 to 4 feet; basalt bedrock underlies some soils southeast of Nampa.	Poor: moderate compressibility; moderate shear strength; clayey material.	High frost-action potential; duripan at a depth of 14 to 20 inches; bedrock below the duripan in areas southeast of Nampa.	Moderate shrink-swell potential; moderate resistance to shearing; low resistance to piping and cracking.
Falk: FaA	Poor: thin topsoil; seasonal high water table at a depth of 3 or 4 feet.	Fair: well-rounded, well-graded sand and gravel below a depth of about 3 feet; water table hinders excavation.	Good below a depth of 3 feet; fair above.	Seasonal high water table at a depth of 3 to 4 feet.	Low resistance to piping.

interpretations of the soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Moderately rapid permeability; seasonal high water table at a depth of 1 to 2 feet.	Low resistance to piping; moderately rapid permeability.	Moderately rapid permeability; seasonal high water table at a depth of 1 to 2 feet.	Somewhat poor drainage; seasonal high water table at a depth of 1 to 2 feet; susceptibility to salt accumulation.	Somewhat poor drainage.	Moderate to severe: seasonal high water table at a depth of 1 to 2 feet.	Moderate: sandy and silty soil material; moderately rapid permeability.
Seasonal high water table at a depth of 2 to 3 feet.	Poor stability; poor compaction characteristics; poor resistance to piping.	Moderate permeability; seasonal high water table at a depth of 2 to 3 feet.	Somewhat poor drainage; seasonal high water table at a depth of 2 to 3 feet.	Somewhat poor drainage; moderate compressibility.	Moderate: seasonal high water table at a depth of 2 to 3 feet; moderate permeability.	Moderate: silty soil material; moderate permeability.
Duripan at a depth of 20 to 40 inches.	Low to moderate permeability.	Good drainage	Moderate depth; moderate to low available water capacity.	Good to poor compaction characteristics; moderate compressibility; duripan at a depth of 20 to 40 inches.	Severe: duripan at a depth of 20 to 40 inches; moderate permeability above the duripan.	Moderate: slopes of 2 to 7 percent; moderate permeability above the duripan.
Duripan at a depth of 20 to 40 inches; bedrock below duripan in some areas.	Low to moderate permeability.	Good drainage; duripan at a depth of 20 to 40 inches.	Moderate depth; moderate available water capacity.	Moderate shrink-swell potential; bedrock below a depth of 3 to 5 feet in some areas southeast of Nampa.	Severe: duripan at a depth of 20 to 40 inches; moderate to rapid permeability below duripan except in some areas southeast of Nampa where bedrock underlies the duripan.	Moderate to severe: duripan at a depth of 20 to 40 inches; some slopes greater than 2 percent.
Duripan at a depth of 14 to 20 inches; bedrock below duripan in some areas.	Limited amount of material.	Good drainage; duripan at a depth of 14 to 20 inches; bedrock below duripan in some areas.	Shallow soil; low to moderate available water capacity; hazard of water erosion on sloping soils.	Duripan at a depth of 14 to 20 inches; bedrock below duripan in some areas southeast of Nampa.	Severe: duripan at a depth of 14 to 20 inches; bedrock below duripan in some areas southeast of Nampa.	Severe: duripan at a depth of 14 to 20 inches; bedrock in some areas.
Moderately rapid permeability; seasonal high water table at a depth of 3 to 4 feet.	Low resistance to piping.	Moderately rapid permeability; seasonal high water table at a depth of 3 to 4 feet.	Seasonal high water table at a depth of 3 to 4 feet; low available water capacity.	Seasonal high water table at a depth of 3 to 4 feet.	Moderate: seasonal high water table at a depth of 3 to 4 feet.	Severe: silty soil material.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Feltham: FeB, FeC, FeD, FeE, FuD. (For Quincy soils in FuD, refer to Quincy series.)	Poor: low available water capacity; highly erosive.	Poor: excess of fines in sand; no gravel present.	Good: silty and sandy material to a depth of about 3 feet.	Hazard of erosion; slopes not stable; gentle to strong slopes.	Low resistance to piping.
Garbutt: GaA, GaB, GaC, GaD, GdB, GdC.	Poor: thin topsoil; some slopes of 12 percent.	None present	Fair: moderate shear strength; high frost-action potential.	High frost-action potential; depth to bedrock is 3 to 5 feet in areas near Melba.	Moderate resistance to shearing; low resistance to piping and cracking.
Grandview: Gn	Poor: strongly alkaline; subsoil has high clay content; slow permeability.	Unsuitable: overburden; seasonal high water table hinders excavation.	Poor: moderate compressibility; moderate shear strength; seasonal high water table hinders excavation.	Seasonal high water table at a depth of 3 to 5 feet; high frost-action potential.	Moderate shrink-swell potential; moderate resistance to shearing, piping, and cracking.
Greenleaf: GsA, GsB, GwA, GwB, GwC, GwD, GwE. (For Owyhee soil in GwA, GwB, GwC, GwD and GwE, refer to Owyhee series.)	Poor: thin topsoil; some slopes of 4 percent.	Unsuitable: well-graded, coarse, angular sand in a few areas northeast of Parma.	Fair: moderate compressibility; moderate shear strength; low to moderate shrink-swell potential.	High frost-action potential.	Low to moderate shrink-swell potential; moderate to low resistance to shearing, piping, and cracking.
GrA	Poor: thin topsoil; moderately fine textures.	None present	Fair: moderate compressibility; moderate shear strength; low to moderate shrink-swell potential.	High frost-action potential.	Low to moderate shrink-swell potential; moderate to low resistance to shearing, piping, and cracking.
Harpt: Ha	Poor: thin topsoil.	Unsuitable: deep overburden; excessive fines; little gravel.	Fair: moderate shear strength; moderate shrink-swell potential.	Features generally favorable.	Moderate shear strength; low resistance to piping and cracking.
Jacquith: JaB, JaC	Poor: highly erosive; low available water capacity; rapid permeability above the duripan.	Fair below a depth of 2 to 4 feet; mostly poorly graded sand with few layers of gravel.	Good	Erosion hazard where exposed; unstable.	Low resistance to piping.
Jenness: JeA, JeB, JeC	Poor: thin topsoil; some slopes of 7 percent.	Unsuitable for gravel; coarse, angular sands are below a depth of 4 or 5 feet.	Fair: moderate shear strength; low to moderate compressibility.	High frost-action potential.	Moderate resistance to shearing; low resistance to piping and cracking.

interpretations of the soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Moderate to rapid permeability; relief is gently to strongly sloping.	Low resistance to piping.	Good drainage	Low to very low available water capacity; hazard of erosion.	Good to poor compaction characteristics.	Slight to moderate: severe in steep areas; hazard of contaminating nearby water supplies.	Moderate to severe: silty soil material; gentle to strong slopes.
Moderate permeability; relief is nearly level to moderately sloping.	Poor stability; poor compaction characteristics; low resistance to piping.	Good drainage	Relief is nearly level to moderately sloping; slow intake rate.	Low to moderate compressibility.	Moderate: moderate permeability; moderate slopes in some areas.	Moderate to severe: silty soil material; moderate permeability; relief is nearly level to moderately sloping.
Seasonal high water table at a depth of 3 to 5 feet.	Moderate to high compressibility.	Slow permeability; seasonal high water table at a depth of 3 to 5 feet.	Seasonal high water table at a depth of 3 to 5 feet; susceptibility to salt accumulation.	Moderately good drainage; seasonal high water table at a depth of 3 to 5 feet; moderate shrink-swell potential.	Severe: slow permeability; seasonal high water table at a depth of 3 to 5 feet.	Slight.
Moderate permeability in subsoil; moderately slow permeability in substratum.	Surface and substratum have poor stability, poor compaction characteristics, and poor resistance to piping.	Good drainage	Slow intake rate	Low to moderate compressibility.	Severe: moderate permeability in subsoil; moderately slow permeability in substratum.	Slight to moderate: slope; silty and clayey material.
Moderate permeability in subsoil; moderately slow permeability in substratum.	Surface and substratum have poor stability, poor compaction characteristics, and low resistance to piping.	Good drainage	Slow intake rate	Moderate compressibility.	Moderate to severe: moderate permeability in subsoil; moderately slow permeability in substratum.	Slight.
Moderate permeability.	Moderate permeability; low resistance to piping and cracking.	Good drainage	Features generally favorable.	Features generally favorable.	Slight to moderate: moderate permeability.	Moderate: moderate permeability.
Rapid permeability; duripan at 20 to 40 inches.	Low resistance to piping.	Good drainage	Moderate depth over duripan; very low available water capacity.	Features generally favorable.	Severe: slow permeability in duripan; pan at a depth of 20 to 40 inches.	Moderate: silty soil material; slopes of 2 to 7 percent.
Moderate permeability.	Poor stability; poor compaction characteristics; low resistance to piping.	Good drainage	Hazard of water erosion on sloping soils.	Low to moderate compressibility.	Slight to moderate: moderate permeability.	Moderate: moderate permeability; silty soil material.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Lankbush: LaC, LaD, LaE, LaF, LeE, LhE, LkC, LkD. (For Elijah soil in LeE, refer to Elijah series. For Power soil in LhE, refer to Power series. For Vickery soil in LkC and LkD, refer to Vickery series.)	Poor: thin topsoil; moderately high clay content in subsoil; gently sloping to steep.	Fair: deep overburden; poorly graded coarse sand in many areas.	Poor: sandy or clayey material.	Moderate to high frost-action potential; gentle to steep slopes.	Moderate to low resistance to shearing, piping, and cracking.
Lankbush, dark variant: LnA.	Poor: thin topsoil; water table at a depth of 2 to 4 feet.	Unsuitable: deep overburden.	Fair to poor: moderate shear strength; low to moderate compressibility.	Seasonal water table at a depth of 2 to 4 feet; high frost-action potential.	Moderate to low resistance to shearing, piping, and cracking.
Letha:					
LsA, LsB	Poor: slow permeability; saline-alkali; seasonal high water table.	Poor: deep overburden; well-rounded, well-graded sand and gravel below a depth of about 4 feet; water table hinders excavation.	Good: seasonal high water table limits accessibility.	Seasonal high water table at a depth of 2½ to 4 feet; moderate frost-action potential.	Low resistance to piping and cracking.
LtA	Poor: slow permeability; saline-alkali; seasonal high water table.	Poor: deep overburden; well-rounded, well-graded sand and gravel below a depth of about 4 feet; water table hinders excavation.	Fair: seasonal high water table limits accessibility.	Seasonal high water table at a depth of 2½ to 4 feet; moderate frost-action potential.	Low resistance to piping and cracking.
Lolalita:					
LuG	Poor: thin topsoil; steep slopes; low available water capacity.	Poor: coarse angular sands containing a few gravels; deep overburden.	Good to fair: silty and sandy material.	Moderate frost-action potential; steep slopes; severe erosion hazard.	Low resistance to piping.
LvB, LvC, LvE	Poor: thin topsoil; low available water capacity.	Poor: coarse angular sands containing a few gravels; deep overburden.	Good to fair: silty materials.	Moderate frost-action potential; very gentle to strong slopes; severe erosion hazard where exposed.	Low resistance to piping and cracking.
Marsing: MgA, MgB, MgC, MgD, MgE.	Poor: thin topsoil; nearly level to strongly sloping.	Fair: 20 to 40 inches of overburden.	Fair: moderate shear strength; good to poor compaction characteristics.	Moderate frost-action potential; relief is nearly level to strongly sloping.	Moderate resistance to shearing; low resistance to piping and cracking.

interpretations of the soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Relief is gently sloping to steep.	Surface soil has low resistance to piping.	Good drainage	Hazard of water erosion on sloping soils.	Subsoil has low shear strength, moderate to high compressibility, and moderate shrink-swell potential.	Severe: moderately slow permeability; sloping soils.	Moderate to severe: slope.
Seasonal water table at 2 to 4 feet.	Moderate permeability.	Moderate permeability; seasonal water table at a depth of 2 to 4 feet.	Seasonal water table at a depth of 2 to 4 feet.	Seasonal water table at a depth of 2 to 4 feet.	Moderate: seasonal water table at a depth of 2 to 4 feet; moderate permeability.	Moderate: moderate permeability.
Seasonal high water table at a depth of 2½ to 4 feet.	Piping hazard	Slow permeability; seasonal high water table at a depth of 2½ to 4 feet.	Seasonal high water table at a depth of 2½ to 4 feet; susceptibility to salt and alkali accumulation.	Seasonal high water table; moderately good drainage.	Moderate: seasonal high water table at a depth of 2½ to 4 feet.	Moderate: slow permeability; sandy and silty soil material.
Seasonal high water table at a depth of 2½ to 4 feet.	Piping hazard	Slow permeability; seasonal high water table at a depth of 2½ to 4 feet; difficult to establish outlets.	Slow or very slow intake rate; seasonal high water table at a depth of 2½ to 4 feet; susceptibility to salt and alkali accumulation.	Seasonal high water table; moderately good drainage.	Severe: seasonal high water table at a depth of 2½ to 4 feet; slow permeability.	Moderate: slow permeability; sandy and silty soil material.
Steep slopes	Steep slopes	Good to somewhat excessive drainage.	Steep slopes	Steep slopes	Severe: steep slopes.	Severe: steep slopes.
Moderate permeability; gentle to strong slopes.	Piping hazard	Good drainage	Low available water capacity; hazard of water erosion on sloping soils.	Features generally favorable.	Slight to moderate: severe if slope is greater than 5 percent.	Moderate to severe: slope; moderate permeability; sandy and silty material.
Sand and gravel at a depth of 20 to 40 inches; nearly level to strongly sloping.	Poor stability; poor compaction characteristics; low resistance to piping.	Good drainage	Moderately deep; low to moderate available water capacity.	Good to poor compaction characteristics.	Slight to moderate: moderate to severe if slope is greater than 5 percent; moderate permeability in subsoil; rapid permeability in substratum.	Moderate to severe: slope; moderate permeability; silty soil material.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Minidoka: MkA, MkB, MnC, MnD. (For Scism soil in MnC and MnD, refer to Scism series.)	Poor: thin topsoil.	Fair below the duripan.	Fair: moderate shear strength; good to poor compaction characteristics; high frost-action potential.	High frost-action potential.	Moderate resistance to shearing; low resistance to piping and cracking; duripan at a depth of 20 to 40 inches.
Moulton: MoA	Poor: very low available water capacity; seasonal high water table.	Fair: well-rounded, well-graded sand and gravel below a depth of 2 to 4 feet; water table hinders excavation.	Good: seasonal high water table limits accessibility.	Seasonal high water table at a depth of 2 to 3 feet; a few seeped areas and drainageways; moderate frost-action potential.	Low resistance to piping.
MtA, MtB	Poor: thin topsoil; low available water capacity; seasonal high water table.	Fair: well-rounded, well-graded sand and gravel below a depth of 2 to 4 feet; water table hinders excavation.	Good: seasonal high water table limits accessibility.	Seasonal high water table at a depth of 2 to 3 feet; a few seeped areas and drainageways; moderate frost-action potential.	Low resistance to piping.
MuA	Poor: saline; low available water capacity; seasonal high water table.	Fair: well-rounded, well-graded sand and gravel below a depth of 2 to 4 feet; water table hinders excavation.	Good to fair: in places seasonal high water table limits accessibility.	Seasonal high water table at a depth of 2 to 3 feet; a few seeped areas and drainageways; moderate frost-action potential.	Low resistance to piping.
MvA	Poor: somewhat poorly drained; seasonal high water table.	Fair: well-rounded, well-graded sand and gravel below a depth of 2 to 4 feet; water table hinders excavation.	Good: seasonal high water table limits accessibility.	Seasonal high water table at a depth of 2 to 3 feet; a few seeped areas and drainageways; moderate frost-action potential.	Moderate resistance to shearing; low resistance to piping and cracking.

interpretations of the soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Duripan at a depth of 20 to 40 inches.	Low to moderate permeability.	Good drainage	Slow intake rate; moderate depth; moderate available water capacity.	Low to moderate compressibility; duripan at a depth of 20 to 40 inches.	Severe: duripan at a depth of 20 to 40 inches.	Moderate: duripan at a depth of 20 to 40 inches.
Seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Piping hazard	Moderately rapid permeability; seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Somewhat poor drainage; seasonal high water table at a depth of 2 to 3 feet; moderate depth; low available water capacity.	Seasonal high water table at a depth of 2 to 3 feet.	Moderate: seasonal high water table at a depth of 2 to 3 feet.	Severe: moderately rapid permeability.
Seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Piping hazard	Moderately rapid permeability; seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Somewhat poor drainage; seasonal high water table at a depth of 2 to 3 feet; moderate depth; low available water capacity.	Seasonal high water table at a depth of 2 to 3 feet.	Moderate: seasonal high water table at a depth of 2 to 3 feet.	Severe: moderately rapid permeability.
Seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Piping hazard	Moderate to moderately rapid permeability; seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Somewhat poor drainage; seasonal high water table at a depth of 2 to 3 feet; low available water capacity; susceptibility to salt and alkali accumulation.	Seasonal high water table at a depth of 2 to 3 feet.	Moderate: seasonal high water table at a depth of 2 to 3 feet.	Moderate to severe: moderate to moderately rapid permeability.
Seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Piping hazard	Moderate to moderately rapid permeability; seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Moderate available water capacity; somewhat poor drainage.	Seasonal high water table at a depth of 2 to 3 feet.	Moderate: seasonal high water table at a depth of 2 to 3 feet.	Moderate to severe: moderate to moderately rapid permeability.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Moulton—Continued MwA	Poor: thin topsoil; saline; seasonal high water table.	Fair: well-rounded, well-graded sand and gravel below a depth of 2 to 4 feet; water table hinders excavation.	Good: in places seasonal high water table limits accessibility.	Seasonal high water table at a depth of 2 to 3 feet; a few seeped areas and drainageways; moderate frost-action potential.	Moderate resistance to shearing; low resistance to piping and cracking.
Nannyton: NaB, NaC	Poor: thin topsoil; slopes of 2 to 7 percent.	Fair: in some areas strata containing excessive fines are below a depth of 2 to 4 feet.	Fair to good: moderate shear strength; good to poor compaction characteristics; low to moderate compressibility; silty and clayey materials.	Moderate frost-action potential.	Moderate resistance to shearing; low resistance to piping and cracking.
Notus: No	Poor: shallow; low available water capacity; seasonal high water table at a depth of 1 to 3 feet.	Good: water table hinders excavation.	Good	Seasonal high water table at a depth of 1 to 3 feet; less than 20 inches to gravel and sand.	Low resistance to piping; less than 20 inches deep to sand and gravel.
Nyssaton: NsA, NsB, NsC, NsD2, NsE2.	Poor: thin topsoil; nearly level to strongly sloping.	None present	Fair: moderate compressibility; moderate shear strength; low shrink-swell potential; high frost-action potential.	High frost-action potential; relief is nearly level to strongly sloping.	Moderate resistance to shearing; low resistance to piping and cracking.
Oliaga: OgA, OgB	Poor: somewhat poorly drained.	Fair below a depth of 2 to 3 feet; seasonal high water table hinders excavation.	Fair: moderate shear strength; seasonal high water table.	Seasonal high water table at a depth of 2 to 3 feet.	Moderate resistance to shearing; low resistance to piping and cracking.
OlA	Poor: somewhat poorly drained.	Fair below a depth of 2 to 3 feet; seasonal high water table hinders excavation.	Fair: moderate shear strength; seasonal high water table.	Seasonal high water table at a depth of 2 to 3 feet.	Moderate resistance to shearing; low resistance to piping and cracking.

interpretations of the soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Piping hazard----	Moderate to moderately rapid permeability; seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Moderate available water capacity; susceptibility to salt and alkali accumulation.	Seasonal high water table at a depth of 2 to 3 feet.	Moderate: seasonal high water table at a depth of 2 to 3 feet.	Moderate to severe: moderate to moderately rapid permeability.
Moderate permeability.	Gravelly material; moderate permeability.	Good drainage--	Moderate depth; moderate available water capacity; hazard of erosion on sloping soils.	All features favorable.	Moderate: moderate permeability; very rapid permeability in substratum.	Moderate: sandy and silty soil material.
Seasonal high water table at a depth of 1 to 3 feet; sand and gravel at a depth of less than 20 inches.	Limited amount of suitable material.	Seasonal high water table at a depth of 1 to 3 feet; sand and gravel at a depth of less than 20 inches.	Somewhat poor drainage; seasonal high water table; shallow soil; very low available water capacity.	Seasonal high water table at a depth of 1 to 3 feet.	Moderate to severe: seasonal high water table at a depth of 1 to 3 feet.	Severe: moderately rapid to rapid permeability.
Relief is nearly level to strongly sloping.	Poor stability; poor compaction characteristics; low resistance to piping.	Good drainage--	Slow intake rate; hazard of erosion on sloping soils.	Low to moderate compressibility.	Severe: moderately slow permeability in subsoil; sloping soils in places.	Moderate to severe: slope.
Seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches.	Piping hazard----	Seasonal high water table at a depth of 2 to 3 feet; sand and gravel at a depth of 20 to 40 inches; moderate permeability.	Moderate depth; seasonal high water table; moderate to low available water capacity.	Somewhat poor drainage.	Moderate: seasonal high water table at a depth of 2 to 3 feet.	Moderate: silty soil material.
Seasonal high water table at a depth of 1 to 3 feet; sand and gravel at a depth of 20 to 40 inches; moderate permeability.	Piping hazard----	Seasonal high water table at a depth of 1 to 3 feet; sand and gravel at a depth of 20 to 40 inches; moderate permeability.	Moderate depth; seasonal high water table; moderate to low available water capacity; susceptibility to salt and alkali accumulation.	Seasonal high water table at a depth of 1 to 3 feet.	Moderate to severe: seasonal high water table at a depth of 1 to 3 feet.	Moderate: silty soil material.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Owyhee: OwA, OwB, OwC	Poor: thin topsoil; nearly level to gently sloping.	None present	Fair: moderate compressibility; moderate shear strength; high frost-action potential.	High frost-action potential.	Moderate resistance to shearing; low resistance to piping and cracking.
Potratz: PaB, PcC, PeB, PeC (For Power soil in PcC, PeB, and PeC, refer to Power series.)	Poor: thin topsoil.	Unsuitable: basalt bedrock at a depth of 2 to 3 feet.	Fair: moderate shear strength; bedrock at a depth of 2 to 3 feet.	Bedrock below a depth of 2 to 3 feet.	Moderate to low resistance to shearing, piping, and cracking; bedrock at a depth of 2 to 3 feet.
Power: PhA, PhB, PhC, PhD, PlD, PoA, PoB, PpA, PpB, PpC, PpD. (For Lankbush soil in PlD, refer to Lankbush series. For Potratz soil in PoA and PoB, refer to Potratz series. For Purdam soil in PpA, PpB, PpC, and PpD, refer to Purdam series.)	Poor: thin topsoil; nearly level to moderately sloping.	Poor to unsuitable: deep overburden; well-rounded deposits as much as 50 feet thick below a depth of about 5 feet.	Fair: moderate shear strength; moderate compressibility; good to poor compaction characteristics.	High frost-action potential.	Moderate to low resistance to shearing, piping, and cracking.
Purdam: PrA, PrB, PrC, PtA, PtB. (For Sebree soil in PtA and PtB, refer to Sebree series.)	Poor: thin topsoil; some slopes of 7 percent.	Fair: well-rounded, well-sorted deposits as much as 50 feet thick below a depth of 3 to 4 feet.	Fair: moderate shear strength; moderate compressibility; good to poor compaction characteristics.	High frost-action potential.	Moderate to low resistance to shearing, piping, and cracking.
PsA	Poor: somewhat poorly drained.	Fair to unsuitable: bedrock or water table hinders excavation.	Fair: moderate shear strength; moderate compressibility; good to poor compaction characteristics; seasonal high water table limits accessibility.	Seasonal high water table at a depth of 2 to 3 feet; bedrock below the duripan in areas southeast of Nampa.	Moderate to low resistance to shearing, piping, and cracking.
Quincy: QcB, QcD, QcE, QfB, QfD. (For Feltham soil in QfB and QfD, refer to Feltham series.)	Poor: very low available water capacity; very erosive.	Unsuitable for gravel: good for poorly graded fine sands.	Good	Unstable slopes; high erosion hazard where exposed; loose sand hinders hauling operations.	Low resistance to piping.
Scism: ScA, ScB, ScC, ScD, SdA, SdB, SdC, SdD.	Poor: thin topsoil; nearly level to moderately sloping.	Unsuitable: fine-grained material.	Fair: moderate compressibility; moderate shear strength; low shrink-swell potential; high frost-action potential.	High frost-action potential.	Moderate resistance to shearing; low resistance to piping and cracking.

interpretations of the soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Relief is nearly level to gently sloping.	Poor stability; poor compaction characteristics; low resistance to piping.	Good drainage	Slow intake rate; hazard of erosion on sloping soils.	Low to moderate compressibility.	Severe: moderately slow permeability in substratum.	Moderate: silty soil material.
Bedrock below a depth of 2 to 3 feet.	Low to moderate permeability; low to moderate volume change.	Good drainage	Moderate depth; moderate available water capacity.	Bedrock at a depth of 2 to 3 feet.	Severe: bedrock at a depth of 2 to 3 feet.	Severe: bedrock at a depth of 2 to 3 feet.
Moderate permeability; relief is nearly level to moderately sloping.	Mixed profile has poor stability, poor compaction characteristics, and low resistance to piping.	Good drainage	Slow intake rate; hazard of erosion on sloping soils.	Medium compressibility.	Slight to moderate: moderate permeability; sloping soils.	Moderate to severe: slope; moderate permeability.
Duripan at a depth of 20 to 40 inches.	Mixed profile has poor stability, poor compaction characteristics, and low resistance to piping.	Good drainage	Slow intake rate; moderate depth to duripan; hazard of erosion on sloping soils.	Duripan at a depth of 20 to 40 inches.	Severe: slow permeability in duripan; pan at a depth of 20 to 40 inches.	Moderate: silty and clayey soil material.
Seasonal high water table at a depth of 2 to 3 feet; bedrock below duripan in some areas.	Mixed profile has poor stability, poor compaction characteristics, and low resistance to piping.	Seasonal high water table at a depth of 2 to 3 feet; duripan at a depth of 20 to 40 inches; bedrock below duripan in some areas.	Seasonal high water table; susceptibility to salt and alkali accumulation.	Seasonal high water table at a depth of 2 to 3 feet; duripan at a depth of 20 to 40 inches.	Moderate to severe: seasonal high water table at a depth of 2 to 3 feet; bedrock below duripan in some areas.	Moderate to severe: silty soil material; bedrock in some areas.
High erosion hazard; very rapid permeability.	Piping and cracking hazard.	Very rapid permeability.	Low to very low available water capacity; hazard of erosion.	Poor stability unless confined.	Slight to severe: some sloping soils; hazard of contaminating nearby water supplies.	Severe: very rapid permeability.
Moderate permeability.	Poor stability and compaction characteristics; low resistance to piping.	Good drainage	Slow intake rate; hazard of erosion on sloping soils.	Poor to good compaction characteristics.	Moderate: moderate permeability; sloping soils.	Moderate to severe: slope; silty soil material.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Sebree Mapped only in complexes with Elijah and Purdam soils.	Poor: saline-alkali; very slow permeability.	Fair for sand in some areas; mostly angular coarse sand containing some gravel.	Fair: low to moderate shrink-swell potential; moderate compressibility; moderate shear strength; silty and clayey materials.	High frost-action potential.	Moderate to low resistance to shearing, piping, and cracking; low to moderate shrink-swell potential.
Timmerman: TeB, TeC	Fair to poor: slopes of 2 to 7 percent; low available water capacity.	Fair: poorly graded in some locations.	Good	All features favorable.	Moderate to low resistance to piping; moderately rapid permeability.
TgB, TgD	Fair to poor: low available water capacity; slopes of 2 to 12 percent.	Fair: poorly graded in some locations.	Good	All features favorable.	Low resistance to piping.
Trevino: TkE, TrB, TrD	Poor: thin topsoil.	Unsuitable: basalt bedrock at a depth of 1 to 2 feet.	Fair: moderate shear strength; bedrock at a depth of 1 to 2 feet.	Bedrock at depth of 1 to 2 feet.	Low resistance to piping and cracking; bedrock at a depth of 1 to 2 feet.
Truesdale: TsA, TsB, TsC, TsD.	Poor: thin topsoil; duripan at a depth of 20 to 40 inches; some slopes of 12 percent.	Poor to unsuitable: deep overburden; excess fines; sand in only a few areas.	Good	Moderate frost-action potential.	Low resistance to piping and cracking; duripan at a depth of 20 to 40 inches.
Turbyfill: TuA, TuB, TuC, TuD, TuE.	Poor: thin topsoil; strong slopes.	Poor to unsuitable: deep overburden; excessive fines; sand in only a few locations.	Good to fair: sandy and silty materials.	Moderate frost-action potential.	Low resistance to piping and cracking.
TvA, TvB, TvC	Poor: thin topsoil; nearly level to gently sloping.	Poor to unsuitable; deep overburden; excessive fines; sand in only a few locations.	Good to fair: sandy and silty materials.	Moderate frost-action potential.	Low resistance to piping and cracking.

interpretations of the soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Duripan at a depth of 20 40 inches.	Slow to moderate permeability.	Good drainage	Very slow intake; saline-alkali; moderate depth; low to moderate available water capacity.	Low to moderate shrink-swell potential; low to moderate compressibility; duripan at a depth of 20 to 40 inches.	Severe: duripan at a depth of 20 to 40 inches; very slow permeability.	Severe: soil occurs as small areas.
Moderately rapid permeability.	Fair to poor stability; moderately rapid permeability.	Good drainage	Low available water capacity; moderate depth to sand and gravel.	All features favorable.	Slight	Severe: moderately rapid permeability.
Rapid permeability.	Rapid permeability; piping hazard.	Good drainage	Very low available water capacity; shallow soil; hazard of soil blowing and water erosion.	All features favorable.	Slight to moderate: sloping soils.	Severe: rapid permeability.
Bedrock at a depth of 1 to 2 feet.	Limited amount of suitable material.	Good drainage	Shallow soil; very low to low available water capacity; some areas are very rocky; hazard of erosion on sloping soils.	Bedrock at a depth of 1 to 2 feet.	Severe: bedrock at a depth of 1 to 2 feet.	Severe: bedrock at a depth of 1 to 2 feet.
Moderately rapid permeability; duripan at a depth of 20 to 40 inches.	Moderately rapid permeability; piping and cracking hazard.	Good drainage	Low available water capacity; moderate depth to duripan; hazard of erosion on sloping soils.	Duripan at a depth of 20 to 40 inches.	Severe: slow permeability in duripan at a depth of 20 to 40 inches; moderate to rapid permeability below the duripan; sloping soils.	Moderate to severe: slope; sandy and silty soil material.
Moderate permeability.	Moderate permeability; piping hazard.	Good drainage	Moderate available water capacity; hazard of erosion on sloping soils.	Features generally favorable.	Slight	Moderate to severe: slope; silty and sandy soil material.
Moderate permeability.	Moderate permeability; piping hazard.	Good drainage	Moderate available water capacity; hazard of erosion on sloping soils.	Features generally favorable.	Slight	Moderate: sandy and silty soil material.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway location	Dikes and levees
Vanderhoff: VaB, VaC, VaD, VaE	Poor: thin topsoil; calcareous; very gently sloping to strongly sloping.	Unsuitable: soft siltstone at a depth of 20 to 40 inches.	Fair: moderate shear strength; good to poor compaction characteristics.	High frost-action potential; very gentle to strong slopes.	Low resistance to piping and cracking; siltstone at a depth of 20 to 40 inches.
VbG (Properties of Badland in this unit are too variable to rate.)	Poor: steep and gravelly.	Unsuitable: soft siltstone at a depth of 20 to 40 inches.	Fair: moderate shear strength; good to poor compaction characteristics.	Moderate frost-action potential; erosion hazard in steep areas.	Low resistance to piping and cracking; siltstone at a depth of 20 to 40 inches.
Vickery: VmB, VmC, VmD (For Marsing soil in VmB, VmC, and VmD, refer to Marsing series.)	Poor: thin topsoil; duripan at a depth of 20 to 40 inches; slopes of 2 to 12 percent.	Fair for sand in some areas; mostly angular coarse sand containing some gravels.	Fair: moderate shear strength; good to poor compaction characteristics.	High frost-action potential.	Low resistance to piping and cracking; duripan at a depth of 20 to 40 inches.

Shrink-swell potential is an indication of the volume change to be expected in soil material with changes in moisture content. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates hazards to the maintenance of structures constructed in, on, or with such materials.

Corrosivity, as used in table 5, indicates the potential danger to uncoated metal caused by chemical action in the soil that dissolves or weakens the structural material. Structural materials may corrode when buried in soil, and a given material corrodes in some kinds of soil more rapidly than in others. Extensive installations that intersect soil boundaries or soil horizons are more likely to be damaged by corrosion than are installations placed entirely in one kind of soil or soil horizon.

Engineering Interpretations of the Soils

Table 6 contains information useful to engineers and others who plan to use soil material in construction of highways, farm facilities, buildings, and sewage disposal systems. Detrimental or undesirable features are emphasized, but very important desirable features also are listed. The ratings and other interpretations in this table are based on the estimated engineering properties of the soils shown in table 5; on available test data, including those in table 4; and on field experience. The information applies strictly to soil depths indicated in table 5, although it is reasonably reliable to depths of about 6 feet for most soils and somewhat deeper for some.

Topsoil refers to soil material used to topdress lawns, roadbanks, and the like. The ratings indicate suitability for such use and are based mainly on fertility and organic-matter content.

Ratings for sand and gravel are based on the probability that areas of the soil contain deposits of sand or gravel. The ratings do not indicate the quality or size of the deposits.

Road fill is material used to build embankments that support the subbase and base courses or the surface course of roads. The ratings are based on the performance of soil material removed from borrow areas and used for highway subgrade. In general, a sandy material that contains adequate binder is the best. Plastic clays or organic materials are the poorest.

Highway location is affected by features that affect construction and maintenance of highways. The entire profile of undisturbed soil is considered, but it is assumed that the surface layer, because of its organic-matter content, will be removed in construction. Favorable and unfavorable features are given.

Dikes and levees are low structures designed to impound or divert water. The soil features given are those of disturbed soil materials used to construct low dikes and levees.

Farm pond reservoir areas are affected mainly by seep-

interpretations of soils—Continued

Soil features affecting—Continued					Degree and kind of limitation for—	
Farm ponds		Agricultural drainage	Irrigation	Foundations for low buildings	Septic tank filter fields	Sewage lagoons
Reservoir area	Embankment					
Very gentle to strong slopes.	Poor stability; poor compaction characteristics; low resistance to piping.	Good drainage	Moderate depth; low available water capacity; hazard of erosion on sloping soils.	Moderate compressibility and shear strength; siltstone at a depth of 20 to 40 inches; very good stability except where exposed.	Severe: siltstone at a depth of 20 to 40 inches; sloping soils.	Severe: siltstone at a depth of 20 to 40 inches.
Features generally unfavorable.	Features generally unfavorable.	Features generally unfavorable.	Features generally unfavorable.	Features generally unfavorable.	Very severe: slope.	Very severe: slope.
Duripan at a depth of 20 to 40 inches; moderate permeability.	Poor stability; poor compaction characteristics; low resistance to piping.	Good drainage	Slow intake rate; moderate depth; hazard of erosion on sloping soils.	Duripan at a depth of 20 to 40 inches; low to moderate compressibility.	Severe: duripan at a depth of 20 to 40 inches; sloping soils.	Moderate to severe: slope; silty soil material.

age of water, and the soil features given are those that influence the rate of seepage. Farm pond embankments serve as dams. Features of both the subsoil and the substratum are given. The features listed are those that influence the suitability of disturbed and compacted soil materials for constructing earth fills.

Agricultural drainage is principally affected by soil permeability and depth to cemented layer, rock, sand, or other material that impedes or accelerates the movement of water through the soil. Other factors to be considered are the presence of a water table and the topographic position of the soil. Also considered are features that affect the installation of drainage systems. Irrigation is affected by such features as slope, erodibility, water intake, and drainage.

Foundations for low buildings are affected chiefly by features of undisturbed soil that influence its capacity to support low buildings that have normal foundation loads. Specific values of bearing capacity are not assigned.

Septic tank filter fields are affected mainly by soil permeability, the water table, and the susceptibility to flooding. The degree of limitation and the principal reasons for moderate or severe limitations are given. A sewage lagoon is a shallow lake used to hold sewage for the time required for bacterial decomposition. Soil features such as permeability, water table, and slope are considered. The degree of limitation and the principal reasons for moderate or severe limitations are given.

Formation and Classification of the Soils

This section describes the major factors of soil formation and explains how they have affected the formation of soils in the Canyon Area. It also shows how the soils have been classified according to the current system of classification.

Factors of Soil Formation

Soil is produced by the action of soil-forming processes on geologic materials. The characteristics of a given soil are determined by the nature of the parent material, the relief, or lay of the land, the plant and animal life in and on the soil, the climate where the soil formed, and the length of time factors of soil formation have acted on the soil material.

In addition to natural factors of soil formation, man has altered the characteristics of soils in the Canyon Area through irrigation and plowing and through the use of fertilizers and insecticides. Application of irrigation water accelerates the leaching of soluble salts and plant nutrients, and smoothing the soils for irrigation changes the relief of many areas. Deep plowing to break up impermeable layers or to bring to the surface materials that have more favorable physical and chemical characteristics

has completely altered some soils. New soils formed by deep plowing are described as Durargidic Arents. Fertilizers change the physical characteristics of soils, and insecticides applied to control such pests as wireworm eliminate organisms from the soils. The accumulation of lead arsenate in the surface layer of soils in orchards commonly makes some soils too toxic for good growth of such crops as corn or potatoes during the first two years following the removal of the trees.

In the following paragraphs the natural factors of soil formation are discussed.

Parent material

Parent material is the unconsolidated mass from which a soil forms. It determines the chemical and mineralogical composition of the soil. The soils in the Canyon Area formed mainly in fluviatile sediments and eolian materials. Eolian materials accumulated through the action of wind, and fluviatile sediments accumulated through the action of water.

Eolian materials are of two kinds: sands near the flood plains of the Snake and Boise Rivers and calcareous loess on the higher terraces and uplands. Soils of the Quincy and Feltham series formed in sandy materials, whereas soils of the Bahem, Chilcott, Greenleaf, Lankbush, and Power series formed in silty loess.

Fluviatile sediments consist of unconsolidated clay, silt, sand, and gravel that are mixed in varying proportions. These materials were derived mostly from rhyolite, quartz monzonite, diorite, and arkose, but they contain some scoria and basalt. The most recent deposits are along flood plains and on very low terraces. Older sediments are on terraces and uplands above the flood plains. The older sediments consist of clay, silt, sand, cinders, and gravel and contain some limy cementing material that is mostly caliche. The soils that formed in the older sediments generally are well drained, have moderately developed profiles, and consist of loess in the upper part. Soils of the Power, Purdam, and Marsing series formed in this type of material. Soils that formed in the recent sediments generally have weakly developed profiles, are medium textured or moderately coarse textured, and are somewhat poorly drained. Soils of the Baldock and Moulton series formed in recent fluviatile sediments.

Other less extensive parent materials are recent shallow lacustrine deposits, recent lava flows and cinder deposits, diatomite, and eroded material of older fluviatile or lacustrine sediments.

Recent silty lacustrine sediments that have a loess mantle occur on medium and low terraces near Notus, Parma, Greenleaf, Wilder, Marsing, and Graveyard Point. Soils of the Nyssaton, Owyhee, and Greenleaf series formed in these sediments. These soils are well drained and silty, and they have weakly to moderately developed profiles.

Recent lava flows and cinder deposits occur in a belt 5 to 10 miles wide north of the Snake River in the southern part of Canyon County. The material consists of fine-textured to coarse-textured fissure basalt flows and pyroclastics. Soils of the Trevino, Bahem, Scism, and Power series formed in areas where these materials were covered by loess. Areas where these materials are not covered by loess consist mainly of barren basalt outcrops.

Diatomite and volcanic tuff occur at higher elevations east of the Area and in older fluviatile and lacustrine sediments within the Canyon Area. These materials contain large amounts of ash. These diatomaceous and ashy materials have accumulated in the Catherine soils that occur west of Caldwell and in the Garbutt soils that occur in Owyhee County.

Relief

The relief, or topography, of the landform influences the genesis of soils through its effect on drainage, erosion, plant cover, and soil temperature. Most of the Canyon Area consists of nearly level to gently sloping soils on terraces and uplands. Alluvial fans, low terraces, and bottom lands occur near drainageways, streams, and rivers. Uplands north of the Boise River generally are rolling, and the soils range from gently sloping to moderately steep. Steep and very steep soils occur mainly near the Snake River in the southwestern part of the Area.

Relief influences the movement of water across or through the soil profile. Water that moves across a soil tends to erode it. Water that moves through soil leaches plant nutrients and soil material and causes these materials to accumulate in lower horizons of the profile. In low wet areas, where soils of the Baldock, Bram, Letha, and Moulton series occur, water and soluble salts from higher areas accumulate in the soil profile. On terraces and uplands, where level to gently sloping soils of the Chilcott, Greenleaf, Lankbush, and Power series occur, most of the natural precipitation moves downward through the soil profile transferring soluble salts and carbonates to lower horizons and causing silicate clay to accumulate in Bt horizons. Through erosion, deep noncalcareous alluvium consisting of material from higher soils has accumulated along bottom lands and drainageways in the uplands. Soils of the Jenness series formed in this deep alluvium.

Differences in temperature also affect the characteristics of soils. The soils of the Bahem and Vanderhoff series provide an example.

Bahem soils formed on steep north-facing slopes. They have lower temperatures, contain more moisture, and consequently have denser vegetation than Vanderhoff soils. Their A1 horizon is 2 percent organic matter. The vegetation helps prevent erosion and causes water to move through the profile. Carbonates have been leached from the A horizon, and a cambic horizon has developed.

Vanderhoff soils formed on steep south-facing slopes. These soils have higher temperatures and contain less moisture than the Bahem soils. Consequently, vegetation on the Vanderhoff soils is very sparse. Water moves across the soils, carbonates are not leached but remain at or near the surface, and erosion is active.

Living organisms

Plants that grow on the soil and microorganisms and animals that live on and in the soil affect the formation of soils through additions of organic matter and nitrogen, formation of organic acids, gains or losses in plant nutrients, changes in structure and porosity, and through their influence on the soil climate.

Most soils in the Area formed under desert shrubs, sagebrush, and bunch grasses. The organic-matter content in most soils is 1 or 2 percent in the uppermost 15 inches. More vegetation grows on uplands where precipitation is greater than in dry areas near the Snake River. Where

vegetation is denser, the amount of organic matter in the soil is greater, and the hazard of erosion is less severe.

The kind of plants that grow on a soil affect its characteristics. In desert areas near the Snake River, greasewood plants have retarded the development of distinct horizons in Garbutt soils by drawing salts from the subsoil and redepositing them on the surface in fallen leaves. In areas where the water table is in the profile, as in saline-alkali Baldock, Bram, and Letha soils, salt-tolerant plants redeposit salts on the soil surface and also retard the development of distinct soil horizons.

Climate

The climate is arid, temperate, and fairly uniform throughout the Canyon Area. Differences in elevation are slight, and the movement of winds is not restricted. Annual precipitation averages 10 inches in most of the Area, but it is about 6 to 8 inches in a narrow strip in the southwestern part near the Snake River, and about 12 inches in the northeastern part. Prevailing winds blow from the northwest during warmer months and from the southeast the rest of the year. Strong winds occur most often near and along the Snake River.

Because the climate is arid and temperate, the soils generally have weakly developed profiles, are unleached, are alkaline, and have high natural fertility. The subsoil generally contains more lime than the surface layer, but the strongest concentrations of lime are not consistently related to depth. Near the Snake River, the amount of water available is low because of stronger winds and low precipitation. The soils in this area, such as those of the Garbutt, Nyssaton, and Bahem series, are weakly developed. They are calcareous at or very near the surface, and they have a Cca horizon that contains only slightly more lime than the parent materials. Where precipitation is greater, as in areas northeast of the Snake River, more organic matter is in the A horizon, lime is leached to greater depth, and more clay is accumulated in the profile. Soils of the Elijah and Lankbush series occur in these areas.

Time

The soils in the Canyon Area range from young to relatively old according to the length of time the parent material has been in place and has been exposed to factors of soil formation.

Older soils have well-defined horizons and commonly occur on the oldest and most stable land formations. Among these are soils of the Chilcott and Elijah series. Chilcott soils have a strong clayey Bt horizon and a strongly cemented or indurated duripan.

Young soils generally occur on unstable land formations where new soil material, such as alluvium, is continually added or where soil material is continually removed through water erosion or soil blowing. Young soils of the Baldock, Garbutt, Jenness, and Moulton series formed near streams, in drainageways, or on alluvial fans where they receive fresh deposits of parent material. Some sloping soils are young because natural erosion removes soil material nearly as rapidly as the soil horizons develop. Examples are steep Lolalita and Vanderhoff soils that continue to develop in fresh underlying parent material. Other soils, such as those of the Feltham and Quincy series, are young because they formed in sand dunes or eolian materials that have stabilized only recently. In steep, barren areas, the rate of erosion exceeds the rate of soil development, and only parent material suitable for soil formation is present.

Processes of Soil Formation

Most of the soils in the Canyon Area have a weakly developed or only moderately developed profile. Profile development is a result of (1) accumulation of organic matter, (2) leaching of soluble salts and carbonates, (3) formation of silicate clay from primary minerals, (4) translocation of carbonates, silicate clay, and particles from one horizon to another, (5) accumulation of salts and alkali, (6) chemical change and transfer of iron, and (7) translocation and concentration of silicates or silica in a cemented layer. These factors are discussed in the following paragraphs.

Accumulation of organic matter.—Some organic matter has accumulated in the uppermost 15 inches of all the soils. The amount varies. It is about 0.5 percent in Vanderhoff and Nannyton soils, 1.0 to 1.5 percent in Greenleaf, Chilcott, Lankbush, and Power soils, and 1.5 to 3.0 percent in somewhat poorly drained Baldock and Moulton soils. Soils in very dry areas, such as those of the Garbutt and Nannyton series, have a thin A1 horizon only beneath and within several inches of the naturally sparse vegetation, and the C1 horizon is at the surface in about 60 percent of the area.

Leaching of carbonates and salts.—Salts and carbonates have been leached in all well-drained soils and, in most cases, this has been the most important process in horizon differentiation. In only a few soils have all soluble salts and carbonates been leached from the profile. In soils that have weakly developed profiles, such as those of the Bahem series, carbonates have been leached only partly from the A1 and C1 horizons, and a weak or moderate accumulation of carbonates occurs at a depth of 16 to 24 inches. In soils that have a moderately developed profile, such as those of the Scism series, more carbonates have been leached from the uppermost 10 to 16 inches and a moderate or strong concentration of carbonates occurs at a depth of 20 to 24 inches. In soils that have a strong profile, such as those of the Lankbush and Chilcott series, the A1 horizon is neutral or slightly acid and carbonates are concentrated in strongly calcareous lower horizons.

Formation of silicate clay.—Following the removal of carbonates, which retard the disintegration of primary silicates, silicate clay minerals develop more rapidly. Silicate clay that formed from primary minerals in the presence of alkalies and alkaline earths, especially potassium and magnesium, is predominately illite or montmorillonitic. The presence of calcium favors the formation of montmorillonite and inhibits the formation of kaolinite (*4*). Although montmorillonite is the dominant clay mineral in mature soils of the Area, other clay minerals, including illite and to a lesser extent kaolinite, occur in many of the soils. The kaolinite was present in parent materials that were transported from other climatic zones or were accumulated in the shallow sediments of ancient Payette Lake.

Translocation of silicate clay.—In many of the soils of the Area, clay has been removed from the A horizon and has accumulated in Bt horizons. This is true of all soils that have a textural B horizon. It is most evident in soils having

moderately fine textured or fine textured B2t horizons, such as those of the Chilcott, Lankbush, Elijah, Power, Purdam, and Greenleaf series. In some soils, the amount of silicate clay that is formed, translocated, and accumulated is not sufficient to form a textural B horizon. In these soils most carbonates and salts have been leached from the upper horizons, a blocky or prismatic structure has formed below the A horizon, and only a very small amount of clay has accumulated. Under these conditions, a cambic horizon forms where not enough clay has accumulated to form a Bt horizon. Soils of the Minidoka series have a cambic horizon.

Accumulation of salts and alkali.—Saline-alkali soils form where ground water moves upward through the profile. Soluble salts and carbonates move upward with the water and are deposited in the upper horizons when the water evaporates. Examples of saline-alkali soils are in the Letha and Grandview series.

Transfer of iron.—Where reduced under conditions of poor aeration, iron usually becomes mobile. In well-drained soils it may move out of the soil in ground water. In poorly drained soils it remains in the horizon where it originated or moves only to a nearby horizon. Alternate wetting and drying of these horizons causes part of this iron to reoxidize and to congregate as mottles, such as the distinct reddish-brown or brown mottles in soils of the Moulton and Baldock series. However, in poorly drained soils in which salts, carbonates, and exchangeable sodium have accumulated, the iron is relatively insoluble. Because the soils are alkaline, the iron does not move or congregate. For example, in soils of the Bram, Cruickshank, and Letha series, mottling is less than normal for soils that are as wet and as shallow to ground water as these soils are.

Formation of cemented layers.—Translocated silicates or silica and carbonates combine to form weakly cemented nodules of soil material in weakly developed profiles, and strongly cemented durinodes and duripans in moderately and strongly developed profiles. In well-drained soils of the Area, nodules of soil material occur in the horizon that has the maximum accumulation of carbonates. In places, nodules also occur in adjacent horizons. The nodules make up very little to more than 50 percent, by volume, of the horizons in which they occur. Weakly cemented nodules slake when wet. Strongly cemented nodules remain firm when soaked alternately in concentrated sodium hydroxide and hydrochloric acid. Most of the nodules consist of soil material that filled holes occupied by cicada pupa (*5*). The walls of the holes were partly solidified by compaction and were weakly cemented by organic secretions. As carbonates and silica accumulate, the horizon becomes more strongly cemented. This horizon is weakly cemented in Bahem soils and is moderately cemented in Scism soils. In Chilcott and Elijah soils it forms a strongly cemented or indurated duripan.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationships to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First, through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. They are placed in classes to facilitate study and comparison in large areas, such as countries and continents.

The current system of classifying soils has been used by the National Cooperative Soil Survey since 1965 (*10*). It is under continual study. Therefore, readers interested in developments of this system should refer to the latest literature available. Table 7 shows the classification of soil series in the Canyon Area. The classes in the current system are briefly defined in the following paragraphs.

Order.—Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions are Entisols and Histosols, which occur in many different climates.

Four soil orders are represented in the Canyon Area: Entisols, Inceptisols, Aridisols, and Mollisols. Entisols are young soils that do not have distinct genetic horizons or have only the beginnings of such horizons. Inceptisols are young soils in which horizons have definitely started to develop. Generally they formed under relatively humid conditions and are high in organic-matter content. Aridisols formed in arid conditions and generally are dry and light colored. They have an ochric epipedon as well as horizons in which lime has accumulated. Mollisols are soils that have a thick, dark, friable surface layer that is relatively high in content of organic matter and bases.

Suborder.—Each order is divided into suborders, primarily on the basis of soil characteristics that produce classes having the greatest genetic similarity. The suborders have a narrower climatic range than the orders. Soils are separated into suborders according to differences in chemical and mineralogical composition, the degree of gleying, the moisture content and temperature, the parent material, climate, or vegetation, and the presence or absence of a high water table during soil formation. For example, in the Canyon Area, soils of the Psamment suborder are sandy and those of the Aquoll suborder are affected by a high water table. The name of the suborders is not given separately in table 7 because it appears in the last term of the subgroup designation.

Great group.—Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of genetic horizons and on the basis of features not likely to be destroyed by tillage, fire, or erosion. Features considered in making separations are major differences in chemical composition (mainly in content of calcium, magnesium, sodium, and potassium), soil temperature, consistence and subsurface colors, the presence of horizons in which carbonates, clay, iron, or humus are accumulated, and the presence of cemented layers that interfere with growth of roots or movement of water. For example, soils in the Calciorthid great group have a calcic horizon, those in Camborthid great group have a cambic horizon, and those in the Durorthid great group have a cemented duri-

TABLE 7.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Bahem	Coarse-silty, mixed, mesic	Xerollic Calciorthids	Aridisols.
Baldock	Fine-loamy, mixed, calcareous, mesic	Typic Haplaquepts	Inceptisols.
Bram	Coarse-silty, mixed, mesic	Xerollic Calciorthids	Aridisols.
Catherine	Fine-silty, mixed, noncalcareous, mesic	Cumulic Haplaquolls	Mollisols.
Cencove	Coarse-loamy over sand or sandy-skeletal, mixed, calcareous, mesic.	Xeric Torriorthents	Entisols.
Chance	Coarse-loamy over sand or sandy-skeletal, mixed, noncalcareous, mesic.	Mollic Haplaquepts	Inceptisols.
Chilcott	Fine, montmorillonitic, mesic	Abruptic Xerollic Durargids	Aridisols.
Cruickshank	Coarse-loamy, mixed, calcareous, mesic	Typic Haplaquepts	Inceptisols.
Draper	Fine-loamy, mixed, mesic	Cumulic Haplustolls	Mollisols.
Elijah	Fine-silty, mixed, mesic	Xerollic Durargids	Aridisols.
Falk	Coarse-loamy over sand or sandy-skeletal, mixed, nonacid, mesic.	Aquic Xerorthents	Entisols.
Feltham	Sandy, mixed, mesic	Xeric Torriorthents	Entisols.
Garbutt	Coarse-silty, mixed, calcareous, mesic	Typic Torriorthents	Entisols.
Grandview	Fine-loamy, mixed, mesic	Typic Calciorthids	Aridisols.
Greenleaf	Fine-silty, mixed, mesic	Xerollic Haplargids	Aridisols.
Harpt	Fine-loamy, mixed, mesic	Cumulic Haploxerolls	Mollisols.
Jacquith	Sandy, mixed, mesic	Haploxerollic Durorthids	Aridisols.
Jenness	Coarse-loamy, mixed, nonacid, mesic	Xeric Torriorthents	Entisols.
Lankbush	Fine-loamy, mixed, mesic	Xerollic Haplargids	Aridisols.
Letha	Coarse-loamy, mixed, calcareous, mesic	Aquic Xerorthents	Entisols.
Lolalita	Coarse-loamy, mixed, nonacid, mesic	Xeric Torriorthents	Entisols.
Marsing	Coarse-loamy over sandy or sandy skeletal, mixed, calcareous, mesic.	Xeric Torriorthents	Entisols.
Minidoka	Coarse-silty, mixed, mesic	Xerollic Durorthids	Aridisols.
Moulton	Coarse-loamy over sand or sandy-skeletal, mixed, noncalcareous, mesic.	Typic Haplaquolls	Mollisols.
Nannyton	Fine-loamy, mixed, mesic	Typic Haplargids	Aridisols.
Notus	Sandy-skeletal, mixed, mesic	Aquic Xerofluvents	Entisols.
Nyssaton	Coarse-silty, mixed, mesic	Xerollic Calciorthids	Aridisols.
Oliaga	Coarse-loamy over sand or sandy-skeletal, mixed, calcareous, mesic.	Aeric Haplaquepts	Inceptisols.
Owyhee	Coarse-silty, mixed, mesic	Xerollic Camborthids	Aridisols.
Potratz	Fine-loamy, mixed, mesic	Xerollic Camborthids	Aridisols.
Power	Fine-silty, mixed, mesic	Xerollic Haplargids	Aridisols.
Purdam	Fine-silty, mixed, mesic	Haploxerollic Durargids	Aridisols.
Quincy	Mixed, mesic	Typic Torripsamments	Entisols.
Scism	Coarse-silty, mixed, mesic	Haploxerollic Durorthids	Aridisols.
Sebree	Fine-silty, mixed, mesic	Xerollic Nadurargids	Aridisols.
Timmerman [1]	Coarse-loamy over sand or sandy-skeletal, mixed, mesic.	Xerollic Camborthids	Aridisols.
Trevino	Loamy, mixed, mesic	Lithic Xerollic Camborthids	Aridisols.
Truesdale	Coarse-loamy, mixed, mesic	Haploxerollic Durorthids	Aridisols.
Turbyfill	Coarse-loamy, mixed, calcareous, mesic	Xeric Torriorthents	Entisols.
Vanderhoff	Coarse-loamy, mixed, calcareous, mesic	Typic Torriorthents	Entisols.
Vickery	Fine-loamy, mixed, mesic	Xerollic Durorthids	Aridisols.

[1] These are taxadjuncts of the Timmerman series because depth to basaltic sand and gravel is 25 to 40 inches.

pan. The name of the great groups is not given separately in table 7 because it appears in the last term of the subgroup designation.

Subgroup.—Each great group is divided into subgroups. One of these subgroups represents the central, or typic, segment of the great group, and the others, called intergrades, contain soils that have properties mostly of the one group, but also one or more properties of another great group, suborder, or order. Generally, minor differences in the degree of soil development and in the effect of water content on the soils are considered in separating soils into subgroups.

Family.—Families are established in each subgroup, primarily on the basis of properties important to the growth of plants or the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, permeability, thickness of horizons, and consistence.

Series.—The series consists of a group of soils that formed from a particular kind of parent material and that have genetic horizons which, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

Mechanical and Chemical Analyses

Data obtained by mechanical and chemical analyses for selected soils in the Canyon Area are given in table 8. The data in the table are useful to soil scientists in classifying soils and in developing concepts of soil genesis. In the fol-

TABLE 8.—*Selected physical and chemical*

[Tests were made at the Idaho Agricultural Experiment Station

Soil type and sample number	Horizon	Depth	Particle-size distribution								Coarse fragments (>2 mm.)
			Sand (2.0–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Sand					
						Very coarse (2–1 mm.)	Coarse (1–0.5 mm.)	Medium (0.5–0.25 mm.)	Fine (0.25–0.10 mm.)	Very fine (0.10–0.05 mm.)	
		In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Bahem silt loam S64-Idaho-37-27(1-5).	Ap	0–7	32.05	55.71	12.24	0.30	0.44	0.66	3.03	27.62	>0.05
	C1ca	7–15	31.20	63.39	5.41	0.13	0.11	0.16	1.13	29.67	>0.05
	C2ca	15–34	41.28	54.89	3.83	0.23	0.11	0.12	0.92	39.90	>0.05
	IIC3	34–48	49.09	46.69	4.42	0.25	0.18	0.18	1.82	46.66	>0.05
Elijah silt loam S64-Idaho-14–127(1-4).	Ap	0–9	14.50	61.99	23.51	0.12	0.37	0.45	2.33	11.23	>0.05
	B21t	9–15	11.52	62.13	26.35	0.04	0.23	0.31	1.91	9.03	>0.05
	B22t	15–19	15.86	64.67	19.47	0.24	0.60	0.62	2.81	11.59	>0.05
	IIC1ca	19–22	21.49	59.19	19.32	0.12	0.76	1.17	5.70	13.66	>0.05
Garbutt silt loam S64Idaho-37–14(1-6).	A1	0–3	20.76	64.80	14.44	0.25	0.35	0.33	2.37	17.46	2.0
	C1	3–9	22.15	62.04	15.81	0.55	0.61	0.58	2.80	17.61	5.0
	C2	9–22	22.03	62.26	15.71	1.35	0.93	0.75	2.81	16.19	6.0
	C3ca	22–40	27.89	58.88	13.23	0.42	0.67	0.66	4.38	21.76	5.0
	IIC4	40–42	46.57	40.29	13.14	6.61	5.11	4.10	10.32	20.43	40.0
	IIIC5	42–60	30.03	56.81	13.16	1.57	1.48	1.21	4.75	21.02	9.0
Greenleaf silt loam S63Idaho-14–110–(1-6).	Ap	0–8	11.03	68.05	20.92	0.20	0.39	0.50	2.39	7.55	<0.05
	B2t	8–13	5.12	63.17	31.71	0.04	0.09	0.14	0.80	4.05	----
	B3tca	13–17	1.26	76.99	21.75	0.00	0.04	0.02	0.10	1.10	----
	C1ca	17–22	.19	81.00	18.81	0.03	0.02	0.01	0.01	0.12	----
	C2ca	22–46	.21	88.41	11.38	0.10	0.06	0.01	0.03	0.01	----
	C3	46–60	10.94	81.52	7.54	0.09	0.12	0.15	0.50	10.08	----
Minidoka silt loam S64Idaho-14–125–(1-7).	A1	0–3	29.13	57.96	12.91	1.27	2.17	1.11	4.20	20.38	5.0
	B2	3–9	26.70	58.08	15.22	0.54	1.98	1.00	3.38	19.80	6.0
	B3	9–14	19.88	66.75	13.37	0.71	1.57	0.67	1.99	14.94	2.0
	C1ca	14–20	18.74	69.66	11.60	0.45	1.20	0.66	1.46	14.97	1.0
	C2ca	20–26	22.96	67.12	9.92	0.97	2.10	0.85	2.37	16.67	9.0
	IIC3sica	26–34	31.77	45.96	22.27	2.22	5.27	2.45	6.35	15.48	15.0
Moulton fine sandy loam S63Idaho-14–114–(1-5).	A1	0–3	59.57	26.50	13.93	0.44	7.05	12.06	24.54	15.48	<.05
	B2g	3–10	69.07	23.72	7.21	0.65	7.93	12.61	28.43	19.45	4.0
	B3g	10–21	70.97	22.44	6.59	0.43	5.59	12.55	29.04	23.36	<.05
	IIC1g	21–30	77.27	18.00	4.73	0.46	7.31	17.36	33.15	19.17	12.0
Nyssaton silt loam S64Idaho-37–18–(1-6).	Ap1	0–6	22.19	67.44	10.37	0.22	0.70	0.60	3.89	16.78	2.0
	Ap2	6–11	23.45	65.45	11.10	0.27	0.63	0.55	3.38	18.62	6.0
	C1ca	11–20	17.27	73.33	9.40	0.00	0.08	0.21	2.36	14.62	<.05
	C2ca	20–27	14.03	78.83	8.14	0.00	0.00	0.10	0.73	13.20	0.00
	C3ca	27–41	22.27	71.67	6.06	0.00	0.00	0.27	0.35	21.65	0.00
	C4	41–60	20.32	74.60	5.08	0.00	0.00	0.33	0.21	19.78	0.00
Quincy fine sand S60Idaho-14–18–(1-4).	AP	0–9	88.10	8.26	3.64	0.00	0.12	2.56	52.96	32.46	0.00
	C1	9–20	91.40	6.19	2.41	0.00	0.05	1.84	55.44	34.07	0.00
	C2	20–62	91.09	6.39	2.52	0.00	0.06	2.44	50.71	37.88	0.00
Scism silt loam S63 Idaho-14–111–(1-6).	AP	0–8	23.24	64.36	12.40	0.35	0.69	0.59	4.00	17.61	<.05
	C1ca	8–13	13.99	75.84	10.17	0.08	0.13	0.16	1.32	12.30	<.05
	C2ca	13–21	20.95	66.70	12.35	0.06	0.11	0.32	3.59	16.87	<.05
	C3casi	21–30	27.50	59.67	12.83	0.20	0.67	0.67	4.49	21.47	<.05
	C4ca	30–42	33.33	56.97	9.70	0.23	1.50	1.36	8.51	21.73	<.05
	C5	42–62	51.80	34.65	13.55	0.98	2.32	2.60	15.68	30.22	<.05

[1] Samples were sonified 5 minutes after shaking.

characteristics of representative soils

in Moscow. Absence of data means tests were not made]

Textural class	Reaction		Organic matter			$CaCO_3$ equivalent	Soluble salts		Exchangeable cations (Meq. per 100 grams of soil)					Cation exchange capacity (C.E.C.)	Exchangeable sodium
	Saturated paste	1:5 suspension	Organic carbon	Nitrogen	Carbon nitrogen ratio (N=1)		Electrical conductivity (Ec x 10^3)	Gypsum	Ca	Mg	H	Na	K		
	pH	*pH*	*Pct.*	*Pct.*		*Pct.*	*Mmho./cm. at 25° C.*	*Meq./100 gm.*						*Meq./100 gm.*	*Pct. of C.E.C.*
Silt loam	7.8	8.0	1.07	0.074	8.5	4.2	0.80	1.0	13.9	2.6		0.5	1.5	21.2	2.5
Silt loam	8.0	8.2	0.85	.061	8.1	15.8	0.60	1.6	10.1	2.8		0.5	0.5	16.9	3.8
Silt loam	8.2	8.4	0.34	.026	7.7	13.2	0.55	1.2	8.9	3.0		0.6	0.5	14.8	4.5
Very fine sandy loam.	8.3	8.6	0.15			9.3	0.50	1.1	7.4	4.2		0.6	0.5	12.6	5.0
Silt loam	7.0	7.3	2.08	.122	9.9	1.7	1.10	1.1	19.7	4.5		0.4	0.6	24.6	1.1
Silt loam or silty clay loam.	6.9	7.4	0.91	.067	7.9	1.7	0.35	0.7	21.7	5.0		0.4	0.6	28.8	1.6
Silt loam	7.1	7.5	0.81	.064	7.3	1.8	0.50	0.8	24.1	4.8		0.6	0.4	30.4	1.9
Silt loam	7.7	8.1	1.26	.076		9.8	0.65	3.2	33.2	4.9		0.5	0.3	31.3	1.3
Silt loam	8.0	8.4	1.72	.086	11.6	2.4	0.50	1.5	19.0	2.4		0.6	3.7	25.7	2.3
Silt loam	8.2	8.6	0.97	.062	9.1	2.4	0.45	1.2	20.8	2.0		1.0	3.5	26.9	3.6
Silt loam	8.3	8.8	1.03	.069	8.6	3.0	0.65	1.2	21.2	2.0		2.9	2.5	29.0	10.1
Silt loam	8.4	9.2	0.57	.044	7.5	4.0	3.00	0.7	16.9	1.0		7.2	1.2	24.6	27.3
Loam	8.1	8.9	0.25	.021	6.8	2.3	5.20	0.5	7.9	0.4		7.9	0.6	12.2	47.0
Silt loam	7.9	9.0	0.39	.040	5.6	5.3	5.60	0.8	11.4	1.3		12.8	1.9	20.8	46.6
Silt loam [1]	6.95	7.10	1.71	.120	8.3	1.5	4.40	1.4	15.3	4.8		1.4	1.5	25.1	6.0
Silty clay loam. [1]	7.65	7.45	0.82	.060	8.0	2.4	1.70	1.0	22.8	6.3		1.3	1.1	35.1	4.3
Silt loam [1]	7.85	7.20	0.79	.052	8.9	23.2	2.40	1.9	[2] 16.7	[2] 4.8		1.2	0.4	29.1	5.0
Silt loam [1]	7.65	7.65	0.61	.040		26.9	2.00	1.8	[2] 12.4	[2] 5.0		1.3	0.3	24.4	6.7
Silt [1]	7.85	7.55	0.30	.026		18.0	1.70	1.7	[2] 14.0	[2] 5.9		1.3	0.4	24.4	6.1
Silt	7.90	7.75	0.26	.020		1.7	0.52	0.7	7.3	4.4		0.7	0.6	15.6	5.5
Silt loam	7.5	7.7	2.21	.115	11.2	2.3	0.60	0.7	12.3	2.4		0.3	1.9	19.4	1.7
Silt loam	7.8	8.2	1.56	.096	9.4	2.1	0.50	1.2	15.8	2.5		0.2	1.0	22.5	1.1
Silt loam	8.1	8.3	0.91	.058	9.1	8.3	0.50	3.1	15.7	2.5		0.3	0.5	20.6	1.4
Silt loam	8.2	8.6	1.07	.060		19.5	0.50	3.1				0.6	0.2	17.1	3.6
Silt loam	8.4	8.8	0.77	.047		24.5	0.95	2.4				1.2	0.2	15.6	8.3
Loam [1]	8.0	8.7	0.88	.045		28.1	11.00	0.9				4.6	0.7	19.1	24.2
Fine sandy loam.	6.5	6.6	6.09	.291	12.2		0.65	0.6	9.7	0.2	6.6	0.6	0.4	16.7	3.6
Fine sandy loam.	6.9	6.9	0.97	.059	9.6		0.70	0.4	5.4	0.1	3.2	0.4	0.2	7.7	5.2
Fine sandy loam.	7.0	7.0	0.76	.025			0.50	0.4	5.8	0.2	2.6	0.4	0.1	8.0	5.0
Loamy fine sand.	7.1	6.7	0.48	.016			0.50	0.4	4.8	0.1	2.4	0.6	0.2	6.1	9.9
Silt loam	8.0	8.4	1.57	.103	8.8	3.4	0.81	2.3	11.5	3.4		1.2	3.1	22.9	5.4
Silt loam	8.2	8.6	1.22	.080	8.9	3.9	0.55	2.6	11.7	3.3		1.8	2.5	24.2	7.3
Silt loam	8.2	8.7	0.55	.041	7.8	9.9	0.45	1.3	11.2	2.4		1.0	2.6		
Silt loam	8.3	8.8	0.45	.033	7.9	16.1	0.52	1.4	5.8	3.0		1.5	0.9	24.0	6.2
Silt loam	8.7	9.4	0.24	.018	7.8	12.9	0.65	0.5	9.1	3.3		1.3	0.4	22.4	5.7
Silt loam	8.8	9.6	0.19	.013		11.3	0.80	0.4	5.2	3.5		1.1	0.5	21.3	5.2
Fine sand	6.5	6.8	1.96	.104	10.9	1.5	0.60	0.22	30.4	0.3	1.5		0.4		
Fine sand	6.8	6.9	0.28	.018	9.2	1.1	0.30	0.02	3.0	0.0	0.0		0.1		
Fine sand	6.9	6.7	0.21	.012	10.1	1.3	0.35	0.23	2.7	0.3	0.0		0.2		
Silt loam [1]	8.0	8.5	1.27	.072	10.3	14.5	1.50	2.0	[2] 11.2	[2] 3.4		0.7	1.4	15.6	3.9
Silt loam [1]	8.1	8.5	1.29	.067	11.2	24.2	0.95	2.7	[2] 9.9	[2] 3.5		0.3	0.3	13.7	1.8
Silt loam [1]	8.5	8.9	0.55	.034	9.4	19.5	0.80	1.9	[2] 6.2	[2] 5.1		1.1	0.1	12.3	8.5
Silt loam [1]	8.7	9.3	0.49	.031	9.1	17.6	1.40	1.0	[2] 4.5	[2] 6.1		2.8	0.3	12.2	20.4
Silt loam [1]	8.5	9.3	0.40	.023		17.5		1.1	[2] 4.9	[2] 9.8		1.8	0.6	12.5	10.5
Loam [1]	8.3	9.1	0.27	.018		13.8	5.00	1.7	[2] 7.3	[2] 5.8		3.9	1.1	13.6	21.4

[2] Calcareous influence possible.

lowing paragraphs the methods of sampling and testing are described.

To determine the content of sand, silt, clay, and other particles, approximately 1 gallon of soil material was collected for each layer from carefully selected pits. Each sample was air dried, rolled, and passed through a 2-millimeter sieve. Material larger than 2 millimeters was weighed to estimate the percentage of coarse fragments. Particle-size distribution was determined by the method of Kilmer and Alexander (*6*). If dispersion was not complete, the samples were sonified for 5 minutes. The pH values of saturated soil paste and of hydrolytic soil consisting of 1 part soil to 5 parts water were determined with a Beckman model H–2 pH meter. The textural classes and pH values given in the table are based on laboratory analysis and may differ somewhat from those in profile descriptions made in the field.

The content of organic carbon was determined by the chromic-acid method on a sample of material smaller than 2 millimeters ground to approximately 80 mesh (*9*, method 24). The nitrogen content was determined by the Kjeldahl method (*2*). The carbon-nitrogen ratio was determined by dividing the total nitrogen content by the total organic-carbon content. The calcium carbonate equivalent was determined by acid neutralization (*9*, method 23c).

The electrical conductivity of a saturation extract was obtained by means of a semimicroconductivity cell and a conductivity bridge (*9*, method 46b).

The exchangeable cations of the following constituents were determined by quantitative analysis of a saturation extract, as follows: carbonates and bicarbonates by acid titration (*9*, method 12); chlorides by titration with silver nitrate (*9*, method 13); sulfates by precipitation with barium chloride and weighing; calcium by precipitation as oxalate and titration with hexanitrate cerate (*9*, method 8); magnesium by a colorimeter, following precipitation as magnesium ammonium phosphate (*9*, method 9); hydrogen by the barium chloride tri-ethanolamine method (*7*); and sodium and potassium by a Perkin-Elmer flame photometer (*9*, methods 10a and 11a).

The cation exchange capacity was determined by a modified Hoskings method. A 10-gram sample of air-dried soil was treated with 35 ml. of ammonium acetate at pH 9 for calcareous soils and pH 7 for other soils. The excess acetate was removed in a Buchner funnel by means of suction. The soil was then washed with 95 percent ethanol and placed in a Kjeldahl flask. Dilute sodium hydroxide and a few chunks of zinc metal were added. The ammonia was distilled into a 4 percent boric-acid solution and then titrated with standard acid. The ammonium-acetate extract was made up to 100 milliliters, and the extractable cations were determined by the same methods as those described for soluble cations. To determine the exchangeable cations, the water-soluble cations (not given in table 8) were subtracted from the total extractable cations of the ammonium-acetate extract. The exchangeable sodium was divided by the total exchangeable cations to compute the percentage of exchangeable sodium.

Climate [5]

The Canyon Area lies almost entirely within the valleys of the Boise and Snake Rivers. The Area is on the boundary between steppe and desert, and the climate is correspondingly semiarid to arid. Summers are warm and dry, annual precipitation is relatively low, and natural vegetation is sparse. Where the soils are irrigated, however, crops grow very well, and nearly 95 percent of the Area is classified as farmland.

Annual precipitation ranges from a little more than 5 inches to more than 15 inches. Table 9 gives data on average monthly precipitation, and table 10 gives the average weekly precipitation and the probability, in percent, that 0.40 inch or more of precipitation will fall each week. Generally rainfall is not adequate for crops from early in June to late in September.

Average monthly and weekly temperatures in the Area are given in tables 9 and 10. Table 11 gives the probable dates of freezing temperatures in spring and fall. The frost-free season, or the interval between the last freeze in spring and the first in fall, generally ranges from 140 to 165 days. However, the dates can vary considerably from year to year and from place to place within the Area. For example, at Caldwell a temperature of 32° F. was recorded as late as June 11 in 1917 and as early as August 31 in 1932. At Parma the latest freeze on record was June 4 in 1962 and the earliest was September 7 in 1927. At Lake Lowell Dam the latest was May 23 in 1944 and the earliest was September 13 in 1960. The shortest frost-free season at Caldwell was 98 days (June 7 to September 13) in 1914; at Lake Lowell Dam it was 114 days (May 23 to September 14) in 1960; and at Parma it was 115 days (May 24 to September 16) in 1944.

These statistics reveal the special hazards to fruit trees that are vulnerable to low temperatures in spring at critical stages of growth. Generally for apple trees, green leaf tips appear on about April 14, full bloom on May 1, and small green fruit on May 12. These dates, however, vary considerably from year to year. Many owners have installed systems to raise air temperatures in orchards during critical periods. Subzero temperatures occur only about 3 days each year, normally in January when vegetation is dormant. In 1955, subzero temperatures occurred in November before fruit trees became fully dormant, and the trees were damaged.

Data on soil temperature from the Agricultural Experiment Station Branch south of Caldwell show that the highest was 84° F. to a depth of 4 inches in June 1966 and the lowest was 28° F. in December 1965. The depth to which frost penetrates the ground is not regularly measured. In January 1949, the coldest month on record, when there was little or no snow cover on the ground, frost penetrated to a depth of 2½ to 3 feet. In most winters frost is likely to penetrate only a few inches.

[5] By D. J. Stevlingson, climatologist for Idaho, National Weather Service, U.S. Department of Commerce.

TABLE 9.—*Temperature and precipitation*

[Based on records from Caldwell, Lake Lowell Dam, Parma, and Nampa in Canyon County]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	2 years in 10 will have at least 4 days with—		Average total	One year in 10 will have—		Number of days with snow cover [1]	Average depth of snow on days with snow cover [1]
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—		
	°F.	°F.	°F.	°F.	Inches	Inches	Inches		Inches
January	37	20	51	2	1.1	0.4	1.9	12	2
February	45	25	55	10	1.1	.4	1.7	8	2
March	54	30	67	19	1.0	.4	2.3	[2]	1
April	65	37	80	27	0.9	.2	1.6	0	0
May	73	44	88	33	1.1	.2	2.0	0	0
June	80	50	94	41	0.8	.2	1.5	0	0
July	91	55	100	46	0.2	[3]	0.4	0	0
August	89	53	98	44	0.2	[3]	0.5	0	0
September	80	45	93	35	0.4	[3]	0.9	0	0
October	66	36	80	26	0.7	.1	1.5	0	0
November	50	28	61	15	1.1	.3	1.7	1	2
December	41	37	52	8	1.1	.4	2.0	5	1
Year	64	38	[4] 102	[5] −4	9.7	7.3	13.0		

[1] Data for Caldwell.
[2] Less than 0.5 day.
[3] Trace.
[4] Average annual highest maximum.
[5] Average annual lowest minimum.

Sunshine is ample during much of the growing season. The daily average number of hours of sunshine, based on 27 years of record, is 9.1 in April, 10.2 in May, 11.7 in June, 14.3 in July, 12.0 in August, 10.3 in September, and 7.5 in October.

Records of average monthly evaporation from open pans at the Agricultural Experiment Station Branch in Parma for the period 1963 through 1966 show that average evaporation was 5.70 inches in April, 8.31 inches in May, 7.79 inches in June, 10.44 inches in July, 8.71 inches in August, 5.48 inches in September, and 2.94 inches in October.

Relative humidity is not measured regularly in the Area. Records from nearby Boise Air Terminal show average humidity at 6-hour intervals for one month in each of the four seasons as follows:

Month	5 a.m.	11 a.m.	5 p.m.	11 p.m.
	Percent	Percent	Percent	Percent
January	82	75	72	81
April	72	48	37	61
July	53	34	22	38
October	68	49	42	61

At Boise Air Terminal the average annual windspeed is 9.0 miles per hour. The average speed ranges from 8.3 in July and August to 10.5 in March. Winds in the Area tend to follow the orientation of the valleys. They blow mainly from the northwest during warmer months, and from the southeast during the rest of the year. Occasionally destructive winds occur with a passing cold front or squall line, or late in spring and in summer during thunderstorms, but tornadoes are extremely rare. The highest windspeed recorded at Boise was 61 miles per hour in July 1944.

Hailstorms are relatively infrequent. Small, soft hailstones fall early in spring. Late in spring and in summer the hailstones are occasionally larger, but generally they are not more than half an inch to three-fourths inch in diameter. Statistics about hail damage are not available, but widespread damage to crops is rare.

Settlement and Agriculture

The first permanent settlers in the Area located along the Boise River in Canyon County in 1863. Middleton was established in 1863, Caldwell in 1882, and Nampa in 1886. By 1865, much of the low-lying land near the Boise River was irrigated, mainly to wheat and oats. Alfalfa was introduced from Mexico in 1876, and hops, now a major crop, was introduced in 1902.

After the first major irrigation canal was completed in 1887, more cash crops could be grown and some of the best

TABLE 10.—*Average weekly temperature and precipitation and probability that 0.40 inch or more of precipitation will fall each week*

[Records from Parma in Canyon County]

Week beginning	Temperature		Precipitation	
	Average daily maximum	Average daily minimum	Average weekly	Probability of 0.40 inch or more
	A	B	C	D
	° F.	° F.	Inch	Percent
January 3	38	20	0.24	20
10	37	19	.25	21
17	37	19	.27	24
24	38	19	.27	24
31	40	20	.29	27
February 7	42	22	.30	27
14	44	24	.24	20
21	47	25	.18	13
March 1	50	27	.17	13
8	54	28	.20	15
15	57	29	.19	16
22	59	31	.20	16
29	61	32	.21	17
April 5	64	34	.18	15
12	66	36	.16	13
19	68	37	.18	15
26	70	39	.20	18
May 3	72	41	.23	21
10	74	42	.25	23
17	75	44	.25	23
24	77	45	.25	23
31	78	47	.26	23
June 7	80	48	.22	19
14	82	49	.16	12
21	84	50	.12	8
28	87	52	.08	4
July 5	90	53	.04	1
12	93	55	.03	<1
19	95	56	.03	1
26	94	56	.04	2
August 2	93	55	.05	4
9	92	54	.06	4
16	90	52	.06	4
23	88	50	.05	3
30	86	48	.05	3
September 6	84	46	.09	6
13	81	44	.12	10
20	78	42	.11	9
27	75	40	.11	9
October 4	72	38	.15	12
11	69	35	.14	11
18	65	33	.15	11
25	60	31	.21	18
November 1	55	29	.25	23
8	52	27	.26	24
15	48	32	.23	21
22	46	25	.21	19
29	44	24	.22	19
December 6	42	23	.23	20
13	40	23	.22	19
20	39	22	.24	21
27	38	21	.26	22

TABLE 10.—*Average weekly temperature and precipitation and probability that 0.40 inch or more of precipitation will fall each week*—Continued

soils in the Area were irrigated for the first time. By 1920, most arable land in the Area was irrigated. In 1947 the Black Canyon irrigation project was developed and in the period 1960–64 the Dry Lake area was irrigated.

Agriculture in the Canyon Area is now characterized by a wide range of farming enterprises. The principal crops are alfalfa and clover for hay and seed, winter and spring wheat, barley, field corn, sweet corn, hybrid sweet corn seed, sugar beets, potatoes, hops, onions, and beans. Specialty crops include lettuce, spinach, onions, carrots, peas, and vegetables for seed. Cherry, plum, peach, and apple orchards are on the south-facing slopes near the Snake River.

Approximately one-half of farm income is derived from livestock and livestock products. Dairying and feedlots for sheep and cattle are the major enterprises.

The trend is toward more specialization in crops and more intensive management of the land. The locations of the principal farming enterprises and the types of farming are discussed in the section "General Soil Map."

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TABLE 11.—*Probabilities of last freezing temperatures in spring and first in fall in Canyon County*

CALDWELL

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	March 18	April 3	April 25	May 12	May 23
2 years in 10 later than	March 10	March 27	April 15	May 5	May 17
5 years in 10 later than	February 21	March 13	April 2	April 21	May 4
Fall:					
1 year in 10 earlier than	November 5	October 18	October 8	September 24	September 8
2 years in 10 earlier than	November 11	October 25	October 14	September 30	September 14
5 years in 10 earlier than	November 25	November 7	October 27	October 13	September 27

LAKE LOWELL DAM

Spring:					
1 year in 10 later than	March 14	March 31	April 15	May 5	May 15
2 years in 10 later than	March 6	March 24	April 9	April 28	May 9
5 years in 10 later than	February 17	March 9	March 27	April 15	April 26
Fall:					
1 year in 10 earlier than	November 9	October 25	October 16	October 3	September 20
2 years in 10 earlier than	November 15	October 31	October 22	October 9	September 26
5 years in 10 earlier than	November 30	November 14	November 4	October 22	October 9

NAMPA

Spring:					
1 year in 10 later than	March 20	April 7	April 29	May 10	May 27
2 years in 10 later than	March 13	March 31	April 22	May 4	May 20
5 years in 10 later than	February 27	March 17	April 8	April 20	May 6
Fall:					
1 year in 10 earlier than	November 11	October 26	October 12	September 27	September 16
2 years in 10 earlier than	November 18	November 2	October 18	October 4	September 22
5 years in 10 earlier than	December 1	November 15	October 31	October 16	October 5

PARMA

Spring:					
1 year in 10 later than	March 21	April 6	April 29	May 11	May 25
2 years in 10 later than	March 13	March 30	April 23	May 6	May 19
5 years in 10 later than	February 25	March 16	April 10	April 24	May 6
Fall:					
1 year in 10 earlier than	November 5	October 19	October 10	September 22	September 8
2 years in 10 earlier than	November 11	October 25	October 15	September 28	September 14
5 years in 10 earlier than	November 26	November 8	October 28	October 11	September 27

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Glossary

ABC soil. A soil that has a complete profile, including an A, B, and C horizon.

AC soil. A soil that has an A and C horizon but no B horizon. Commonly such soils are immature, as those developing from alluvium or those on steep, rocky slopes.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali soil. Generally, a highly alkaline soil. Specifically, an alkali soil has 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 the growth of most crop plants is low from this cause.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity (also termed 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 capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Badlands. Areas of rough, irregular, land where most of the surface is occupied by ridges, gullies, and deep channels. Land hard to traverse.

Calcareous soil. A soil that contains enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in many soils of warm-temperate areas, as in the Southwestern States. The material may consist of soft, thin layers in the soil or of hard, thick beds just beneath the solum, or it may be exposed at the surface by erosion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Claypan. A compact, slowly permeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

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

Depth of soil. Effective depth to which plant roots can readily penetrate without being restricted by a cemented layer, gravel, sand, or bedrock. Very shallow is less than 10 inches; shallow is 10 to 20 inches; moderately deep is 20 to 40 inches; deep is 40 to 60 inches; and very deep is more than 60 inches.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

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

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Duripan. See Hardpan.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Genesis, soil. The manner in which a soil originates. Refers especially to the processes initiated by climate and organisms that are responsible for the development of the solum, or true soil, from the unconsolidated parent material, as conditioned by relief and age of landform.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rains. The distinction between gully and rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by normal tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. V-shaped gullies result if the material is more difficult to erode with depth; whereas U-shaped gullies result if the lower material is more easily eroded than that above it.

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

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

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

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to relatively level plots surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops, or in orchards, to confine the flow of water to one direction.

Furrow.—Water is applied in small ditches made by cultivation implements 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.—Irrigation water, released at high points, flows onto the field without controlled distribution.

Miscellaneous land type. A mapping unit for areas of land that have little or no natural soil; or that are too nearly inaccessible for orderly examination; or that occur where, for other reasons, it is not feasible to classify the soil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical mineralogical, and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Natural soil drainage. Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and in Podzolic soils commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape.

pH value. A numerical means for designating relatively weak acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Poorly graded. A soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles in poorly graded soil material, density can be increased only slightly by compaction.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Range condition. The state of health or productivity of both soil and forage in a given range, in terms of what productivity could or should be under normal climate and the best practical management. Condition classes generally recognized are—*excellent, good, fair,* and *poor.* The classification is based on the percentage of original, or climax, vegetation on the site, as compared to what ought to grow on it if management were good.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid or alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Residual material. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil forms.

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silica. Silica is a combination of silicon and oxygen. The mineral form is called quartz.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as ontrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Well-graded soil. A soil or soil material consisting of particles that are well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the soil series to which the mapping unit belongs. In referring to a capability unit or a windbreak suitability group, read the introduction to the section it is in for general information about its management. Lack of information in the "Windbreak suitability group" column indicates the soil is not used for windbreaks. Other information is given in text and tables as follows:

Acreage and extent, table 1, p. 8.
Estimated yields, tables 2 and 3, pp. 68 through 75.

Engineering uses of the soils, tables 4, 5, and 6, pp. 78 through 105.

Map symbol	Mapping unit	Described on page	Capability unit: Irrigated		Capability unit: Dryland pasture or range		Windbreak suitability group
			Symbol	Page	Symbol	Page	Number
BaA	Bahem silt loam, 0 to 1 percent slopes	10	I-1	58	--------	--	1
BaB	Bahem silt loam, 1 to 3 percent slopes	10	IIe-2	59	--------	--	1
BaC	Bahem silt loam, 3 to 7 percent slopes	10	IIIe-2	60	--------	--	2
BaD	Bahem silt loam, 7 to 12 percent slopes	10	IVe-1	63	--------	--	2
BaE	Bahem silt loam, 12 to 30 percent slopes	10	VIe-1	65	VIe-2	66	--
BaF	Bahem silt loam, 30 to 50 percent slopes	10	-------	--	VIe-2	66	--
BdA	Baldock loam, 0 to 1 percent slopes	11	IIIw-6	62	--------	--	3
BdB	Baldock loam, 1 to 3 percent slopes	11	IIIw-6	62	--------	--	3
BhA	Baldock loam, high water table, 0 to 1 percent slopes	11	-------	--	Vw-1	65	--
BrA	Bram silt loam, 0 to 1 percent slopes	13	IIIw-6	62	--------	--	3
BrB	Bram silt loam, 1 to 3 percent slopes	13	IIIw-6	62	--------	--	3
BsA	Bram silt loam, saline-alkali, 0 to 1 percent slopes	12	IVw-3	65	--------	--	--
BsB	Bram silt loam, saline-alkali, 1 to 3 percent slopes	12	IVw-3	65	--------	--	--
Ca	Catherine silt loam	13	IIIw-6	62	--------	--	--
CcA	Cencove fine sandy loam, 0 to 1 percent slopes	14	IIIs-1	63	--------	--	5
CcB	Cencove fine sandy loam, 1 to 3 percent slopes	14	IIIe-7	62	--------	--	5
CcC	Cencove fine sandy loam, 3 to 7 percent slopes	14	IVe-2	63	--------	--	5
CcD	Cencove fine sandy loam, 7 to 12 percent slopes	14	IVe-2	63	--------	--	5
Ch	Chance fine sandy loam	15	-------	--	Vw-1	65	--
Cr	Cruickshank loamy fine sand	17	IVw-1	64	--------	--	4
Cu	Cruickshank fine sandy loam	16	IIIw-1	62	--------	--	4
DrA	Draper loam, 0 to 1 percent slopes	17	IIw-1	60	--------	--	3
DrB	Draper loam, 1 to 3 percent slopes	18	IIw-1	60	--------	--	3
DuB	Durargidic Arents, 1 to 3 percent slopes	18	IIIe-6	61	--------	--	1
DuC	Durargidic Arents, 3 to 7 percent slopes	18	IIIe-8	62	--------	--	2
EhA	Elijah silt loam, 0 to 1 percent slopes	19	IIs-1	60	--------	--	1
EhB	Elijah silt loam, 1 to 3 percent slopes	19	IIIe-6	61	--------	--	1
ElA	Elijah silt loam, shallow, 0 to 1 percent slopes	19	IIs-1	60	--------	--	--
ElB	Elijah silt loam, shallow, 1 to 3 percent slopes	20	IIIe-6	61	--------	--	--
ElC	Elijah silt loam, shallow, 3 to 7 percent slopes	20	IIIe-8	62	--------	--	--
EsA	Elijah-Sebree silt loams, 0 to 1 percent slopes	20	IIs-1	60	VIs-1	66	1
EsB	Elijah-Sebree silt loams, 1 to 3 percent slopes	20	IIIe-6	61	VIs-1	66	1
EvC	Elijah-Vickery silt loams, 3 to 7 percent slopes	20	IIIe-8	62	VIe-2	66	2
EvD	Elijah-Vickery silt loams, 7 to 12 percent slopes	20	IVe-1	63	VIe-2	66	2
FaA	Falk fine sandy loam, 0 to 2 percent slopes	21	IIIs-1	63	--------	--	4
FeB	Feltham loamy fine sand, 0 to 3 percent slopes	21	IVs-1	65	--------	--	5
FeC	Feltham loamy fine sand, 3 to 7 percent slopes	22	IVe-3	63	--------	--	5
FeD	Feltham loamy fine sand, 7 to 12 percent slopes	22	IVe-3	63	--------	--	5
FeE	Feltham loamy fine sand, 12 to 25 percent slopes	22	-------	--	VIIe-2	67	--
FuD	Feltham-Quincy complex, 0 to 12 percent slopes	22	-------	--	VIe-3	66	5
GaA	Garbutt silt loam, 0 to 1 percent slopes	23	I-1	58	--------	--	1
GaB	Garbutt silt loam, 1 to 3 percent slopes	23	IIe-2	59	--------	--	1
GaC	Garbutt silt loam, 3 to 7 percent slopes	23	IIIe-2	60	--------	--	2
GaD	Garbutt silt loam, 7 to 12 percent slopes	23	IVe-1	63	--------	--	2
GdB	Garbutt silt loam, deep over basalt, 1 to 3 percent slopes	23	IIe-2	59	--------	--	1

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit Irrigated Symbol	Irrigated Page	Dryland pasture or range Symbol	Dryland pasture or range Page	Windbreak suitability group Number
GdC	Garbutt silt loam, deep over basalt, 3 to 7 percent slopes	23	IIIe-2	60	--------	--	2
Gn	Grandview loam	24	IVw-3	65	--------	--	--
Gp	Gravel pit	24	-------	--	VIIIs-1	67	--
GrA	Greenleaf silty clay loam, 0 to 1 percent slopes	26	I-1	58	--------	--	1
GsA	Greenleaf silt loam, 0 to 1 percent slopes	26	I-1	58	--------	--	1
GsB	Greenleaf silt loam, 1 to 3 percent slopes	26	IIe-2	59	--------	--	1
GwA	Greenleaf-Owyhee silt loams, 0 to 1 percent slopes	25	I-1	58	--------	--	1
GwB	Greenleaf-Owyhee silt loams, 1 to 3 percent slopes	26	IIe-2	59	--------	--	1
GwC	Greenleaf-Owyhee silt loams, 3 to 7 percent slopes	26	IIIe-2	60	--------	--	2
GwD	Greenleaf-Owyhee silt loams, 7 to 12 percent slopes	26	IVe-1	63	--------	--	2
GwE	Greenleaf-Owyhee silt loams, 12 to 20 percent slopes	26	VIe-1	65	VIe-2	66	--
Ha	Harpt loam	27	I-1	58	--------	--	1
JaB	Jacquith loamy fine sand, 1 to 3 percent slopes	27	IVs-1	65	--------	--	5
JaC	Jacquith loamy fine sand, 3 to 7 percent slopes	28	IVe-3	63	--------	--	5
JeA	Jenness loam, 0 to 1 percent slopes	28	I-1	58	VIs-1	66	1
JeB	Jenness loam, 1 to 3 percent slopes	29	IIe-2	59	VIs-1	66	1
JeC	Jenness loam, 3 to 7 percent slopes	29	IIIe-2	60	VIe-2	66	2
LaC	Lankbush sandy loam, 3 to 7 percent slopes	30	IIIe-2	60	--------	--	2
LaD	Lankbush sandy loam, 7 to 12 percent slopes	30	IVe-1	63	--------	--	2
LaE	Lankbush sandy loam, 12 to 30 percent slopes	29	VIe-1	65	VIe-2	66	--
LaF	Lankbush sandy loam, 30 to 50 percent slopes	30	-------	--	VIe-2	66	--
LeE	Lankbush-Elijah silt loams, 12 to 30 percent slopes	30	VIe-1	65	VIe-2	66	--
LhE	Lankbush-Power complex, 12 to 30 percent slopes	30	VIe-1	65	VIe-2	66	--
LkC	Lankbush-Vickery silt loams, 3 to 7 percent slopes	30	IIIe-8	62	VIe-2	66	2
LkD	Lankbush-Vickery silt loams, 7 to 12 percent slopes	31	IVe-1	63	VIe-2	66	2
LnA	Lankbush loam, dark variant, 0 to 1 percent slopes	31	IIw-1	60	--------	--	3
LsA	Letha fine sandy loam, 0 to 1 percent slopes	32	IIIw-6	62	--------	--	4
LsB	Letha fine sandy loam, 1 to 3 percent slopes	32	IIIw-6	62	--------	--	4
LtA	Letha fine sandy loam, strongly saline-alkali, 0 to 1 percent slopes	32	IVw-3	65	--------	--	--
LuG	Lolalita coarse sandy loam, 30 to 55 percent slopes	33	-------	--	VIe-2	66	--
LvB	Lolalita sandy loam, 1 to 3 percent slopes	33	IIe-3	59	VIe-3	66	1
LvC	Lolalita sandy loam, 3 to 7 percent slopes	33	IIIe-3	61	VIe-3	66	2
LvE	Lolalita sandy loam, 12 to 30 percent slopes	33	VIe-1	65	VIe-2	66	--
Ma	Marsh	34	-------	--	VIIIw-1	67	--
MgA	Marsing loam, 0 to 1 percent slopes	34	IIs-1	60	--------	--	1
MgB	Marsing loam, 1 to 3 percent slopes	34	IIIe-6	61	--------	--	1
MgC	Marsing loam, 3 to 7 percent slopes	34	IIIe-8	62	--------	--	2
MgD	Marsing loam, 7 to 12 percent slopes	34	IVe-1	63	VIe-2	66	2
MgE	Marsing loam, 12 to 20 percent slopes	34	VIe-1	65	VIe-2	66	--
MkA	Minidoka silt loam, 0 to 1 percent slopes	36	IIs-1	60	--------	--	1
MkB	Minidoka silt loam, 1 to 3 percent slopes	36	IIIe-6	61	---------	--	1
MnC	Minidoka-Scism silt loams, 3 to 7 percent slopes	35	IIIe-8	62	--------	--	2
MnD	Minidoka-Scism silt loams, 7 to 12 percent slopes	35	IVe-1	63	--------	--	2
MoA	Moulton loamy sand, 0 to 1 percent slopes	37	IVw-1	64	--------	--	4
MtA	Moulton fine sandy loam, 0 to 1 percent slopes	36	IIIw-1	62	--------	--	4
MtB	Moulton fine sandy loam, 1 to 3 percent slopes	37	IIIw-1	62	--------	--	4
MuA	Moulton fine sandy loam, saline, 0 to 1 percent slopes	37	IIIw-1	62	--------	--	4
MvA	Moulton loam, 0 to 1 percent slopes	37	IIIw-1	62	--------	--	3
MwA	Moulton loam, saline, 0 to 1 percent slopes	37	IIIw-1	62	--------	--	3
NaB	Nannyton loam, 1 to 3 percent slopes	37	IIIe-6	61	VIs-1	66	1

Map symbol	Mapping unit	Described on page	Capability unit Irrigated Symbol	Page	Dryland pasture or range Symbol	Page	Windbreak suitability group Number
NaC	Nannyton loam, 3 to 7 percent slopes	38	IIIe-8	62	VIe-2	66	2
No	Notus soils	38	IVw-2	65	--------	--	--
NsA	Nyssaton silt loam, 0 to 1 percent slopes	39	I-1	58	--------	--	1
NsB	Nyssaton silt loam, 1 to 3 percent slopes	40	IIe-2	59	--------	--	1
NsC	Nyssaton silt loam, 3 to 7 percent slopes	40	IIIe-2	60	--------	--	2
NsD2	Nyssaton silt loam, 7 to 12 percent slopes, eroded	40	IVe-1	63	--------	--	2
NsE2	Nyssaton silt loam, 12 to 20 percent slopes, eroded	40	VIe-1	65	VIe-2	66	--
OgA	Oliaga loam, 0 to 1 percent slopes	40	IIIw-6	62	--------	--	3
OgB	Oliaga loam, 1 to 3 percent slopes	41	IIIw-6	62	--------	--	3
OlA	Oliaga loam, saline-alkali, 0 to 1 percent slopes	41	IVw-3	65	--------	--	--
OwA	Owyhee silt loam, 0 to 1 percent slopes	41	I-1	58	--------	--	1
OwB	Owyhee silt loam, 1 to 3 percent slopes	42	IIe-2	59	--------	--	1
OwC	Owyhee silt loam, 3 to 7 percent slopes	42	IIIe-2	60	--------	--	2
PaB	Potratz silt loam, 1 to 3 percent slopes	42	IIIe-6	61	--------	--	1
PcC	Potratz-Power silt loams, 3 to 7 percent slopes	43	IIIe-8	62	--------	--	2
PeB	Potratz-Power rocky silt loams, 1 to 3 percent slopes	43	IVe-4	64	--------	--	1
PeC	Potratz-Power rocky silt loams, 3 to 7 percent slopes	43	IVe-10	64	--------	--	2
PhA	Power silt loam, 0 to 1 percent slopes	43	I-1	58	--------	--	1
PhB	Power silt loam, 1 to 3 percent slopes	44	IIe-2	59	--------	--	1
PhC	Power silt loam, 3 to 7 percent slopes	44	IIIe-2	60	--------	--	2
PhD	Power silt loam, 7 to 12 percent slopes	44	IVe-1	63	--------	--	2
PlD	Power-Lankbush silt loams, 7 to 12 percent slopes	44	IVe-1	63	--------	--	2
PoA	Power-Potratz silt loams, 0 to 1 percent slopes	45	IIs-1	60	--------	--	1
PoB	Power-Potratz silt loams, 1 to 3 percent slopes	45	IIIe-6	61	--------	--	1
PpA	Power-Purdam silt loams, 0 to 1 percent slopes	45	I-1	58	--------	--	1
PpB	Power-Purdam silt loams, 1 to 3 percent slopes	45	IIe-2	59	--------	--	1
PpC	Power-Purdam silt loams, 3 to 7 percent slopes	45	IIIe-2	60	--------	--	2
PpD	Power-Purdam silt loams, 7 to 12 percent slopes	45	IVe-1	63	--------	--	2
PrA	Purdam silt loam, 0 to 1 percent slopes	46	IIs-1	60	--------	--	1
PrB	Purdam silt loam, 1 to 3 percent slopes	46	IIIe-6	61	--------	--	1
PrC	Purdam silt loam, 3 to 7 percent slopes	46	IIIe-8	62	--------	--	2
PsA	Purdam silt loam, water table, 0 to 1 percent slopes	46	IIIw-6	62	--------	--	3
PtA	Purdam-Sebree silt loams, 0 to 1 percent slopes	47	IIs-1	60	--------	--	1
PtB	Purdam-Sebree silt loams, 1 to 3 percent slopes	47	IIIe-6	61	--------	--	1
QcB	Quincy fine sand, 0 to 3 percent slopes	47	IVs-1	65	--------	--	--
QcD	Quincy fine sand, 3 to 12 percent slopes	47	VIe-4	66	--------	--	--
QcE	Quincy fine sand, 12 to 30 percent slopes	47	-------	--	VIIe-2	67	--
QfB	Quincy-Feltham loamy sands, 1 to 3 percent slopes	47	IVs-1	65	VIe-3	66	--
QfD	Quincy-Feltham loamy sands, 3 to 12 percent slopes	47	VIe-4	66	VIe-2	66	--
Re	Riverwash	48	-------	--	VIIIw-1	67	--
Ro	Rock outcrop	48	-------	--	VIIIs-1	67	--
ScA	Scism silt loam, 0 to 1 percent slopes	48	I-1	58	--------	--	1
ScB	Scism silt loam, 1 to 3 percent slopes	49	IIe-2	59	--------	--	1
ScC	Scism silt loam, 3 to 7 percent slopes	49	IIIe-2	60	--------	--	2
ScD	Scism silt loam, 7 to 12 percent slopes	49	IVe-1	63	--------	--	2
SdA	Scism silt loam, deep over basalt, 0 to 1 percent slopes	49	I-1	58	--------	--	1
SdB	Scism silt loam, deep over basalt, 1 to 3 percent slopes	49	IIe-2	59	--------	--	1
SdC	Scism silt loam, deep over basalt, 3 to 7 percent slopes	49	IIIe-2	60	--------	--	2
SdD	Scism silt loam, deep over basalt, 7 to 12 percent slopes	49	IVe-1	63	--------	--	2
Tc	Terrace escarpment	50	-------	--	VIIIs-1	67	--

Map symbol	Mapping unit	Described on page	Capability unit: Irrigated Symbol	Irrigated Page	Dryland pasture or range Symbol	Dryland pasture or range Page	Windbreak suitability group Number
TeB	Timmerman coarse sandy loam, 1 to 3 percent slopes--	50	IIIe-7	62	-------	--	--
TeC	Timmerman coarse sandy loam, 3 to 7 percent slopes--	51	IVe-2	63	-------	--	--
TgB	Timmerman gravelly coarse sandy loam, 1 to 3 percent slopes----------	51	VIe-4	66	-------	--	--
TgD	Timmerman gravelly coarse sandy loam, 3 to 12 percent slopes----------	51	VIe-4	66	VIe-2	66	--
TkE	Trevino very rocky loam, 0 to 20 percent slopes-----	52	------	--	VIs-5	66	--
TrB	Trevino silt loam, 1 to 3 percent slopes----------	51	IVe-4	64	-------	--	--
TrD	Trevino silt loam, 3 to 12 percent slopes----------	52	IVe-10	64	-------	--	--
TsA	Truesdale fine sandy loam, 0 to 1 percent slopes----	53	IIIs-1	63	-------	--	1
TsB	Truesdale fine sandy loam, 1 to 3 percent slopes----	53	IIIe-7	62	-------	--	1
TsC	Truesdale fine sandy loam, 3 to 7 percent slopes----	52	IVe-2	63	-------	--	2
TsD	Truesdale fine sandy loam, 7 to 12 percent slopes---	53	IVe-2	63	-------	--	2
TuA	Turbyfill fine sandy loam, 0 to 1 percent slopes----	53	I-1	58	-------	--	1
TuB	Turbyfill fine sandy loam, 1 to 3 percent slopes----	54	IIe-3	59	-------	--	1
TuC	Turbyfill fine sandy loam, 3 to 7 percent slopes----	54	IIIe-3	61	-------	--	2
TuD	Turbyfill fine sandy loam, 7 to 12 percent slopes---	54	IVe-2	63	-------	--	2
TuE	Turbyfill fine sandy loam, 12 to 30 percent slopes--	54	VIe-1	65	VIe-2	66	--
TvA	Turbyfill fine sandy loam, deep over hardpan, 0 to 1 percent slopes----------	54	IIs-2	60	-------	--	1
TvB	Turbyfill fine sandy loam, deep over hardpan, 1 to 3 percent slopes----------	54	IIe-3	59	-------	--	1
TvC	Turbyfill fine sandy loam, deep over hardpan, 3 to 7 percent slopes----------	54	IIIe-3	61	-------	--	2
VaB	Vanderhoff loam, 1 to 3 percent slopes----------	55	IIIe-6	61	-------	--	1
VaC	Vanderhoff loam, 3 to 7 percent slopes----------	55	IIIe-8	62	-------	--	2
VaD	Vanderhoff loam, 7 to 12 percent slopes----------	55	IVe-1	63	-------	--	2
VaE	Vanderhoff loam, 12 to 30 percent slopes----------	55	VIe-1	65	VIe-2	66	--
VbG	Vanderhoff soils and Badland, 20 to 80 percent slopes----------	55					
	Vanderhoff soils----------	--	------	--	VIe-2	66	--
	Badland----------	--	------	--	VIIIs-1	67	--
Ve	Very stony land----------	56	------	--	VIIIs-1	67	--
VmB	Vickery-Marsing silt loams, 1 to 3 percent slopes----------	57	IIIe-6	61	-------	--	1
VmC	Vickery-Marsing silt loams, 3 to 7 percent slopes----------	56	IIIe-8	62	-------	--	2
VmD	Vickery-Marsing silt loams, 7 to 12 percent slopes----------	57	IVe-1	63	VIe-2	66	2

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