United States Department of Agriculture

Soil Conservation Service

In cooperation with United States Department of Agriculture, Forest Service, and Wyoming Agricultural Experiment Station

Soil Survey of Weston County, Wyoming

How To Use This Soil Survey

General Soil Map

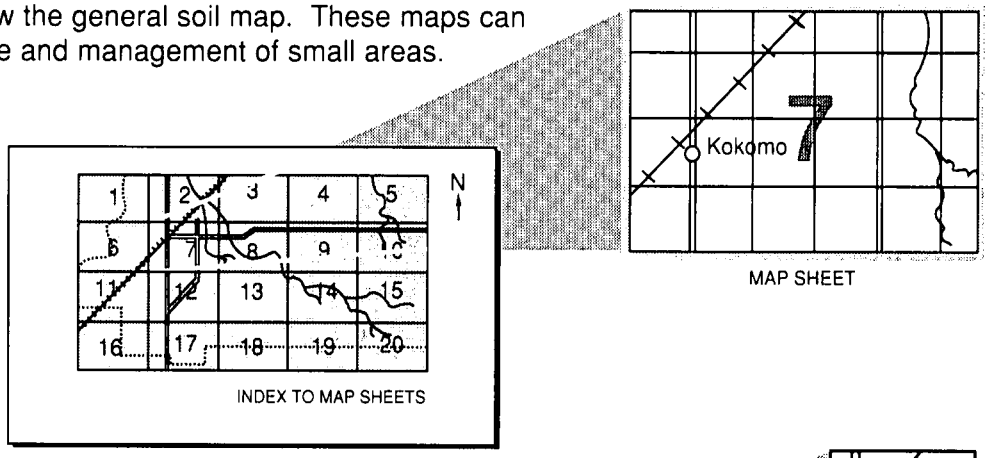
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

Detailed Soil Maps

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

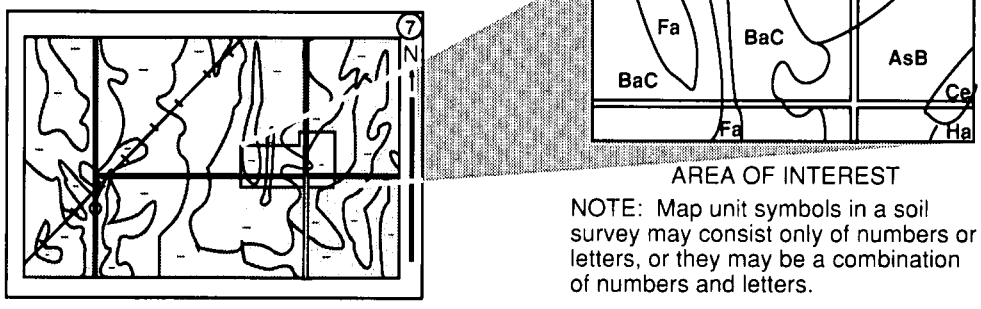
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

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



MAP SHEET

AREA OF INTEREST

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

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

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

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Soil Conservation Service, Forest Service, and Wyoming Agricultural Experiment Station. It is part of the technical assistance furnished to the Beaver Skull Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Alfalfa in an area of Vassett silt loam northwest of Four Corners.

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Taxonomic Units

Issued February 1990

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Summary of Tables

Foreword

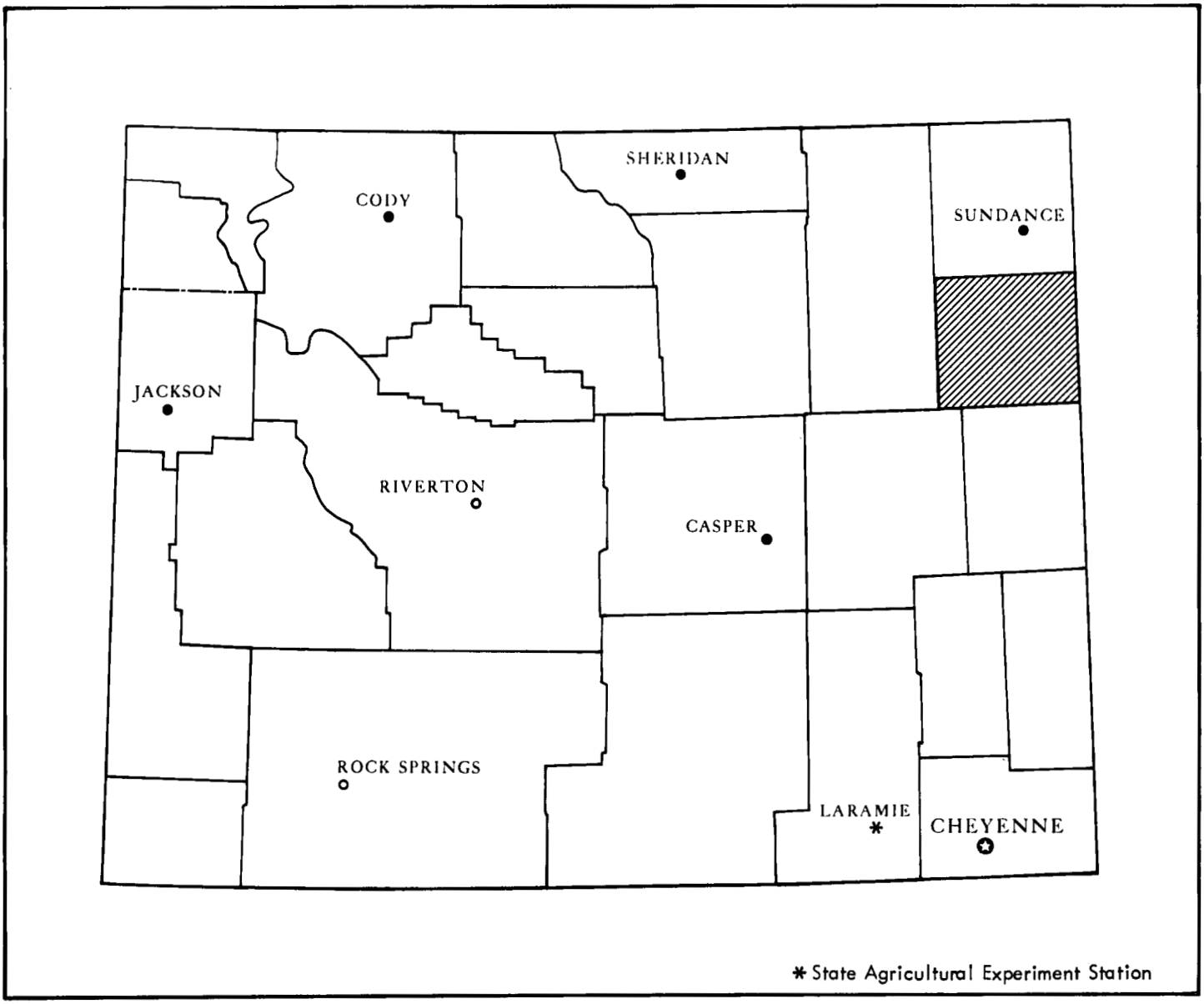
This soil survey contains information that can be used in land- planning programs in Weston County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practice needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

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

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

Frank S. Dickson, Jr.
State Conservationist
Soil Conservation Service



Location of Weston County in Wyoming.

Soil Survey of Weston County, Wyoming

By Gordon F. Kee, Jr., Soil Conservation Service

Fieldwork by Gordon F. Kee, Jr., Waldo G. Elwonger, and
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Forest Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with
United States Department of Agriculture, Forest Service,
and Wyoming Agricultural Experiment Station

WESTON COUNTY is in the northeastern part of Wyoming. The total area of the county is 1,541,120 acres. Of this, 1,061,521 acres is privately owned, 60,462 acres is administered by the Bureau of Land Management, and 238,220 acres is administered by the Forest Service; of the latter, 231,936 acres is in the Thunder Basin National Grasslands and 6,284 acres is in the Black Hills National Forest. The state administers 180,917 acres.

Three areas totaling 96,230 acres were not mapped at the request of the landowners who, for one reason or another, did not wish to have the resource data made available to the public.

This survey area adjoins that described in an earlier published soil survey of Crook County. Some of the names of adjoining general soil map units and detailed soil map units are not the same as those in the soil survey of Crook County. The collection of more recent data on the soils has led to the reclassification and renaming of map units in Weston County.

Mapping was done primarily at an intensity that will facilitate the management of the soils for livestock grazing. This requires somewhat less mapping detail than normally would be required if the primary use of the soils were for farming. The lower detail of the mapping that has been done does not preclude the use of the survey for farm management if the limitations of the lower intensity mapping are duly considered.

Most of the survey area consists of rolling plains, except for the Black Hills, in the northeastern part of the area. Elevation ranges from 6,480 feet in the northeastern corner of the area to 3,620 feet in the southeastern corner. The elevation is 4,334 feet at Newcastle and 4,235 feet at Upton. Most of the area is 3,800 to 4,800 feet in elevation.

The drainage in the survey area is to the southeast and east. The Cheyenne River enters and leaves in the south-central part of the area. The main small streams include Salt, Soldier, Cold Springs, Oil, and Skull Creeks in the northeastern part of the area; Stockade Beaver and Whoop-Up Creeks on the eastern border; Beaver and Mush Creeks in the east-central part; Raven Creek in the northwestern part; Buffalo Creek in the western part; and Lodgepole, Black Thunder, and Hay Creeks in the south-central part.

Important natural resources in the survey area are the soil, minerals, timber, and grasses. The mineral resources are coal, bentonite, and oil and gas. The Cambria Coal Mine operated until the Great Depression of the 1930's. Oil was discovered in 1880 but did not become important until the Osage Oil Field discovery of 1918. Gas and oil now are transported out of the area by truck and pipeline. An oil refinery is located in Newcastle. The presence of bentonite deposits near Upton and elsewhere in the county led to one of the first

commercial bentonite operations in the United States. Bentonite is processed in two plants located west of Upton. Timber is harvested in the Black Hills and processed at a lumber mill east of Newcastle.

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

Climate

Prepared by the Wyoming Agricultural Experiment Station from data provided by the Department of Atmospheric Science, University of Wyoming.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Newcastle in the period 1940-71. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring as recorded at Newcastle in the period 1926-70.

In winter, the average temperature is 25 degrees F and the average daily minimum temperature is 14 degrees. The lowest temperature on record, which occurred at Newcastle on February 1, 1951, is -32 degrees. In summer, the average temperature is 70 degrees and the average daily maximum temperature is 84 degrees. The highest recorded temperature, which occurred at Newcastle in July 1954, is 105 degrees.

The total annual precipitation is 14.1 inches. Of this, 11.1 inches, or 79 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 2.7 inches at Newcastle in June 1964. Thunderstorms occur on about 25 days each year, and most occur in April through July.

The average seasonal snowfall is 37.1 inches. The greatest snow depth at any one time during the period of record was 12 inches. On an average of 31 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The sun shines 70 to 80 percent of the time in summer and 60 to 70 percent in winter. The prevailing wind is from the west or northwest.

How This Survey Was Made

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

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

Individual soils on the landscape commonly merge gradually onto one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

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

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the

soils in different uses and under different levels of management. Some interpretations were modified to fit local conditions, and some new interpretations were developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

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

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

General Soil Map Units

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

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

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

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

Map Unit Descriptions

Soils on uplands, toe slopes, foot slopes, and alluvial fans

This group consists of seven map units. It makes up about 77 percent of the survey area.

I. Shingle-Samday-Rock outcrop

Shallow, well drained, rolling to steep soils; on uplands

This map unit is in the Rochelle Hills, in the southwestern part of the survey area. Slope is 6 to 60 percent. The vegetation on this unit is mainly perennial grasses, forbs, shrubs, and pine. Elevation is 3,600 to 5,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 47 degrees F, and the frost-free season is 110 to 130 days.

This unit makes up about 11 percent of the survey area. It is about 33 percent Shingle soils, 25 percent Samday soils, and 15 percent Rock outcrop. The remaining 27 percent is components of minor extent.

Shingle soils are in rolling areas on uplands. These soils are shallow and well drained. They formed in residuum derived dominantly from shale. The surface layer is loam about 6 inches thick. The underlying material to a depth of 17 inches is loam. Shale is at a depth of 17 inches.

Samday soils are in rolling to steep areas on uplands. These soils are shallow and well drained. They formed in residuum derived dominantly from shale. The surface layer is clay about 4 inches thick. The next layer is clay about 12 inches thick. Shale is at a depth of 16 inches.

Rock outcrop consists of areas of exposed shale, siltstone, and sandstone.

Of minor extent in this unit are Tassel, Kishona, Theedle, Terro, Cushman, and Wibaux soils.

Most areas of this unit are used mainly as wildlife habitat. A few areas are used for livestock grazing. Shallow rooting depth, droughtiness of the soil, and low annual precipitation limit production of forage and wood.

2. Shingle-Forkwood-Cushman

Shallow to deep, well drained, nearly level to steep soils; on uplands, alluvial fans, and toe slopes

This map unit is in the western one-fourth of the survey area. Slope is 2 to 30 percent. The vegetation on this unit is mainly perennial grasses, forbs, and shrubs. Elevation is 3,600 to 5,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 47 degrees F, and the frost-free season is 110 to 130 days.

This unit makes up about 10 percent of the survey area. It is about 24 percent Shingle soils, 28 percent Forkwood and similar soils, and 14 percent Cushman soils. The remaining 34 percent is components of minor extent.

Shingle soils are in rolling to steep areas on uplands. These soils are shallow and well drained. They formed in residuum derived dominantly from shale. The surface layer is loam about 6 inches thick. The underlying material to a depth of 17 inches is loam. Shale is at a depth of 17 inches.

Forkwood soils are in nearly level areas on alluvial fans and toe slopes. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is loam about 4 inches thick.

The subsoil is clay loam about 17 inches thick. Below this to a depth of 60 inches the soils are loam.

Cushman soils are in rolling areas on uplands. These soils are moderately deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is loam about 2 inches thick. The subsoil is clay loam about 10 inches thick. Below this to a depth of 34 inches the soils are loam. Shale is at a depth of 34 inches.

Of minor extent in this unit are Tassel, Cambria, Theedle, Vonalee, Worf, Zigweid, and Turnercrest soils.

This unit is used mainly for livestock grazing and wildlife habitat.

The limited rooting depth and droughtiness of the Shingle and Cushman soils and the low annual precipitation limit production of forage on the unit.

3. Terro-Forkwood-Tassel

Shallow to deep, well drained, gently sloping to rolling soils; on upland plains, alluvial fans, and ridgetops

This map unit is in the center of the survey area. Slope is 2 to 15 percent. The vegetation on this unit is mainly perennial grasses, forbs, and shrubs. Elevation is 3,600 to 5,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 47 degrees F, and the frost-free season is 110 to 130 days.

This unit makes up about 27 percent of the survey area. It is about 25 percent Terro and similar soils, 20 percent Forkwood and similar soils, and 16 percent Tassel soils. The remaining 39 percent is components of minor extent.

Terro soils are in gently sloping to moderately sloping areas on upland plains. These soils are moderately deep and well drained. They formed in material derived dominantly from sandstone. The surface layer is sandy loam about 6 inches thick. The subsoil is sandy loam about 14 inches thick. Below this to a depth of about 34 inches the soils are sandy loam. Sandstone is at a depth of about 34 inches.

Forkwood soils are in gently sloping areas on alluvial fans. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is loam about 4 inches thick. The subsoil is clay loam about 17 inches thick. Below this to a depth of 60 inches the soils are loam.

Tassel soils are in moderately sloping areas on ridgetops. These soils are shallow and well drained. They formed in residuum derived dominantly from sandstone. The surface layer is fine sandy loam about 6 inches thick. The underlying material to a depth of 16 inches is fine sandy loam. Sandstone is at a depth of 16 inches.

Of minor extent in this unit are Ulm, Kishona, Keeline, Bowbac, Vonalee, Turnercrest, Theedle, and Bidman soils.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

Limited rooting depth and droughtiness of the Tassel and Terro soils and the low annual precipitation limit production of forage on this unit.

4. Grummit-Snomo-Samday

Shallow and deep, well drained, gently sloping to steep soils; on uplands

This map unit is in the vicinity of Upton. Slope is 2 to 30 percent. The vegetation on this unit is mainly pine, forbs, shrubs, and perennial grasses. Elevation is 3,600 to 5,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 47 degrees F, and the frost-free season is 110 to 130 days.

This unit makes up about 5 percent of the survey area. It is about 54 percent Grummit soils, 19 percent Snomo soils, and 9 percent Samday soils. The remaining 18 percent is components of minor extent.

Grummit soils are in gently sloping to steep areas on uplands. These soils are shallow and well drained. They formed in residuum derived dominantly from acid shale. The surface layer is clay loam about 4 inches thick. The underlying material to a depth of 15 inches is clay. Shale is at a depth of 15 inches.

Snomo soils are in gently sloping to hilly areas on uplands. These soils are deep and well drained. They formed in slopewash alluvium derived dominantly from acid shale. The surface is covered with a layer of forest litter 0.5 inch thick. The surface layer is silty clay loam about 4 inches thick. The underlying material to a depth of 44 inches is clay. Acid shale is at a depth of 44 inches.

Samday soils are in gently sloping to hilly areas on uplands. These soils are shallow and well drained. They formed in residuum derived dominantly from calcareous shale. The surface layer is clay about 4 inches thick. The underlying material to a depth of 16 inches is clay. Shale is at a depth of 16 inches.

Of minor extent in this unit are Maggin, Shingle, and Hilight soils and Rock outcrop of shale.

Most areas of this unit are used for wildlife habitat and livestock grazing. A few areas are used for bentonite mining.

Limited rooting depth, droughtiness, and low annual precipitation limit production of forage and wood on this unit.

5. Orella-Petrie-Samday

Shallow and deep, well drained, gently sloping to steep soils; on uplands, hillslopes, and alluvial fans

This map unit is in a narrow area extending from south of Upton and Osage to the southeast corner of the survey area. Slope is 2 to 30 percent. The vegetation on this unit is mainly forbs, shrubs, and perennial grasses. Elevation is 3,600 to 5,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air

temperature is 47 degrees F, and the frost-free season is 110 to 130 days.

This unit makes up about 7 percent of the survey area. It is about 34 percent Orella soils, 24 percent Petrie soils, and 22 percent Samday soils. The remaining 20 percent is components of minor extent.

Orella soils are in rolling to steep areas on uplands. These soils are shallow and well drained. They formed in residuum derived dominantly from sodic shale. The surface layer is silty clay loam about 2 inches thick. The underlying material to a depth of 12 inches is silty clay. Shale is at a depth of 12 inches.

Petrie soils are in nearly level areas on alluvial fans. These soils are deep and well drained. They formed in alluvium derived dominantly from sedimentary rock. The surface layer is clay loam about 4 inches thick. The underlying material to a depth of 60 inches is clay loam.

Samday soils are in steep areas on hillslopes. These soils are shallow and well drained. They formed in residuum derived dominantly from shale. The surface layer is clay about 4 inches thick. The underlying material to a depth of 16 inches is clay. Shale is at a depth of 16 inches.

Of minor extent in this unit are Shingle, Absted, Bone, and Cadoma soils.

This unit is used for wildlife habitat and livestock grazing.

Restricted rooting depth and droughtiness of the Orella and Samday soils, clayey texture, alkalinity, and low annual precipitation limit production of forage on this unit.

6. Savageton-Absted-Bahl

Moderately deep and deep, well drained, nearly level to moderately sloping soils; on foot slopes and alluvial fans

This map unit is in the southeastern part of the survey area. Slope is 2 to 10 percent. The vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 3,600 to 5,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 47 degrees F, and the frost-free season is 110 to 130 days.

This unit makes up about 12 percent of the survey area. It is about 40 percent Savageton soils, 22 percent Absted soils, and 18 percent Bahl soils. The remaining 20 percent is components of minor extent.

Savageton soils are in gently sloping to moderately sloping areas on foot slopes. These soils are moderately deep and well drained. They formed in alluvium derived dominantly from shale. The surface layer is clay loam about 5 inches thick. The subsoil is clay loam about 15 inches thick. The substratum is clay loam and is underlain by shale at a depth of about 29 inches.

Absted soils are in nearly level areas on alluvial fans. These soils are deep and well drained. They formed in alluvium derived dominantly from sedimentary rock. The surface layer is loam about 4 inches thick. The subsoil is clay about 8 inches thick. Below this to a depth of 60 inches or more the soils are clay loam.

Bahl soils are in gently sloping to moderately sloping areas on alluvial fans. These soils are deep and well drained. They formed in clayey alluvium or residuum derived dominantly from shale. The surface layer is clay loam about 6 inches thick. The next layer is clay about 6 inches thick. Below this to a depth of 60 inches or more is clay.

Of minor extent in this unit are Ulm, Parmleed, Bone, Lohsman, Stetter, Topeman, Twotop, Bidman, and Winler soils.

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

If this unit is used for forage production, the main limitations are clayey texture, slow permeability, and low annual precipitation. It is poorly suited to use as cropland.

7. Forkwood-Cushman-Turnercrest

Deep and moderately deep, well drained, nearly level to moderately sloping soils; on hillslopes, toe slopes, foot slopes, and alluvial fans

This map unit is in the northwestern corner of the survey area. Slope is 2 to 15 percent. The vegetation on this unit is mainly perennial grasses, forbs, and shrubs. Elevation is 3,600 to 5,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 47 degrees F, and the frost-free season is 110 to 130 days.

This unit makes up about 5 percent of the survey area. It is about 37 percent Forkwood and similar soils, 25 percent Cushman soils, and 23 percent Turnercrest and similar soils. The remaining 15 percent is components of minor extent.

Forkwood soils are in nearly level areas on alluvial fans and in gently sloping areas on toe slopes. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is loam about 4 inches thick. The subsoil is clay loam about 17 inches thick. Below this to a depth of 60 inches or more the soils are loam.

Cushman soils are in moderately sloping areas on hillslopes. These soils are moderately deep and well drained. They formed in slopewash alluvium derived from mixed sources. The surface layer is loam about 2 inches thick. The next layer is clay loam about 10 inches thick. Below this to a depth of 34 inches the soils are loam. Shale is at a depth of 34 inches.

Turnercrest soils are in nearly level to sloping areas on uplands. These soils are deep and well drained. They formed in residuum derived dominantly from sedimentary rock. The surface layer is fine sandy loam about 6 inches thick. The underlying material is fine sandy loam about 19 inches thick. Sandstone is at a depth of 25 inches.

Of minor extent in this unit are Cambria, Theedle, Recluse, and Hiland soils.

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

Production of forage and crops is limited by low annual precipitation and by the droughtiness and limited rooting depth of the Cushman and Turnercrest soils.

Soils on flood plains, terraces, and small alluvial fans

This group consists of 1 map unit. It makes up about 6 percent of the survey area.

8. Haverdad-Bidman-Clarkelen

Deep, well drained, nearly level to gently sloping soils; on flood plains, low terraces, and small alluvial fans

This map unit is in the southwestern part of the survey area. Slope is 0 to 6 percent. The vegetation on the Haverdad and Clarkelen soils is mainly perennial grasses, forbs, shrubs, and broadleaf trees. The vegetation on the Bidman soils is mainly perennial grasses, forbs, and shrubs. Elevation is 3,600 to 5,000 feet. The annual precipitation is about 10 to 14 inches, the average annual air temperature is 47 degrees F, and the frost-free season is 110 to 130 days.

This unit makes up about 6 percent of the survey area. It is about 45 percent Haverdad and similar soils, 11 percent Clarkelen soils, and 17 percent Bidman and similar soils. The remaining 27 percent is components of minor extent.

Haverdad and Clarkelen soils are in nearly level to gently sloping areas on flood plains and low terraces. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer of the Haverdad soils is loam about 9 inches thick. The underlying material to a depth of 60 inches or more is loam stratified with silty clay loam and fine sandy loam. The surface layer of the Clarkelen soils is sandy loam about 5 inches thick. The underlying material to a depth of 60 inches or more is sandy loam stratified with loamy sand and fine sandy loam.

Bidman soils are in nearly level to gently sloping areas on alluvial fans. These soils are deep and well drained. They formed in alluvium derived dominantly from mixed sources. The surface layer is loam about 4 inches thick. The subsoil is clay about 8 inches thick. Below this to a depth of 60 inches or more the soils are clay loam.

Of minor extent in this unit are Lohmiller, Ulm, Dwyer, and Kishona soils.

This unit is used mainly for livestock grazing. It is also used as hayland and wildlife habitat.

This unit is well suited to use as hayland, for livestock grazing, and as wildlife habitat. Production of hay and forage is limited by low annual precipitation and by the slow permeability of the Bidman soils.

Soils on foothills

This group consists of 2 map units. It makes up about 12 percent of the survey area.

9. Crownest-Lakoa-Norkool

Shallow and deep, well drained, gently sloping to very steep soils; on foothills

This map unit is on the lower foothills of the Black Hills, in the northeastern part of the survey area. Slope is 2 to 60 percent. The vegetation on this unit is mainly pine, perennial grasses, forbs, and shrubs. Elevation is 4,600 to 6,000 feet. The annual precipitation is about 15 to 19 inches, the average annual air temperature is 43 degrees F, and the frost-free season is 90 to 110 days.

This unit makes up about 8 percent of the survey area. It is about 29 percent Lakoa and similar soils, 24 percent Crownest soils, and 9 percent Norkool and similar soils. The remaining 38 percent is components of minor extent.

Crownest soils are in very steep areas on foothills. These soils are shallow and well drained. They formed in residuum derived dominantly from sandstone. The surface layer is channery sandy loam about 4 inches thick. The underlying material to a depth of 12 inches is channery sandy loam. Sandstone is at a depth of 12 inches.

Lakoa soils are in gently sloping to very steep areas on foothills. These soils are deep and well drained. They formed in residuum derived dominantly from interbedded sandstone and shale. The surface is covered with a layer of decomposed forest litter 1 inch thick. The surface layer is loam about 11 inches thick. The next layer is clay loam about 21 inches thick. Below this to a depth of 60 inches or more the soils are loam.

Norkool soils are in gently sloping to moderately sloping areas on foothills. These soils are deep and well drained. They formed in alluvium derived dominantly from siltstone. The surface layer is loam about 4 inches thick. The subsoil is silty clay loam about 10 inches thick. Below this to a depth of 60 inches or more the soils are silt loam.

Of minor extent in this unit are Regnaps, Citadel, Chinook, Colsavage, Cordeston, Reicess, Samoist, Bahl Variant, Colnevee Variant, Wages Variant, and McCaffery soils.

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

This unit is well suited to livestock grazing. The short growing season somewhat limits production of forage and wood. The Crownest soils are limited by restricted rooting depth and low available water capacity.

10. Vassett-Colnevee-Corpening

Deep and shallow, well drained, nearly level to steep soils; on foot slopes and terraces

This map unit is in the Black Hills, at the northeast corner of the survey area (fig. 1). Slope is 2 to 30 percent. The vegetation on this unit is mainly pine, perennial grasses, forbs, and shrubs. Elevation is 4,600 to 6,000 feet. The annual precipitation is about 15 to 19 inches, the average annual air temperature is 43 degrees F, and the frost-free season is 90 to 110 days.

This unit makes up about 4 percent of the survey area. It is about 21 percent Vassett and similar soils, 18 percent Colnevee soils, and 14 percent Corpening soils. The remaining 47 percent is components of minor extent.

Vassett soils are in nearly level areas on terraces. These soils are deep and well drained. They formed in alluvium derived dominantly from red shale. The surface layer is silt loam about 9 inches thick. The subsoil is clay loam about 15 inches thick. Below this to a depth of 60 inches or more is silt loam.

Colnevee soils are in nearly level to gently sloping areas on terraces. These soils are deep and well drained. They formed in alluvium derived dominantly from red shale. The surface layer is reddish brown silt loam about 5 inches thick. The underlying material to a depth of 60 inches or more is light red silt loam.

Corpening soils are in moderately sloping to steep areas on foot slopes. These soils are shallow and well drained. They formed in material derived dominantly from limestone. The surface layer is channery loam about 6 inches thick. The underlying material to a depth of 16 inches is channery loam. Limestone is at a depth of 16 inches.

Of minor extent in this unit are Colhill, Rothican, Cordeston, Nilrap, Nunnston, Reicess, Sugakool, and Rekop Variant soils.

This unit is used for livestock grazing and as hayland, cropland, and wildlife habitat.

This unit is well suited to livestock grazing, and for use as hayland and cropland. Production of forage and crop on the Corpening soils is limited by droughtiness and restricted rooting depth. The hazard of erosion restricts cropping in the steeper areas. The short growing season also limits production of crops and hay.

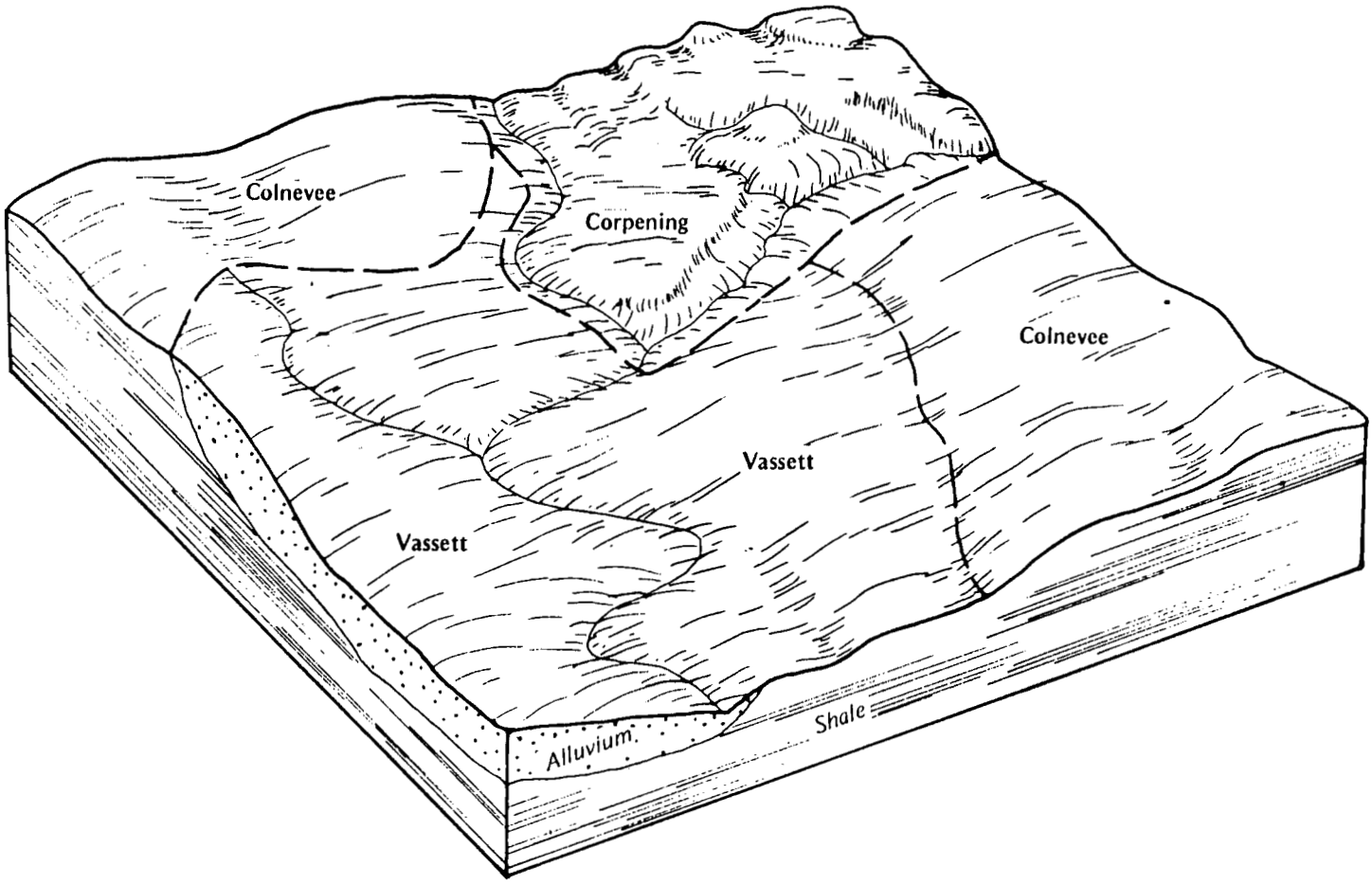

Figure 1.—Vassett-Colnevee-Corpening general soil map unit in the Black Hills.

Soils on foothills and mountains

This group consists of 1 map unit. It makes up about 5 percent of the survey area.

11. Citadel-Vanocker-Lakoa

Deep, well drained, moderately sloping to very steep soils; on foothills and mountains

This map unit is at the extreme northeastern corner of the survey area. Slopes are 10 to 60 percent. The vegetation on this unit is mainly pine, forbs, shrubs, and perennial grasses. Elevation is 4,600 to 7,000 feet. The annual precipitation is about 15 to 19 inches, the average annual air temperature is 43 degrees F, and the frost-free season is 90 to 110 days.

This unit makes up about 5 percent of the survey area. It is about 50 percent Citadel soils, 18 percent Vanocker soils, and 7 percent Lakoa soils. The remaining 25 percent is components of minor extent.

Citadel soils are in moderately sloping to very steep areas on foothills and mountains. These soils are deep and well drained. They formed in residuum derived dominantly from sandstone, limestone, and shale. The surface is covered with a layer of forest litter 3 inches thick. The surface layer is loam about 10 inches thick. Below this to a depth of 60 inches or more the soils are clay.

Vanocker soils are in moderately sloping to very steep areas on mountains. These soils are deep and well drained. They formed in slopewash alluvium derived dominantly from shale and sandstone. The surface is covered with a layer of forest litter 2 inches thick. The surface layer is gravelly loam about 2 inches thick. The subsoil is very channery clay loam about 14 inches thick. Below this to a depth of 60 inches or more the soils are very channery clay loam.

Lakoa soils are in moderately sloping to steep areas on foothills and mountains. These soils are deep and well drained. They formed in residuum derived from sandstone and shale. The surface layer is loam about 11 inches thick. The subsurface layer is clay loam about 3 inches thick. The subsoil to a depth of 32 inches is clay loam. The substratum to a depth of 60 inches or more is loam.

Of minor extent in this unit are Paunsaugunt, Chinook, Stovho, and Pesowyo soils and Rock outcrop.

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

This unit is well suited to use as woodland.

Detailed Soil Map Units

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

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

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Kishona clay loam, saline, 0 to 2 percent slopes, is one of several phases in the Kishona series.

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Forkwood-Cambria-Cushman loams, 0 to 12 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary

to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Shingle-Theedle-Cambria association, steeply sloping, is an example.

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

Table 3 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Map Unit Descriptions

1—Absted-Bone complex, 0 to 6 percent slopes. This map unit is on alluvial fans. Areas are 75 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 65 percent Absted fine sandy loam and 25 percent Bone loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bidman loam and Ulm loam near areas of the Absted soil. Also included are small areas of Petrie clay loam near areas of the Bone soil. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Absted soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown fine sandy loam about 2 inches thick. The subsurface layer is light brownish gray fine sandy loam about 4 inches thick. The subsoil is brown clay about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray clay loam.

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

The Bone soil is deep and well drained. It formed in clayey alluvium derived dominantly from saline shale. Typically, the surface layer is light gray loam about 1 inch thick. The subsoil is light brownish gray clay about 3 inches thick. The substratum to a depth of 60 inches or more is pale yellow clay loam.

Permeability of the Bone soil is very slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is very strongly alkaline.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Absted soil is mainly western wheatgrass, needleandthread, blue grama, and green needlegrass. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. The production of forage is limited by low annual precipitation. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this soil for rangeland seeding is good. Where blue grama and Sandberg bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

The potential plant community on the Bone soil is mainly western wheatgrass, inland saltgrass, greasewood, and gardner saltbush. As the range condition deteriorates, the soil becomes nearly barren. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 500 pounds in favorable years to 200 pounds in unfavorable years. The production of forage is limited by excessive salt content and low annual precipitation. The suitability of this soil for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIs, nonirrigated. The Absted soil is in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Bone soil is in the Saline Upland, 10- to 14-inch ppt., Northern Plains range site.

2—Alice Variant fine sandy loam, 2 to 10 percent slopes. This deep, well drained soil is on stream terraces and alluvial fans. It formed in alluvium derived dominantly from sedimentary rock. Areas are 10 to 25 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F,

and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsoil is pale brown fine sandy loam about 12 inches thick. The substratum to a depth of 60 inches or more is very pale brown loamy very fine sand.

Included in this unit are small areas of Vonalee and Terro sandy loams.

Permeability of this soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland, hayland, and wildlife habitat.

The potential plant community on this unit is mainly needleandthread, prairie sandreed, threadleaf sedge, and western wheatgrass. As the range condition deteriorates, threadleaf sedge and fringed sagewort increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. The production of forage is limited by low annual precipitation. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. This unit is limited for livestock watering ponds and other water impoundments because of the seepage potential. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

If this unit is used for hay and pasture, the main limitations are low precipitation and the hazard of water erosion. Using management that maintains optimum vigor and quality of forage plants is a good practice. Rotation grazing helps to maintain the quality of forage.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

3—Bidman loam, 0 to 6 percent slopes. This deep, well drained soil is on alluvial fans and valley sides. It formed in alluvium derived dominantly from sedimentary rock. Areas are 25 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is grayish brown loam about 4 inches thick. The subsoil is pale brown clay about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray clay loam.

Included in this unit are small areas of Ulm loam on the lower slopes and Parmleed clay loam on the upper slopes.

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

This unit is used mainly as rangeland. It is also used as cropland, hayland, and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years.

The suitability of this unit for rangeland seeding is good. Where blue grama and Sandberg bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit is moderately suited to crops, hay, and pasture. It is limited mainly by low annual precipitation and slow permeability.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

4—Bidman-Bone loams, 0 to 2 percent slopes. This map unit is on alluvial fans. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air

temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 60 percent Bidman loam and 25 percent Bone loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Ulm loam near areas of the Bidman soil and Absted fine sandy loam near areas of the Bone soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Bidman soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown loam about 4 inches thick. The subsoil is pale brown clay about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray clay loam.

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

The Bone soil is deep and well drained. It formed in clayey alluvium derived dominantly from saline shale. Typically, the surface layer is light brownish gray loam about 1 inch thick. The subsoil is light brownish gray clay about 3 inches thick. The substratum to a depth of 60 inches or more is pale yellow clay loam.

Permeability of the Bone soil is very slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is very strongly alkaline.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Bidman soil is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. The production of forage is limited by low annual precipitation. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this soil for rangeland seeding is good. Where blue grama and Sandberg bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

The potential plant community on the Bone soil is mainly western wheatgrass, inland saltgrass, greasewood, and gardner saltbush. As the range condition deteriorates, the soil becomes nearly barren. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 500 pounds in favorable years to 200 pounds in unfavorable years. The production of forage is limited by the content of salt and sodium and low annual precipitation. The suitability of this soil for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. The Bidman soil is in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Bone soil is in the Saline Upland, 10- to 14-inch ppt., Northern Plains range site.

5—Bidman-Ulm association, undulating. This map unit is on alluvial fans and valley side slopes. Slope is 1 to 6 percent. Areas are 30 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Bidman loam and 30 percent Ulm clay loam. The Bidman soil is on the upper slopes, and the Ulm soil is on the lower slopes.

Included in this unit are small areas of Forkwood loam near areas of the Ulm soil and Parmleed loam near areas of the Bidman soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Bidman soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown loam about 4 inches thick. The subsoil is pale brown clay about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray clay loam.

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

The Ulm soil is deep and well drained. It formed in clayey alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray clay loam about 6 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is light gray clay loam.

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

This unit is used mainly as rangeland and hayland. It is also used as cropland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit is moderately suited to crops, hay, and pasture. It is limited mainly by low annual precipitation and slow permeability. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. The Bidman soil is in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Ulm soil is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

6—Bone loam, 0 to 3 percent slopes. This deep, well drained soil is on alluvial fans. It formed in clayey alluvium derived dominantly from saline shale. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light gray loam about 1 inch thick. The subsoil is light brownish gray clay about 3 inches thick. The substratum to a depth of 60 inches or more is pale yellow clay loam.

Included in this unit are small areas of Absted fine sandy loam and Petrie clay loam.

Permeability of this Bone soil is very slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. The Bone soil is very strongly alkaline.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, inland saltgrass, greasewood, and gardner saltbush. As the range condition deteriorates, the unit becomes nearly barren. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 500 pounds in favorable years to 200 pounds in unfavorable years. The production of forage is limited by the content of salt and alkali and low annual precipitation. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIs, nonirrigated. It is in the Saline Upland, 10- to 14-inch ppt., Northern Plain range site.

7—Bowbac-Tassel-Rock outcrop complex, 3 to 20 percent slopes. This map unit is on ridges and hillsides and on fan aprons of the Rochelle Hills. The native vegetation is mainly grasses, shrubs, and coniferous trees. Elevation is 4,500 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average frost-free period is 110 to 130 days.

This unit is about 40 percent Bowbac sandy loam, 3 to 10 percent slopes, about 35 percent Tassel fine sandy loam, 3 to 20 percent slopes, and about 15 percent sandstone Rock outcrop. The Bowbac soil is on foot slopes and the upper parts of valley filling fans, and the Tassel soil is on ridges and hillsides.

Included in this unit are small areas of Vonalee and Terro sandy loams on foot slopes and valley filling fans. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Bowbac soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is grayish brown sandy loam about 7 inches thick. The subsoil is pale brown sandy clay loam about 11 inches thick. The substratum to a depth of 33 inches or more is very pale brown sandy loam. Sandstone bedrock is at a depth of 33 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Bowbac soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

The Tassel soil is shallow and well drained. It formed in residuum derived dominantly from noncalcareous sandstone. Typically, the surface layer is light brownish gray fine sandy loam 3 inches thick. The underlying material to a depth of 15 inches is light brownish gray fine sandy loam. Sandstone is at a depth of 15 inches.

Permeability of the Tassel soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of wind erosion is severe.

This unit is used as wildlife habitat and rangeland.

The potential plant community on the Bowbac soil is mainly needleandthread, western wheatgrass, prairie sandreed, and blue grama. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. The production of forage is limited by low annual precipitation.

The potential plant community on the Tassel soil is mainly needleandthread, prairie sandreed, and little bluestem. As the range condition deteriorates, threadleaf sedge and fringed sagewort increase. As the range condition further deteriorates, broom snakeweed and cheatgrass increase. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production varies from 1,400 pounds in favorable years to 600 pounds in unfavorable years. The production of forage is limited by low available water capacity and shallow soil depth.

If the range on this unit is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community.

This map unit is in capability subclass VIe, nonirrigated. The Bowbac soil is in the Sandy, 10- to 14-inch ppt., Northern Plains range site. The Tassel soil is in the Shallow Sandy, 10- to 14-inch ppt., Northern Plains range site.

8—Cadoma silty clay loam, 2 to 10 percent slopes. This moderately deep, well drained soil is on shoulder slopes and foot slopes. It formed in very strongly alkaline residuum derived dominantly from sodic shale. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light gray silty clay loam about 3 inches thick. The subsoil is grayish brown silty clay loam about 8 inches thick. The substratum to a depth of 28 inches is light brownish gray clay. Shale is at a depth of 28 inches.

Included in this unit are small areas of Orella and Petrie clay loams.

Permeability of this Cadoma soil is slow. Available water capacity is high. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight. The subsoil and substratum are very strongly alkaline.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, inland saltgrass, greasewood, and gardner saltbush. As the range condition deteriorates, greasewood and gardner saltbush increase. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 250 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The production of forage is limited by the content of salt and alkali and low annual precipitation. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, sage grouse, jackrabbit, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIs, nonirrigated. It is in the Saline Upland, 10- to 14-inch ppt., Northern Plains range site.

9—Cambria loam, 2 to 6 percent slopes. This deep, well drained soil is on upland foot slopes. It formed in loamy alluvium derived dominantly from sedimentary rock. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is brown loam about 4 inches thick. The subsoil is brown loam about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

Included in this unit are small areas of Forkwood, Kishona, and Cushman loams.

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

This unit is used mainly as rangeland. It is also used as cropland, hayland, and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable

years. The production of forage is limited by low annual precipitation. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Where blue grama and Sandberg bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. If the range vegetation is seriously deteriorated, seeding is needed. The suitability of this unit for rangeland seeding is good.

This unit is moderately well suited to crop and hay production. It is limited mainly by low annual precipitation. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable.

This unit provides habitat for antelope, mule deer, coyote, fox, sage grouse, jackrabbit, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

10—Chinook fine sandy loam, 2 to 10 percent slopes. This deep, well drained soil is on fans and stream terraces. It formed in alluvium derived dominantly from sedimentary rock. Areas are 15 to 25 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is grayish brown fine sandy loam about 10 inches thick. The subsoil is pale brown fine sandy loam about 10 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

Included in this unit are small areas of Reicess and Wages Variant loams.

Permeability of this Chinook soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and wildlife habitat.

The potential plant community on this unit is mainly prairie sandreed, needleandthread, sand bluestem, and western wheatgrass. As the range condition deteriorates, blue grama and bluegrass increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the unit from erosion. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

This unit provides habitat for white-tailed deer, mule deer, coyote, sharp-tailed grouse, bobcat, and other birds and small animals. Oak and Hawthorn provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Sandy, 15-to-19 inch ppt., Black Hills range site.

11—Chinook-Tassel Variant fine sandy loams, 2 to 10 percent slopes. This map unit is on fans, hillslopes, and ridge crests. Areas are 25 to 40 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 70 percent Chinook fine sandy loam and 20 percent Tassel Variant fine sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Reicess loam near areas of the Chinook soil, and Theedle Variant loam near areas of the Tassel Variant soil. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Chinook soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown fine sandy loam about 10 inches thick. The subsoil is pale brown fine sandy loam about 10 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

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

The Tassel Variant soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is dark grayish brown fine sandy loam about 6 inches thick. The underlying material to a depth of 16 inches is very pale brown fine sandy loam. Sandstone is at a depth of 16 inches.

Permeability of the Tassel Variant soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Chinook soil is mainly prairie sandreed, needleandthread, sand bluestem, and western wheatgrass. As the range condition deteriorates, blue grama and bluegrass increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the soil from erosion. The suitability of this soil for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water erosion during seedling establishment.

The potential plant community on the Tassel Variant soil is mainly prairie sandreed, bluebunch wheatgrass, western wheatgrass, and little bluestem. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production varies from 1,800 pounds in favorable years to 900 pounds in unfavorable years. The production of forage is limited by droughtiness and shallow rooting depth. The suitability of this Tassel Variant soil for rangeland seeding is poor. The main limitations for seeding are limited rooting depth and the hazard of erosion by wind and water during seedling establishment.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, sharp-tailed grouse, bobcat, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Chinook soil is in the Sandy, 15- to 19-inch ppt., Black Hills range site. The Tassel Variant soil is in the Shallow Sandy, 15- to 19-inch ppt., Black Hills range site.

12—Chinook-Tassel Variant fine sandy loams, 10 to 30 percent slopes. This map unit is on foot slopes and back slopes on uplands. Areas are 20 to 50 acres in size. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Chinook fine sandy loam, 10 to 15 percent slopes, and 30 percent Tassel Variant fine sandy loam, 10 to 30 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Reicess loam near areas of the Chinook soil on the lower slopes and Theedle Variant loam near areas of the Tassel Variant soil on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Chinook soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown fine sandy loam about 10 inches thick. The subsoil is pale brown fine sandy loam about 10 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

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

The Tassel Variant soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is dark grayish brown fine sandy loam about 2 inches thick. The underlying material to a depth of 16 inches is very pale brown fine sandy loam. Sandstone is at a depth of 16 inches.

Permeability of the Tassel Variant soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Chinook soil is mainly prairie sandreed, needleandthread, sand bluestem, and western wheatgrass. As the range condition deteriorates, blue grama and bluegrass increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the soil from erosion. The suitability of this soil for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

The potential plant community on the Tassel Variant soil is mainly prairie sandreed, bluebunch wheatgrass, western wheatgrass, and little bluestem. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production varies from 1,800 pounds in favorable

years to 900 pounds in unfavorable years. The production of forage is limited by low available water capacity and shallow rooting depth. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. The suitability of this Tassel Variant soil for rangeland seeding is poor.

This unit provides habitat for white-tailed deer, mule deer, coyote, bobcat, Merriam's turkey, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Chinook soil is in the Sandy, 15- to 19-inch ppt., Black Hills range site. The Tassel Variant soil is in the Shallow Sandy, 15- to 19-inch ppt., Black Hills range site.

13—Chinook-Theedle Variant complex, 3 to 10 percent slopes. This map unit is on valley sides and back slopes. Areas are 25 to 40 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Chinook fine sandy loam and 30 percent Theedle Variant loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Reicess loam near areas of the Chinook soil on the lower slopes and Tassel Variant fine sandy loam near areas of the Theedle Variant soil on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Chinook soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown fine sandy loam about 10 inches thick. The subsoil is pale brown fine sandy loam about 10 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

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

The Theedle Variant soil is moderately deep and well drained. It formed in loamy residuum derived dominantly from soft shale. Typically, the surface layer is light brownish gray loam about 3 inches thick. The underlying material to a depth of 30 inches is light gray loam. Shale is at a depth of 30 inches.

Permeability of the Theedle Variant soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Chinook soil is mainly prairie sandreed, needleandthread, sand bluestem, and western wheatgrass. As the range condition deteriorates, blue grama and bluegrass increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the soil from erosion.

The potential plant community on the Theedle Variant soil is mainly western wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and fringed sagewort increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the soil from erosion.

The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

This unit provides habitat for white-tailed deer, mule deer, coyote, bobcat, Merriam's turkey, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, nonirrigated. The Chinook soil is in the Sandy, 15- to 19-inch ppt., Black Hills range site. The Theedle Variant soil is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

14—Chinook-Theedle Variant complex, 10 to 30 percent slopes. This map unit is on valley sides and hillslopes. Areas are 20 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Chinook fine sandy loam, 10 to 15 percent slopes, and 30 percent Theedle Variant loam, 10 to 30 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Reicess loam on the lower slopes and Shingle Variant loam on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Chinook soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown fine sandy loam about 10 inches thick. The subsoil is pale brown fine sandy loam about 10 inches thick. The substratum to a depth of 60 inches or more is very pale brown fine sandy loam.

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

The Theedle Variant soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from soft shale. Typically, the surface layer is light brownish gray loam about 3 inches thick. The underlying material to a depth of 30 inches is light gray loam. Shale bedrock is at a depth of 30 inches.

Permeability of the Theedle Variant soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Chinook soil is mainly prairie sandreed, needleandthread, sand bluestem, and western wheatgrass. As the range condition deteriorates, blue grama and bluegrass increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the soil from erosion. The suitability of this Chinook soil for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

The potential plant community on the Theedle Variant soil is mainly western wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and fringed sagewort increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Livestock grazing should be managed to protect the soil from erosion. The suitability of this Theedle Variant soil for rangeland seeding is poor. The main limitation for seeding is the hazard of water erosion. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Chinook soil is in the Sandy, 15- to 19-inch ppt., Black Hills range site. The Theedle Variant soil is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

15—Citadel-Lakoa loams, 3 to 10 percent slopes. This map unit is on foot slopes. Areas are 75 to 200 acres in size. The native vegetation is mainly coniferous trees, grasses, and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Citadel loam and 25 percent Lakoa loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Crownest channery sandy loam on the upper slopes and McCaffery loamy sand on the lower slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Citadel soil is deep and well drained. It formed in residuum derived dominantly from calcareous sandstone, limestone, and shale. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is pinkish gray loam about 10 inches thick. The subsoil is reddish brown clay about 16 inches thick. The substratum to a depth of 60 inches or more is red clay.

Permeability of the Citadel soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Lakoa soil is deep and well drained. It formed in residuum derived dominantly from interbedded sandstone and shale. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is dark grayish brown loam about

3 inches thick. The subsurface layer is light brownish gray loam about 8 inches thick. The subsoil is brown clay loam about 21 inches thick. The substratum to a depth of 60 inches or more is light brown loam.

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

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

This unit is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 60 to 65. The main concerns in producing and harvesting timber are soil wetness resulting from snowmelt and heavy rainfall and the hazard of erosion and compaction being caused by use of heavy logging equipment.

The understory vegetation on the Citadel soil consists mainly of Kentucky bluegrass, green needlegrass, timber danthonia, and western snowberry. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 1,950 pounds in favorable years to 1,200 pounds in unfavorable years. The understory vegetation on the Lakoa soil consists mainly of sideoats grama, little bluestem, sedges, and Oregon-grape. The potential plant community produces about 600 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 400 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, nonirrigated. It is in woodland suitability group 3A.

16—Citadel-Lakoa loams, 10 to 60 percent slopes. This map unit is on foothills and mountain slopes. Areas are 75 to 350 acres in size. The native vegetation is mainly coniferous trees, shrubs, and grasses. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Citadel loam, 6 to 40 percent slopes, on the lower part of slopes and 25 percent Lakoa loam, 10 to 60 percent slopes, on the upper part. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Crownest channery sandy loam on the upper slopes and McCaffery loamy sand on the lower slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Citadel soil is deep and well drained. It formed in residuum derived dominantly from calcareous sandstone, limestone, and shale. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is pinkish gray loam about 10 inches thick. The subsoil is reddish brown clay about 16 inches thick. The substratum to a depth of 60 inches or more is red clay.

Permeability of the Citadel soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Lakoa soil is deep and well drained. It formed in residuum derived dominantly from interbedded sandstone and shale. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is dark grayish brown loam about 3 inches thick. The subsurface layer is light brownish gray loam about 8 inches thick. The subsoil is brown clay loam about 21 inches thick. The substratum to a depth of 60 inches or more is light brown loam.

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

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

This unit is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 60 to 65. The main concern in producing and harvesting timber is that the steeper areas are subject to landslides in times of snowmelt or high rainfall. Landslides may occur naturally or in road cuts.

The understory vegetation on the Citadel soil consists mainly of Kentucky bluegrass, green needlegrass, sedges, timber danthonia, and western snowberry. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 1,950 pounds in favorable years to 1,200 pounds in unfavorable years.

The understory vegetation on the Lakoa soil consists mainly of sideoats grama, little bluestem, western wheatgrass, sedges, and Oregon-grape. The potential plant community produces about 600 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 400 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 3R.

17—Citadel-McCaffery complex, 3 to 10 percent slopes. This map unit is on foothills. Areas are 75 to 200

acres in size. The native vegetation is mainly coniferous trees, shrubs, and grasses. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Citadel loam and 15 percent McCaffery loamy sand. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lakoa and Nilrap loams on the lower slopes and Crownest channery sandy loam on the upper slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Citadel soil is deep and well drained. It formed in residuum derived dominantly from calcareous sandstone, limestone, and shale. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is pinkish gray loam about 10 inches thick. The subsoil is reddish brown clay about 16 inches thick. The substratum to a depth of 60 inches or more is red clay.

Permeability of the Citadel soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The McCaffery soil is deep and excessively drained. It formed in residuum derived dominantly from sandstone. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is pale brown loamy sand about 30 inches thick. The subsoil is pinkish gray loamy sand about 30 inches thick. Sandstone is at a depth of 60 inches.

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

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

This unit is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 60 to 65. The main concerns in producing and harvesting timber are soil wetness resulting from snowmelt and heavy rainfall and the hazards of erosion and compaction being caused by use of heavy logging equipment. Some areas are very sandy and may limit movement of equipment.

The understory vegetation on the Citadel soil consists mainly of Kentucky bluegrass, green needlegrass, sedges, timber danthonia, and western snowberry. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,500 pounds in favorable years to 1,200 pounds in unfavorable years.

The understory vegetation on the McCaffery soil consists mainly of timber danthonia, sedges, Kentucky bluegrass, roughleaf ricegrass, and serviceberry. The potential plant community produces about 1,550 pounds of air-dry vegetation per acre in normal years. Production varies from 1,950 pounds in favorable years to 1,200 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, nonirrigated. The Citadel soil is in woodland suitability group 3R. The McCaffery soil is in woodland suitability group 3S.

18—Citadel-McCaffery complex, 10 to 30 percent slopes. This map unit is on foothills and mountains. Areas are 75 to 200 acres in size. The native vegetation is mainly coniferous trees, shrubs, and grasses. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Citadel loam and 15 percent McCaffery loamy sand. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lakoa and Nilrap loams on the lower slopes and Crownest channery sandy loam on the upper slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Citadel soil is deep and well drained. It formed in residuum derived dominantly from calcareous sandstone, limestone, and shale. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is pinkish gray loam about 10 inches thick. The subsoil is reddish brown clay about 16 inches thick. The substratum to a depth of 60 inches or more is red clay.

Permeability of the Citadel soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The McCaffery soil is deep and excessively drained. It formed in residuum derived dominantly from sandstone. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is pale brown loamy sand about 30 inches thick. The subsoil is pinkish gray loamy sand about 30 inches thick. Sandstone is at a depth of 60 inches.

Permeability of the McCaffery soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water

erosion is severe. The hazard of wind erosion is very severe.

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

This unit is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 60 to 65. The main concerns in producing and harvesting timber are soil wetness as a result of snowmelt and heavy rainfall and the hazard of erosion on the steeper slopes. Some areas are very sandy and may limit movement of equipment.

The understory vegetation on the Citadel soil consists mainly of Kentucky bluegrass, green needlegrass, sedges, timber danthonia, and western snowberry. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,500 pounds in favorable years to 1,200 pounds in unfavorable years.

The understory vegetation on the McCaffery soil consists mainly of timber danthonia, sedges, Kentucky bluegrass, roughleaf ricegrass, and serviceberry. The potential plant community produces about 1,550 pounds of air-dry vegetation per acre in normal years. Production varies from 1,950 pounds in favorable years to 1,200 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Citadel soil is in woodland suitability group 3R. The McCaffery soil is in woodland suitability group 3S.

19—Colhill-Rothican complex, 10 to 40 percent slopes. This map unit is upland terraces. Areas are 50 to 100 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Colhill gravelly loam and 20 percent Rothican loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Sugakool loam, Rock outcrop, and Thermopolis Variant silt loam. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Colhill soil is deep and excessively drained. It formed in gravelly alluvium derived from mixed sources. Typically, the surface layer is light brownish gray gravelly loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light gray very gravelly loam.

Permeability of the Colhill soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Rothican soil is deep and well drained. It formed in gravelly alluvium derived from mixed sources. Typically, the surface layer is grayish brown loam about 8 inches thick. The subsoil is light brownish gray gravelly loam about 8 inches thick. The substratum to a depth of 60 inches or more is light brown gravelly loam.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,000 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. The production of forage is limited by droughtiness and slope. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Livestock grazing should be managed to protect the unit from erosion. The suitability of this unit for rangeland seeding is poor. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Northern Plains range site.

20—Colnevee silt loam, 2 to 6 percent slopes. This deep, well drained soil is on upland terraces, fans, and foot slopes. It formed in silty alluvium derived dominantly from red shale. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is reddish brown silt loam about 5 inches thick. The underlying material to a depth of 60 inches or more is light red silt loam.

Included in this unit are small areas of Colnevee Variant silt loam on upper slopes and Vassett silt loam on the lower slopes.

Permeability of this Colnevee soil is moderate. Available water capacity is high. Effective rooting depth

is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

This unit is used mainly as cropland, hayland, and rangeland (fig 2). It is also used as wildlife habitat.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is a short growing season.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment. Where bluegrass and blue grama are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Loamy, 15-to-19 inches ppt., Black Hills range site.

21—Colnevee silt loam, 6 to 15 percent slopes. This deep, well drained soil is on rolling upland terraces and foot slopes. It formed in silty alluvium derived dominantly from red shale. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is reddish brown silt loam about 5 inches thick. The underlying material to a depth of 60 inches or more is light red silt loam.

Included in this unit are small areas of Colnevee Variant silt loam on the upper slopes and Vassett silt loam on the lower slopes.

Permeability of this Colnevee soil is moderate. Available water capacity is high. Effective rooting depth

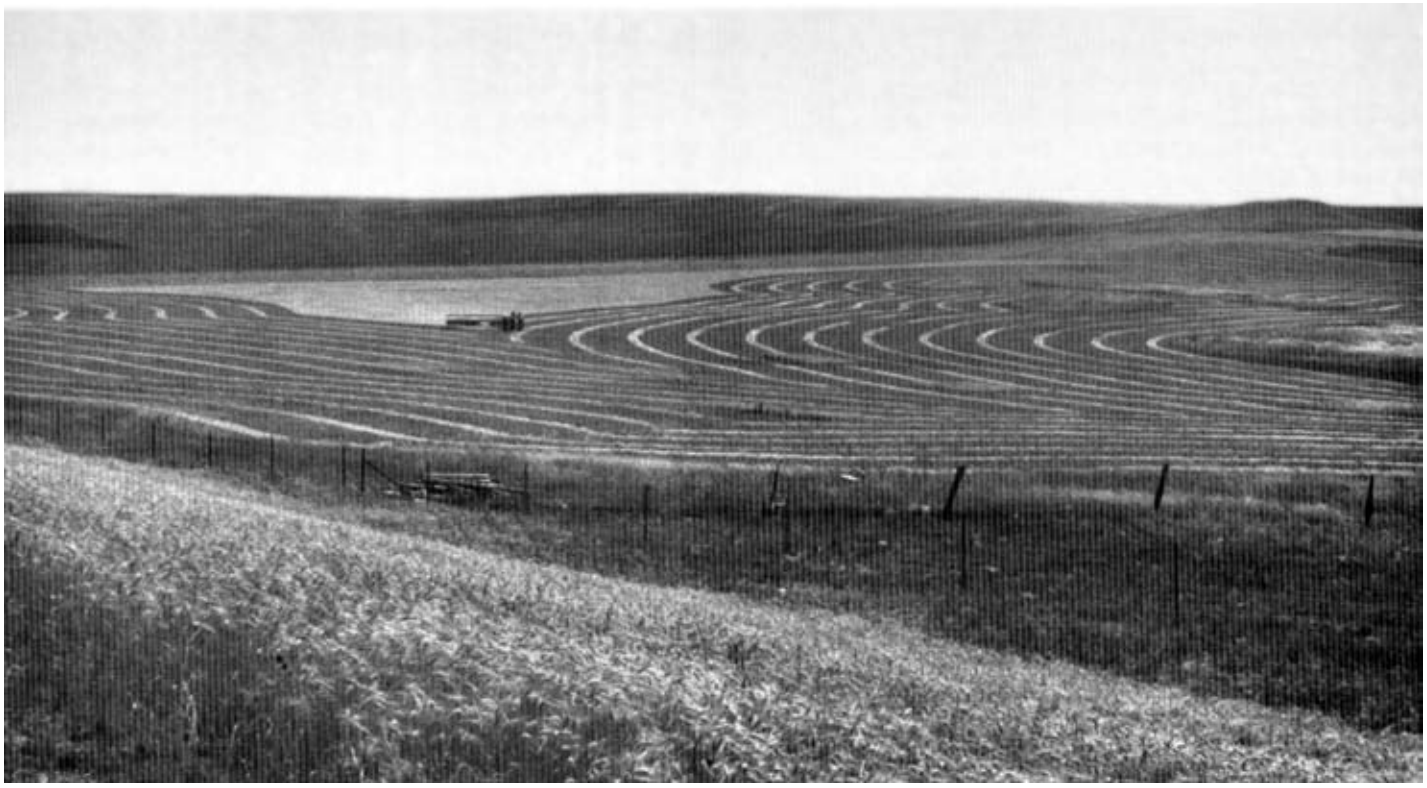

Figure 2.—Harvesting alfalfa in an area of Colnevee silt loam, 2 to 6 percent slopes.

is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. The suitability of the unit for rangeland seeding is poor. The main limitation for seeding is the hazard of water erosion. Where bluegrass and blue grama are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy 15- to 19-inch ppt., Black Hills range site.

22—Colnevee silt loam, eroded, 2 to 6 percent slopes. This deep, well drained soil is on foot slopes of uplands. It formed in silty alluvium derived dominantly from red shale. Most of the original surface layer has been removed by erosion, exposing underlying material that contains less organic matter and is redder. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is reddish brown silt loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light red silt loam.

Included in this unit are small areas of Vassett silt loam and Colnevee Variant silt loam.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,000 pounds of air-dry vegetation per acre in normal years. Production varies from 2,800 pounds in favorable years to 1,300 pounds in unfavorable years. Livestock grazing should be managed to protect the unit from erosion. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

23—Colnevee silt loam, eroded, 6 to 15 percent slopes. This deep, well drained soil is on moderately sloping to rolling foot slopes. It formed in silty alluvium derived dominantly from red shale. Most of the original surface layer has been removed by erosion, exposing underlying material that contains less organic matter and is redder. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is reddish brown silt loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light red silt loam.

Included in this unit are small areas of Vassett silt loam on the lower slopes and Colnevee Variant silt loam on the upper slopes.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,000 pounds of air-dry vegetation per acre in normal years. Production varies from 2,800 pounds in favorable years to 1,300 pounds in unfavorable years. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Livestock grazing should be managed to protect the unit from erosion. The suitability of this unit for rangeland seeding is poor. The main limitation for seeding is the hazard of water erosion.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed

grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

24—Colnevee Variant silt loam, 2 to 10 percent slopes. This moderately deep, well drained soil is on foot slopes. It formed in silty alluvium derived dominantly from red shale. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is reddish brown silt loam about 5 inches thick. The underlying material to a depth of 31 inches is light yellow silt loam. Siltstone is at a depth of 31 inches.

Included in this unit are small areas of Colnevee silt loam on the lower slopes and Thermopolis Variant silt loam on the upper slopes.

Permeability of the Colnevee Variant soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,000 pounds of air-dry vegetation per acre in normal years. Production varies from 2,800 pounds in favorable years to 1,300 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the soil from erosion. Where bluegrass and blue grama are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is poor. The main limitation for seeding is the hazard of water erosion.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

25—Colombo Variant loam, 0 to 2 percent slopes. This deep, well drained soil is on flood plains and low terraces. It formed in stratified alluvium derived dominantly from sedimentary rock. Areas are 50 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is brown loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loam stratified with lenses of clay loam and sandy loam.

Included in this unit are small areas of Reicess loam on low terraces and Haverdad on flood plains.

Permeability of the Colombo Variant soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight. This soil is subject to rare periods of flooding.

This unit is used mainly as rangeland and cropland. It is also used as wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, big bluestem, and basin wildrye. As the range condition deteriorates, blue grama and silver sagebrush increase. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 2,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit is moderately suited to nonirrigated crops. The organic matter content can be maintained by using all crop residue, plowing under cover crops, and using a suitable rotation. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of diversions and grassed waterways.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Overflow, 10- to 14-inch ppt., Northern Plains range site.

26—Colombo Variant loam, occasionally flooded, 0 to 2 percent slopes. This deep, well drained soil is on flood plains. It formed in stratified alluvium derived dominantly from sedimentary rock. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is brown loam about 8 inches thick. The underlying material to a depth of 60 inches or more is pale brown loam stratified with lenses of clay loam and sandy loam.

Included in this unit are small areas of Haverdad Loam and Colombo Variant loam, nonflooded.

Permeability of the Colombo Variant soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight. Flooding occurs during periods of short duration from April to June.

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, big bluestem, blue wildrye, and western wheatgrass. As the range condition deteriorates, blue grama and silver sagebrush increase. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 2,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit is moderately suited to nonirrigated crops. It is limited mainly by flooding. The organic matter content can be maintained by using all crop residue, plowing under cover crops, and using a suitable rotation. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of diversions.

This unit is moderately suited to hay and pasture. The main limitation is flooding.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IIIw, irrigated and nonirrigated, It is in the Overflow, 10- to 14-inch ppt., Northern Plains range site.

27—Colsavage-Bahl Variant clay loams, 2 to 10 percent slopes. This map unit is on alluvial fans and foot slopes. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 45 percent Colsavage clay loam, which is on the upper parts of fans and foot slopes, and 35 percent Bahl Variant clay loam, which is on the lower parts of alluvial fans. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Nunnston clay loam near areas of the Bahl Variant soil and Samoist clay and Theedle Variant loam near areas of the Colsavage soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Colsavage soil is moderately deep and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is grayish brown clay loam about 5 inches thick. The underlying material to a depth of 30 inches is light brownish gray clay. Shale is at a depth of 30 inches.

Permeability of the Colsavage soil is slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Bahl Variant soil is deep and well drained. It formed in clayey alluvium derived dominantly from shale. Typically, the surface layer is pale olive clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is olive clay.

Permeability of the Bahl Variant soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, western wheatgrass, Columbia needlegrass, and blue grama. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 2,900 pounds in favorable years to 1,400 pounds in unfavorable years. Management

practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitations for seeding are clayey texture and the hazard of water erosion.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, sharp-tailed grouse, bobcat, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclasses IVe, irrigated, and VIe, nonirrigated. It is in the Clayey, 15- to 19-inch ppt., Black Hills range site.

28—Cordeston loam, 0 to 6 percent slopes. This deep, well drained soil is alluvial fans. It formed in alluvium derived dominantly from sandstone or siltstone. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer is dark gray loam about 6 inches thick. The subsoil is dark grayish brown loam about 30 inches thick. The underlying material to a depth of 60 inches or more is grayish brown loam.

Included in this unit are small areas of Reicess loam.

Permeability of this Cordeston soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight. This soil is subject to rare periods of flooding.

This unit is used mainly as rangeland and cropland. It is also used as wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, big bluestem, blue wildrye, and western wheatgrass. As the range condition deteriorates, snowberry and bluegrass increase. The potential plant community produces about 3,000 pounds of air-dry vegetation per acre in normal years. Production varies from 4,000 pounds in favorable years to 2,000 pounds in unfavorable years. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is good.

This unit is moderately suited to nonirrigated crops. Practices that can be used to control erosion include early fall seeding, stubble mulch tillage, and construction of diversions.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Overflow, 15- to 19-inch ppt., Black Hills range site.

29—Corpening-Rock outcrop complex, 2 to 30 percent slopes. This map unit is on uplands. Areas are 50 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Corpening channery loam and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Colhill gravelly loam and Colnevee Variant silt loam near areas of the Corpening soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Corpening soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from limestone. Typically, the surface layer is brown channery loam about 6 inches thick. The underlying material to a depth of 16 inches is brown channery loam. Limestone is at a depth of 16 inches.

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

Rock outcrop consists of areas of exposed limestone.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly little bluestem, western wheatgrass, sideoats grama, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 700 pounds of air-dry vegetation per acre in normal years. Production varies from 900 pounds in favorable years to 400 pounds in unfavorable years. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are slope, shallow soil depth, and rockiness.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIs, nonirrigated. It is in Shallow Loamy, 15- to 19-inch ppt., Black Hills range site.

30—Crownest-Regnaps complex, 2 to 10 percent slopes. This map unit is on foothills. Areas are 50 to 100

acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Crownest channery sandy loam that is on the upper slopes and 40 percent Regnaps loam that is on the lower slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Theedle Variant loam near areas of the Regnaps soil and Rock outcrop near areas of the Crownest soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Crownest soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is grayish brown channery sandy loam about 4 inches thick. The underlying material to a depth of 12 inches is grayish brown channery sandy loam. Sandstone is at a depth of 12 inches.

Permeability of the Crownest soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Regnaps soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is pale brown loam about 4 inches thick. The subsoil is brown clay loam about 12 inches thick. The substratum to a depth of 21 inches is pale brown loam. Sandstone is at a depth of 21 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Crownest soil is mainly little bluestem, western wheatgrass, sideoats grama, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,000 pounds in unfavorable years.

The potential plant community on the Regnaps soil is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are limited rooting depth and rockiness.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Crownest soil is in the Shallow Loamy, 15- to 19-inch ppt., Black Hills range site. The Regnaps soil is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

31—Crownest-Regnaps complex, 10 to 30 percent slopes. This map unit is on foothills. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Crownest channery sandy loam, 10 to 30 percent slopes, that is on the upper slopes, and 20 percent Regnaps loam, 10 to 20 percent slopes, that is on the lower slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Theedle Variant loam near areas of the Regnaps soil and Rock outcrop near areas of the Crownest soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Crownest soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is grayish brown channery sandy loam about 4 inches thick. The underlying material to a depth of 12 inches is grayish brown channery sandy loam. Sandstone is at a depth of 12 inches.

Permeability of the Crownest soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Regnaps soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is pale brown loam about 4 inches thick. The subsoil is brown clay loam about 12 inches thick. The substratum to a depth of 21 inches or more is pale brown loam. Sandstone is at a depth of 21 inches.

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

The potential plant community on the Crownest soil is mainly little bluestem, western wheatgrass, sideoats grama, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,000 pounds in unfavorable years.

The potential plant community on the Regnaps soil is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years.

If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are slope, rockiness, and limited rooting depth.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Crownest soil is in the Shallow Loamy, 15- to 19-inch ppt., Black Hills range site. The Regnaps soil is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

32—Cushman loam, 2 to 10 percent slopes. This moderately deep, well drained soil is on foot slopes. It formed in loamy slopewash alluvium and residuum derived dominantly from sandstone or shale. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is grayish brown loam about 2 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 34 inches or more is light brownish gray loam. Shale is at a depth of 34 inches.

Included in this unit are small areas of Forkwood loam that is on the lower slopes and Theedle loam that is on the upper slopes.

Permeability of this Cushman soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

33—Cushman-Cambria loams, 2 to 10 percent slopes. This map unit is on uplands. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 65 percent Cushman loam that is on the upper slopes and 25 percent Cambria loam that is on the lower slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Forkwood loam near areas of the Cambria soil and Theedle loam near areas of the Cushman soil. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Cushman soil is moderately deep and well drained. It formed in loamy slopewash alluvium derived

dominantly from shale or sandstone. Typically, the surface layer is grayish brown loam about 2 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 34 inches is light brownish gray loam. Shale is at a depth of 34 inches.

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

The Cambria soil is deep and well drained. It formed in loamy alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is brown clay loam about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

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

This unit is used mainly as rangeland and hayland. It is also used as cropland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase.

This unit is moderately suited to production of hay and cultivated crops production. The main limitation is low annual precipitation. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Stripcropping and field windbreaks help to control wind erosion and to conserve moisture.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

34—Cushman-Renohill loams, 2 to 12 percent slopes. This map unit is on uplands. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,500 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 60 percent Cushman loam and 30 percent Renohill loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Samday clay on the upper slopes and Cambria loam on the lower slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Cushman soil is moderately deep and well drained. It formed in loamy slopewash alluvium derived dominantly from sandstone or shale. Typically, the surface layer is grayish brown loam about 2 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 34 inches is light brownish gray loam. Shale is at a depth of 34 inches.

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

The Renohill soil is moderately deep and well drained. It formed in residuum or slopewash alluvium derived dominantly from shale. Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is grayish brown clay loam about 8 inches thick. The substratum to a depth of 34 inches is grayish brown clay loam. Shale is at a depth of 34 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore,

livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the soil from erosion. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

35—Cushman-Shingle loams, 6 to 15 percent slopes. This map unit is on shoulders and ridges of uplands. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,500 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Cushman loam that is on the lower slopes and 40 percent Shingle loam that is on the upper slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Kishona loam near areas of the Cushman soil and Theedle loam near areas of the Shingle soil. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Cushman soil is moderately deep and well drained. It formed in loamy slopewash alluvium derived dominantly from shale or sandstone. Typically, the surface layer is grayish brown loam about 2 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 34 inches is light brownish gray loam. Shale is at a depth of 34 inches.

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

The Shingle soil is shallow and well drained. It formed in residuum derived dominantly from interbedded sandstone and shale. Typically, the surface layer is pale brown loam about 6 inches thick. The underlying material to a depth of 17 inches is pale brown loam. Soft shale is at a depth of 17 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Livestock grazing should be managed to protect the unit from erosion. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are limited rooting depth and the hazard of water erosion during seedling establishment. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Cushman soil is in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Shingle soil is in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site.

36—Cushman-Terro complex, 2 to 10 percent slopes. This map unit is on foot slopes. Areas are 25 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,500 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 60 percent Cushman loam and 30 percent Terro sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Shingle loam on the upper slopes and Keeline sandy loam on the lower slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Cushman soil is moderately deep and well drained. It formed in loamy slopewash alluvium derived dominantly from sandstone or shale. Typically, the surface layer is grayish brown loam about 2 inches thick. The subsoil is grayish brown clay loam about 10 inches

thick. The substratum to a depth of 34 inches is light brownish gray loam. Shale is at a depth of 34 inches.

Permeability of the Cushman soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate or severe. The hazard of wind erosion is moderate.

The Terro soil is moderately deep and well drained. It formed in sediment derived dominantly from sandstone. Typically, the surface layer is light brownish gray sandy loam about 8 inches thick. The subsoil is pale brown sandy loam about 16 inches thick. The substratum to a depth of 36 inches is light brownish gray sandy loam. Sandstone is at a depth of 36 inches.

Permeability of the Terro soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly needleandthread, prairie sandreed, threadleaf sedge, and blue grama. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. The Cushman soil is in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Terro soil is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

37—Dwyer fine sand, 3 to 15 percent slopes. This deep, excessively drained soil is on foot slopes. It formed in eolian material derived from mixed sources. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is pale brown fine sand about 5 inches thick. The underlying material to a depth of 60 inches or more is very pale brown fine sand.

Included in this unit are small areas of Keeline sandy loam on the lower slopes and Turnercrest sandy loam on the upper slopes.

Permeability of the Dwyer soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is very severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly prairie sandreed, sand bluestem, needleandthread, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 2,000 pounds of air-dry vegetation per acre in normal years. Production varies from 2,500 pounds in favorable years to 1,400 pounds in unfavorable years. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Livestock grazing should be managed to protect the soil from erosion. This unit is limited for livestock watering ponds and other water impoundments because of the seepage potential. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are sand blowing and droughtiness.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, irrigated and nonirrigated. It is in the Sands, 10- to 14-inch ppt., Northern Plains range site.

38—Forkwood loam, 2 to 6 percent slopes. This deep, well drained soil is on alluvial fans and toe slopes. It formed in loamy alluvium derived dominantly from sedimentary rock. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

Included in this unit are small areas of Cushman loam on the upper slopes and Cambria loam on the lower slopes.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass,

needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is good. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase.

This unit is moderately suited to nonirrigated crops. It is limited mainly by low annual precipitation.

This unit is moderately suited to hay and pasture. Using management that maintains optimum vigor and quality of forage plants is a good practice.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

39—Forkwood-Cambria-Cushman loams, 0 to 12 percent slopes. This map unit is on nearly level to rolling fans, toe slopes, and foot slopes. Areas are 25 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Forkwood loam, 0 to 6 percent slopes, 30 percent Cambria loam, 0 to 6 percent slopes, and 20 percent Cushman loam, 6 to 12 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Ulm loam near areas of the Forkwood and Cambria soils and Theedle loam near areas of the Cushman soil. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Forkwood soil is deep and well drained. It formed in loamy alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

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

The Cambria soil is deep and well drained. It formed in loamy alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is brown clay loam about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

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

The Cushman soil is moderately deep and well drained. It formed in loamy slopewash alluvium derived dominantly from shale or sandstone. Typically, the surface layer is grayish brown loam about 2 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 34 inches is light brownish gray loam. Shale is at a depth of 34 inches.

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

This unit is used mainly as rangeland and wildlife habitat. It is also used as nonirrigated cropland and hayland.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. The production of forage is limited by low annual precipitation. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is good. Livestock grazing should be managed to protect the soil from erosion. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

If this unit is used for nonirrigated cultivated crops and hay, the main limitations are low annual precipitation and the hazard of water erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of terraces.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

40—Forkwood-Cushman-Terro complex, 2 to 10 percent slopes. This map unit is on gently sloping to rolling terraces and alluvial fans. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 35 percent Forkwood loam, 2 to 10 percent slopes, 30 percent Cushman loam, 2 to 10 percent slopes, and 20 percent Terro sandy loam, 2 to 10 percent slopes. Most areas of the Forkwood soil have slopes of less than 6 percent. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cambria loam near areas of the Forkwood soil, Theedle loam near areas of the Cushman soil, and Keeline sandy loam near areas of the Terro soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Forkwood soil is deep and well drained. It formed in loamy alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

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

The Cushman soil is moderately deep and well drained. It formed in loamy slopewash alluvium derived dominantly from shale or sandstone. Typically, the surface layer is grayish brown loam about 2 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 34 inches is light brownish gray loam. Shale is at a depth of 34 inches.

Permeability of the Cushman soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

The Terro soil is moderately deep and well drained. It formed in sediment derived dominantly from sandstone. Typically, the surface layer is light brownish gray sandy loam about 8 inches thick. The subsoil is pale brown sandy loam about 16 inches thick. The substratum to a depth of 36 inches is light brownish gray sandy loam. Sandstone is at a depth of 36 inches.

Permeability of the Terro soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland and wildlife habitat. It is also used as nonirrigated cropland and hayland.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. The production of forage is limited by low annual precipitation. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is good. Livestock grazing should be managed to protect the soil from erosion. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

If this unit is used as nonirrigated cropland and hayland, the main limitations are low annual precipitation and the hazard of water erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of terraces.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. The Forkwood and Cushman soils are in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Terro soil is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

41—Forkwood-Ulm complex, 0 to 10 percent slopes. This map unit is on gently sloping alluvial fans and moderately sloping valley sides. Areas are 25 to 250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Forkwood loam, 0 to 10 percent slopes, and 30 percent Ulm clay loam, 0 to 6 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cambria soils near areas of the Forkwood soil on the upper slopes and Bidman soils near areas of the Ulm soil on the lower slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Forkwood soil is deep and well drained. It formed in loamy alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

Permeability of the Forkwood soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is moderate.

The Ulm soil is deep and well drained. It formed in clayey alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray clay loam about 6 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is light gray clay loam.

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

This unit is used mainly as rangeland and wildlife habitat. It is also used as cropland and hayland.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, Sandberg bluegrass and blue grama increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. The production of forage is limited by low annual precipitation. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

If this unit is used as nonirrigated cropland and hayland, the main limitations are low annual precipitation and the hazard of water erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Practices that can be used to control erosion include early fall seeding, stubble-mulch tillage, and construction of terraces.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. The Forkwood soil is in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Ulm soil is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

42—Grummit-Maggin association, rolling. This map unit is on uplands. Slope is 2 to 30 percent. Areas are 50 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Grummit clay loam, 2 to 30 percent slopes, on the upper slopes; and 30 percent Maggin clay loam, 2 to 15 percent slopes, on the lower slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Snomo silty clay loam near areas of the Maggin soil on the lower slopes and Rock outcrop near areas of the Grummit soil on the upper slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Grummit soil is shallow and well drained. It formed in clayey residuum derived dominantly from acid shale. Typically, the surface layer is gray clay loam about 4 inches thick. The underlying material to a depth of 15 inches is light brownish gray clay. Shale is at a depth of 15 inches.

Permeability of the Grummit soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Maggin soil is moderately deep and well drained. It formed in residuum derived dominantly from acid shale. Typically, the surface layer is grayish brown clay loam about 7 inches thick. The underlying material to a depth of 29 inches is pale brown clay. Shale is at a depth of 29 inches.

Permeability of the Maggin soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly little bluestem, prairie sandreed, sun sedge, and western wheatgrass. As the range condition deteriorates, sun sedge and threeawn increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 800 pounds in unfavorable years. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are limited rooting depth and the hazard of water erosion during seedling establishment. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Grummit soil is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site. The Maggin soil is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

43—Grummit-Snomo complex, 2 to 10 percent slopes. This map unit is on uplands. Areas are 50 to 300 acres in size. The native vegetation is mainly grasses, coniferous trees, and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Grummit clay loam on the upper slopes and 40 percent Snomo silty clay loam on the lower slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Maggin clay loam on the upper slopes and Topeman clay on the lower slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Grummit soil is shallow and well drained. It formed in clayey residuum derived dominantly from acid shale. Typically, the surface layer is gray clay loam about 4 inches thick. The underlying material to a depth of 15 inches is light brownish gray clay. Shale is at a depth of 15 inches.

Permeability of the Grummit soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Snomo soil is deep and well drained. It formed in slopewash alluvium derived dominantly from acid shale. Typically, the surface layer is light brownish gray silty clay loam about 4 inches thick. The subsoil is dark grayish brown clay about 24 inches thick. The substratum to a depth of 44 inches is dark grayish brown clay. Shale is at a depth of 44 inches.

Permeability of the Snomo soil is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential plant community on the Grummit soil is mainly little bluestem, prairie sandreed, sun sedge, and threeawn. As the range condition deteriorates, sun sedge and threeawn increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 800 pounds in unfavorable years. The suitability of this soil for rangeland seeding is poor. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

The potential plant community on the Snomo soil is mainly ponderosa pine, little bluestem, prairie sandreed, and sun sedge. As the range condition deteriorates, sun sedge and threeawn increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. The suitability of this soil for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit is poorly suited to wood products. The site index for ponderosa pine ranges from 45 to 55. The

main concern in producing and harvesting timber on this unit is the low potential for wood products.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Grummit soil is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site. The Snomo soil is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

44—Grummit-Snomo complex, 10 to 30 percent slopes. This map unit is on uplands. Areas are 50 to 200 acres in size. The native vegetation is mainly grasses, coniferous trees, and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Grummit clay loam, 10 to 30 percent slopes, on the upper slopes; and 30 percent Snomo silty clay loam, 10 to 30 percent slopes, on the lower slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Maggin clay loam on the lower slopes near areas of the Snomo soil and Rock outcrop on the upper slopes near areas of the Grummit soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Grummit soil is shallow and well drained. It formed in clayey residuum derived dominantly from acid shale. Typically, the surface layer is gray clay loam about 4 inches thick. The underlying material to a depth of 15 inches is light brownish gray clay. Shale is at a depth of 15 inches.

Permeability of the Grummit soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Snomo soil is deep and well drained. It formed in slopewash alluvium derived dominantly from acid shale. Typically, the surface layer is light brownish gray silty clay loam about 4 inches thick. The subsoil is dark grayish brown clay about 24 inches thick. The substratum to a depth of 44 inches is dark grayish brown clay. Shale is at a depth of 44 inches.

Permeability of the Snomo soil is moderate. Available water capacity is low. Effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is very severe. The hazard of wind erosion is slight.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential plant community on the Grummit soil is mainly little bluestem, prairie sandreed, and sun sedge. As the range condition deteriorates, sun sedge and threeawn increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 800 pounds in unfavorable years. The suitability of this soil for rangeland seeding is poor. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

The potential plant community on the Snomo soil is mainly ponderosa pine, little bluestem, prairie sandreed, and sun sedge. As the range condition deteriorates, sun sedge and threeawn increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. The suitability of this soil for rangeland seeding is poor. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit is poorly suited to the production of wood products. The site index for ponderosa pine ranges from 45 to 55. The main concern in producing and harvesting timber is the low potential for wood products.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Grummit soil is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site. The Snomo soil is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

45—Gullied land-Torriorthents, 10 to 60 percent slopes. This map unit is in drainageways on hillsides. Areas are 50 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 60 percent Gullied land and 30 percent Torriorthents. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Fluvents. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The original surface layer and subsoil of the Gullied land has been lost through erosion.

Torriorthents are shallow to deep and are poorly drained to well drained. The original surface layer in

most areas of these soils has been lost through erosion. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of pale brown loam about 4 inches thick. The underlying material is light brownish gray loam about 20 inches thick over shale.

The hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as wildlife habitat and rangeland.

This map unit is in capability subclass VIIe, nonirrigated. It is not placed in a range site.

46—Haverdad-Clarkelen complex, 0 to 4 percent slopes. This map unit is on flood plains and low terraces. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Haverdad loam and 35 percent Clarkelen sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Colombo Variant loam on flood plains and Forkwood loam and Kishona loam on low terraces. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Haverdad soil is deep and moderately well drained. It formed in stratified alluvium derived from mixed sources. Typically, the surface layer is light brownish gray loam about 9 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loam stratified with lenses of silty clay loam and fine sandy loam.

Permeability of the Haverdad soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is rarely flooded.

The Clarkelen soil is deep and well drained. It formed in stratified alluvium derived from mixed sources. Typically, the surface layer is light brownish gray sandy loam about 5 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy loam stratified with loamy sand and fine sandy loam.

Permeability of the Clarkelen soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe. This soil is rarely flooded.

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, western wheatgrass, big bluestem, and basin wildrye. As the range condition deteriorates, blue grama and silver sagebrush increase. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 2,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit is moderately suited to nonirrigated cultivated crops, hay, and pasture. It is limited mainly by low annual precipitation.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Overflow, 10- to 14-inch ppt., Northern Plains range site.

47—Haverdad-Clarkelen Variant complex, saline, 0 to 4 percent slopes. This map unit is on flood plains and low terraces. Areas are 50 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Haverdad loam, saline, and 35 percent Clarkelen Variant sandy loam, saline. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lohmiller clay loam on flood plains and Kishona loam, saline, and Ustic Torriorthents, saline, on terraces. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Haverdad soil is deep and moderately well drained. It formed in stratified alluvium derived from mixed sources. Typically, the surface layer is light brownish gray loam about 9 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loam stratified with lenses of silty clay loam and fine sandy loam.

Permeability of the Haverdad soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is slightly saline. It is rarely flooded.

The Clarkelen Variant soil is deep and somewhat poorly drained. It formed in stratified alluvium derived from mixed sources. Typically, the surface layer is light brownish gray sandy loam about 5 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy loam stratified with loamy sand and very fine sandy loam and silt loam.

Permeability of the Clarkelen Variant soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is severe. This soil is slightly saline. It is rarely flooded.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly alkali sacaton, greasewood, inland saltgrass, and western wheatgrass. As the range condition deteriorates, greasewood and rabbitbrush increase. The potential plant community produces about 1,700 pounds of air-dry vegetation per acre in normal years. Production varies from 2,200 pounds in favorable years to 1,400 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the content of salts and alkali in the soil. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVw, irrigated and nonirrigated. It is in the Saline Lowland, 10- to 14-inch ppt., Northern Plains range site.

48—Higgins Variant silt loam, 0 to 2 percent slopes. This deep, very poorly drained soil is on flood plains. It formed in stratified silty alluvium containing gypsum. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is pinkish gray silt loam about 3 inches thick. The substratum to a depth of 60 inches or more is pinkish white and pinkish gray silt loam.

Included in this unit are small areas of Haverdad loam, saline.

Permeability of the Higgins Variant soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. The hazard of flooding is rare. The water table is at a depth of 4 to 6 feet from March to June.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly alkali sacaton, inland saltgrass, western wheatgrass, and greasewood. As the range condition deteriorates, inland saltgrass and greasewood increase. The potential plant community produces about 1,700 pounds of air-dry vegetation per acre in normal years. Production varies from 2,200 pounds in favorable years to 1,400 pounds in unfavorable years. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the content of salts and alkali. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass Vw, nonirrigated. It is in the Saline Lowland, 10- to 14-inch ppt., Northern Plains range site.

49—Hiland-Bowbac complex, 0 to 10 percent slopes. This map unit is on nearly level to rolling fan aprons and foot slopes. Areas are 25 to 250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Hiland fine sandy loam on the lower slopes and 35 percent Bowbac sandy loam on the upper slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Terro sandy loam near areas of the Bowbac soil and Vonalee fine sandy loam near areas of the Hiland soil. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Hiland soil is deep and well drained. It formed in alluvial sediment derived dominantly from sandstone. Typically, the surface layer is grayish brown fine sandy loam about 5 inches thick. The subsoil is light brownish gray sandy clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is light gray sandy loam.

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

The Bowbac soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish

brown sandy loam about 7 inches thick. The subsoil is pale brown sandy clay loam about 11 inches thick. The substratum to a depth of 33 inches is very pale brown sandy loam. Sandstone is at a depth of 33 inches.

Permeability of the Bowbac soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly needleandthread, prairie sandreed, threadleaf sedge, and western wheatgrass. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Livestock grazing should be managed to protect the soil from erosion. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

If this unit is used for nonirrigated small grain and hay crops, the main limitations are slope, the hazard of water erosion, and low annual precipitation. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

50—Hiland-Vonalee association, rolling. This map unit is on gently sloping to rolling foot slopes. Areas are 25 to 75 acres in size. Slope is 2 to 10 percent. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Hiland fine sandy loam on the lower slopes and 35 percent Vonalee sandy loam on the upper slopes.

Included in this unit are small areas of Terro sandy loam near areas of the Vonalee soil and Forkwood loam and Bowbac sandy loam near areas of the Hiland soil. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Hiland soil is deep and well drained. It formed in alluvial sediment derived dominantly from sandstone. Typically, the surface layer is grayish brown fine sandy loam about 5 inches thick. The subsoil is light brownish gray sandy clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is light gray sandy loam.

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

The Vonalee soil is deep and well drained. It formed in eolian sand and wind-reworked alluvial material derived dominantly from sandstone. Typically, the surface layer is light brownish gray fine sandy loam about 6 inches thick. The subsoil is brown sandy loam about 14 inches thick. The substratum to a depth of 60 inches or more is light brownish gray sandy loam.

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

This unit is used mainly as rangeland and wildlife habitat. It is also used as cropland and hayland.

The potential plant community on this unit is mainly needleandthread, threadleaf sedge, prairie sandreed, and western wheatgrass. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Livestock grazing should be managed to protect the unit from erosion. This unit is limited for livestock watering ponds and other water impoundments because of the seepage potential. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

If this unit is used for nonirrigated small grain and hay, the main limitations are slope, the hazard of wind

erosion, and low annual precipitation. The risk of wind erosion can be reduced by returning crop residue to the soil and practicing minimum tillage. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

51—Hilight clay loam, 3 to 30 percent slopes. This shallow, well drained soil is on uplands. It formed in residuum derived dominantly from noncalcareous shale. Areas are 35 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray clay loam about 4 inches thick. The underlying material to a depth of 16 inches is grayish brown clay. Shale is at a depth of 16 inches.

Included in this unit are small areas of Samday clay and Grummit clay loam.

Permeability of the Hilight soil is very slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, blue grama, and big sagebrush. As the range condition deteriorates, blue grama and blue sagebrush increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. The suitability of this unit for rangeland seeding is poor. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site.

52—Keeline-Turnercrest sandy loams, 2 to 10 percent slopes. This map unit is on fans and foot slopes. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Keeline sandy loam and 30 percent Turnercrest sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Terro sandy loam and Vonalee fine sandy loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Keeline soil is deep and somewhat excessively drained. It formed in sandy alluvium derived dominantly from sandstone. Typically, the surface layer is light brownish gray sandy loam about 4 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

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

The Turnercrest soil is moderately deep and well drained. It formed in moderately coarse textured residuum derived dominantly from sandstone. Typically, the surface layer is grayish brown sandy loam about 6 inches thick. The substratum to a depth of 25 inches is light brownish gray fine sandy loam. Sandstone is at a depth of 25 inches.

Permeability of the Turnercrest soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

This unit is used mainly as rangeland and hayland. It is also used as cropland and wildlife habitat.

The potential plant community on this unit is mainly needleandthread, prairie sandreed, threadleaf sedge, and western wheatgrass. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. This unit is limited for livestock watering ponds and other water impoundments because of the seepage potential. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

If this unit is used for hay and nonirrigated crops, the main limitations are droughtiness and low annual precipitation. The risk of wind erosion can be reduced by returning crop residue to the soil and practicing minimum tillage. Because precipitation is not sufficient for annual

cropping, a cropping system that includes small grain and summer fallow is most suitable.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

53—Kishona loam, 0 to 6 percent slopes. This deep, well drained soil is on alluvial fans. It formed in alluvial sediment derived dominantly from sedimentary rock. Areas are 25 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray loam about 7 inches thick. The substratum to a depth of 60 inches or more is pale brown loam.

Included in this unit are small areas of Theedle loam on the upper slopes and Zigweid loam on the lower slopes.

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

This unit is used as rangeland and wildlife habitat.

The present vegetation in most areas is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Range renovation can be used to improve areas of deteriorated rangeland. This practice increases water infiltration, reduces plant competition, and allows the desirable native plants to increase. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community. The suitability of this unit for rangeland seeding is good.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

54—Kishona clay loam, saline, 0 to 2 percent slopes. This deep, moderately well drained, saline soil is on nearly level alluvial fans and flats. It formed in alluvium derived dominantly from sedimentary rock. Areas are 50 to 250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 6,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray clay loam about 5 inches thick. The substratum to a depth of 60 inches or more is pale brown loam.

Included in this unit are small areas of Kishona loam, Haverdad loam, saline, and Petrie clay loam.

Permeability of this Kishona soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. This soil contains excess soluble salts. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The present vegetation in most areas is mainly alkali sacaton, greasewood, inland saltgrass, and western wheatgrass. As the range condition deteriorates, greasewood and inland saltgrass increase. The potential plant community produces about 1,700 pounds of air-dry vegetation per acre in normal years. Production varies from 2,200 pounds in favorable years to 1,400 pounds in unfavorable years. The production of forage is limited by low annual precipitation and by the content of salts in the soil. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the content of salts and alkali in the soil. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

This map unit provides habitat for antelope, mule deer, coyote, fox, sage grouse, jackrabbit, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIw, nonirrigated. It is in the Saline Lowland, 10- to 14-inch ppt., Northern Plains range site.

55—Kishona-Shingle-Theedle loams, 6 to 15 percent slopes. This map unit is on foot slopes and shoulder slopes. Areas are 100 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Kishona loam, 25 percent Shingle loam, and 25 percent Theedle loam. The

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

Included in this unit are small areas of Cambria loam on the lower slopes and Tassel fine sandy loam on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Kishona soil is deep and well drained. It formed in alluvial sediment derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray loam about 7 inches thick. The substratum to a depth of 60 inches or more is pale brown loam.

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

The Shingle soil is shallow and well drained. It formed in residuum derived dominantly from sandstone or shale. Typically, the surface layer is pale brown loam about 6 inches thick. The substratum to a depth of 17 inches is pale brown loam. Shale is at a depth of 17 inches.

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

The Theedle soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from soft sandstone. Typically, the surface layer is light brownish gray loam about 8 inches thick. The underlain material to a depth of 28 inches is pale brown loam. Shale is at a depth of 28 inches.

Permeability of the Theedle soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, blue grama, needleandthread, and Sandberg bluegrass. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 800 pounds in unfavorable years. The production of forage is limited by low annual precipitation and shallow rooting depth. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is fair. The main limitations for seeding are the hazard of water erosion during seedling establishment and the shallow depth of the Shingle soil. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Kishona and Theedle soils are in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Shingle soil is in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site.

56—Kishona-Theedle-Zigweid loams, 2 to 10 percent slopes. This map unit is on gently sloping fans and moderately sloping toe slopes. Areas are 50 to 250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Kishona loam, 30 percent Theedle loam, and 20 percent Zigweid loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cambria loam and Cushman loam. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Kishona soil is deep and well drained. It formed in alluvial sediment derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray loam about 7 inches thick. The substratum to a depth of 60 inches or more is pale brown loam.

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

The Theedle soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from soft shale. Typically, the surface layer is light brownish gray loam about 8 inches thick. The substratum to a depth of 28 inches is light gray loam. Shale is at a depth of 28 inches.

Permeability of the Theedle soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

The Zigweid soil is deep and well drained. It formed in alluvial sediment derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown loam about 5 inches thick. The subsoil is light brownish gray

loam about 7 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

57—Lakoa-Crownest complex, 10 to 60 percent slopes. This map unit is on foothills and mountains. Areas are 250 to 2,000 acres in size. The native vegetation is mainly grasses, shrubs, and coniferous trees. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Lakoa loam on the lower slopes and 30 percent Crownest channery sandy loam on the upper slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Citadel loam, Shingle Variant loam, and Regnaps loam. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Lakoa soil is deep and well drained. It formed in residuum derived dominantly from sandstone or shale. Typically, the surface is covered with a mat of decomposing forest litter about 1 inch thick. The surface layer is dark grayish brown loam about 3 inches thick. The subsurface layer is light brownish gray loam about 8 inches thick. The subsoil is brown clay loam about 21 inches thick. The substratum to a depth of 60 inches or more is very pale brown loam.

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

The Crownest soil is shallow and well drained. It formed in residuum derived from sandstone. Typically, the surface layer is grayish brown channery sandy loam about 4 inches thick. The underlying material to a depth of 12 inches or more is grayish brown channery sandy loam. Sandstone is at a depth of 12 inches.

Permeability of the Crownest soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

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

The understory vegetation on the Lakoa soil consists mainly of sideoats grama, little bluestem, western wheatgrass, and sedges. The potential plant community produces about 600 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 400 pounds in unfavorable years.

The understory vegetation on the Crownest soil consists mainly of sideoats grama, sedges, little bluestem, and western wheatgrass. The potential plant community produces about 400 pounds of air-dry vegetation per acre in normal years. Production varies from 475 pounds in favorable years to 300 pounds in unfavorable years.

The Lakoa soil is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 60 to 65. The Crownest soil is poorly suited to the production of wood products. The site index for ponderosa pine ranges from 40 to 50. The main concerns in producing and harvesting timber are erosion control and equipment limitations. The steeper areas are subject to landslides during periods of snowmelt and high rainfall.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Lakoa soil is in woodland suitability

group 3A. The Crownest soil is in the Shallow Loamy, 15- to 19-inch ppt., Black Hills range site.

58—Lohmiller clay loam, occasionally flooded, 0 to 3 percent slopes. This deep, well drained soil is on flood plains. It formed in alluvium derived dominantly from sedimentary rock. Areas are 50 to 175 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is grayish brown clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is grayish brown clay loam stratified with thin lenses of loam and clay.

Included in this unit are small areas of Haverdad loam and Clarkelen sandy loam.

Permeability of this Lohmiller soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight. Occasional brief periods of flooding during April through June.

This unit is used mainly as rangeland. It is also used as cropland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, western wheatgrass, big bluestem, and basin wildrye. As the range condition deteriorates, blue grama and silver sagebrush increase. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 2,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit is moderately suited to nonirrigated crops. It is limited mainly by flooding and low annual precipitation.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVw, irrigated and nonirrigated. It is in the Overflow, 10- to 14-inch ppt., Northern Plains range site.

59—Lohmiller-Haverdad complex, 1 to 4 percent slopes. This map unit is on flood plains and low terraces. Areas are 75 to 500 acres in size. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 45 percent Lohmiller clay loam and 40 percent Haverdad loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Clarkelen sandy loam on flood plains and Bidman loam on low terraces. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Lohmiller soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is grayish brown clay loam stratified with thin lenses of loam and clay.

Permeability of the Lohmiller soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight. The soil is subject to rare periods of flooding.

The Haverdad soil is deep and well drained. It formed in stratified alluvium derived from mixed sources. Typically, the surface layer is light brownish gray loam about 9 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loam stratified with lenses of silty clay loam and fine sandy loam.

Permeability of the Haverdad soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight. The soil is subject to rare periods of flooding.

This unit is used mainly as rangeland and wildlife habitat. It is also used as hayland.

The potential plant community on this unit is mainly green needlegrass, western wheatgrass, big bluestem, and basin wildrye. As the range condition deteriorates, blue grama and silver sagebrush increase. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 2,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit is moderately suited to hay crops. The main limitations are the clayey texture of the Lohmiller soil and low annual precipitation.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Overflow, 10- to 14-inch ppt., Northern Plains range site.

60—Lohmiller-Haverdad complex, saline, 1 to 4 percent slopes. This map unit is on flood plains and low terraces. Areas are 75 to 450 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 45 percent Lohmiller clay loam and 40 percent Haverdad loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Clarkelen sandy loam, saline, and Kishona loam, saline. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Lohmiller soil is deep and moderately well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is grayish brown, clay loam stratified with thin lenses of loam and clay.

Permeability of the Lohmiller soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight. This soil is saline. It is subject to rare periods of flooding.

The Haverdad soil is deep and moderately well drained. It formed in stratified alluvium derived from mixed sources. Typically, the surface layer is light brownish gray loam about 9 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loam stratified with lenses of silty clay loam and fine sandy loam.

Permeability of the Haverdad soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight. This soil is saline. It is subject to rare periods of flooding.

This unit is used mainly as rangeland. It is also used for wildlife habitat.

The potential plant community on this unit is mainly alkali sacaton, greasewood, inland saltgrass, and western wheatgrass. As the range condition deteriorates, greasewood and rabbitbrush increase. The potential plant community produces about 1,700 pounds of air-dry vegetation per acre in normal years. Production varies from 2,200 pounds in favorable years to 1,400 pounds in unfavorable years. The production of forage is limited by excess salt content. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the content of salt and alkali. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIs, nonirrigated. It is in the Saline Lowland, 10- to 14-inch ppt., Northern Plains range site.

61—Lohsman loam, 2 to 10 percent slopes. This moderately deep, well drained soil is on uplands. It formed in strongly alkaline, calcareous slopewash alluvium or residuum derived dominantly from sodic shale. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light grayish brown loam about 3 inches thick. The subsoil is light olive brown clay about 19 inches thick. The substratum to a depth of 38 inches is light brownish gray clay. Shale is at a depth of 38 inches.

Permeability of this Lohsman soil is slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate. This soil is subject to rare periods of flooding.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, inland saltgrass, greasewood, and gardner saltbush. As the range condition deteriorates, greasewood and gardner saltbush increase. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 250 pounds in unfavorable years. The production of forage is limited by excess salts and alkali. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in

the plant community. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVs, nonirrigated. It is in the Saline Upland, 10- to 14-inch ppt., Northern Plains range site.

62—Nilrap loam, 0 to 6 percent slopes. This deep, well drained soil is on fans and high terraces. It formed in alluvium derived from mixed sources. Areas are 50 to 175 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is grayish brown loam about 15 inches thick. The subsoil is brown clay loam about 22 inches thick. The substratum to a depth of 60 inches or more is pink very gravelly loam.

Included in this unit are small areas of Vassett silt loam and Sugakool silt loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. Livestock grazing should be managed to protect the soil from erosion. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is a short growing season.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

63—Norkool loam, 2 to 10 percent slopes. This deep, well drained soil is on fan aprons, foot slopes, and toe slopes. It formed in alluvium derived dominantly from siltstone. Areas are 50 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil is brown silty clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is light brownish gray silt loam.

Included in this unit are small areas of Regnaps loam and Sugakool silt loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, Sandberg bluegrass, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. Livestock grazing should be managed to protect the soil from erosion. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

If this unit is used for nonirrigated small grain and hay crops the main limitation is a short growing season.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

64—Nunnston clay loam, 0 to 6 percent slopes. This deep, well drained soil is on fan aprons and

terraces. It formed in alluvium derived dominantly from sedimentary rock. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is very dark grayish brown clay loam about 8 inches thick. The subsoil is grayish brown clay about 8 inches thick. The substratum to a depth of 60 inches or more is pale brown clay.

Included in this unit are small areas of Tanna Variant clay loam and Reicess loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, western wheatgrass, Columbia needlegrass, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 2,900 pounds in favorable years to 1,400 pounds in unfavorable years. Livestock grazing should be managed to protect the soil from erosion. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is a short growing season.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Clayey, 15- to 19-inch ppt., Black Hills range site.

65—Nunnston-Tanna Variant clay loams, 3 to 10 percent slopes. This map unit is on terraces and foothills. Areas are 50 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Nunnston clay loam on the lower slopes and 35 percent Tanna Variant clay loam on the upper slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Colsavage clay loam near areas of the Tanna Variant soil and Reicess loam and Wages Variant loam near areas of the Nunnston soil. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Nunnston soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is very dark grayish brown clay loam about 8 inches thick. The subsoil is grayish brown clay about 8 inches thick. The substratum to a depth of 60 inches or more is pale brown clay.

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

The Tanna Variant soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone and shale. Typically, the surface layer is dark grayish brown clay loam about 8 inches thick. The subsoil is grayish brown clay about 15 inches thick. The substratum to a depth of 36 inches is light brownish gray clay loam. Shale is at a depth of 36 inches.

Permeability of the Tanna Variant soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, western wheatgrass, Columbia needlegrass, Sandberg bluegrass, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 2,900 pounds in favorable years to 1,400 pounds in unfavorable years. Livestock grazing should be managed to protect the unit from erosion. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Clayey, 15- to 19-inch ppt., Black Hills range site.

66—Nunnston-Tanna Variant clay loams, 10 to 20 percent slopes. This map unit is on terraces and foothills. Areas are 50 to 350 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Nunnston clay loam, 10 to 15 percent slopes, and 35 percent Tanna Variant clay loam, 10 to 20 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Samoist clay and Colsavage clay loam on the upper slopes and Reicess loam on the lower slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Nunnston soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is very dark grayish brown clay loam about 8 inches thick. The subsoil is grayish brown clay about 8 inches thick. The substratum to a depth of 60 inches or more is pale brown clay.

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

The Tanna Variant soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone and shale. Typically, the surface layer is dark grayish brown clay loam about 8 inches thick. The subsoil is grayish brown clay about 15 inches thick. The substratum to a depth of 36 inches is light brownish gray clay loam. Shale is at a depth of 36 inches.

Permeability of the Tanna Variant soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, western wheatgrass, Columbia needlegrass, Sandberg bluegrass, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,500 pounds in favorable years to 1,000 pounds in unfavorable years. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Livestock grazing should be managed to protect the unit from erosion. The suitability of this unit for rangeland seeding is poor. The main limitation for seeding is the hazard of water erosion. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. It is in the Clayey, 15- to 19-inch ppt., Black Hills range site.

67—Onita Variant loam, 0 to 3 percent slopes. This deep, well drained soil is on fans and valley sides. It formed in alluvium derived from mixed sources. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is dark grayish brown loam about 22 inches thick. The subsoil is brown silty clay loam about 16 inches thick. The substratum to a depth of 60 inches or more is pale brown silt loam.

Included in this unit are small areas of Cordeston loam and Norkool loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. Livestock grazing should be managed to protect the soil from erosion. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is good.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is a short growing season.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

68—Orella-Cadoma silty clay loams, 2 to 15 percent slopes. This map unit is on gently sloping to rolling upland plains. Areas are 50 to 350 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Orella silty clay loam and 40 percent Cadoma silty clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Samday clay on the upper slopes and Savageton clay loam and Petrie clay loam on the lower slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Orella soil is shallow and well drained. It formed in residuum derived dominantly from sodic shale. Typically, the surface layer is light gray silty clay loam about 2 inches thick. The underlying material to a depth of 12 inches is light brownish gray silty clay. Shale is at a depth of 12 inches.

Permeability of the Orella soil is very slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight. The soil is very strongly alkaline.

The Cadoma soil is moderately deep and well drained. It formed in residuum derived dominantly from sodic shale. Typically, the surface layer is light gray silty clay loam about 3 inches thick. The subsoil is grayish brown silty clay loam about 8 inches thick. The substratum to a depth of 28 inches is light brownish gray clay. Shale is at a depth of 28 inches. The subsoil and substratum are strongly alkaline and very strongly alkaline.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, inland saltgrass, greasewood, and gardner saltbush. As the range condition deteriorates, greasewood and gardner saltbush increase. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 250 pounds in unfavorable years. The production of forage is limited by low annual precipitation, shallow rooting depth, and alkali content. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Saline Upland, 10- to 14-inch ppt., Northern Plains range site.

69—Orella-Samday-Rock outcrop complex, 3 to 30 percent slopes. This map unit is on shoulder slopes and ridgetops of shale plains. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Orella silty clay loam on the lower slopes, 20 percent Samday clay on the upper slopes and 20 percent Rock outcrop on the upper slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Petrie clay loam and Renohill clay loam on the lower slopes and Shingle loam on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Orella soil is shallow and well drained. It formed in residuum derived from sodic shale. Typically, the surface layer is light gray silty clay loam about 2 inches thick. The underlying material to a depth of 12 inches is light brownish gray silty clay. Shale is at a depth of 12 inches.

Permeability of the Orella soil is very slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight. The soil is very strongly alkaline.

The Samday soil is shallow and well drained. It formed in residuum derived from shale. Typically, the surface layer is olive gray clay about 4 inches thick. The underlying material to a depth of 16 inches is olive gray clay. Shale is at a depth of 16 inches.

Permeability of the Samday soil is slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

Rock outcrop consists of areas of exposed shale.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly inland saltgrass, western wheatgrass, alkali sacaton, and greasewood. As the range condition deteriorates, greasewood and gardner saltbush increase. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 250 pounds in unfavorable years. The production of forage is limited by excessive salt content and shallow rooting depth. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Saline Upland, 10- to 14-inch ppt., Northern Plains range site.

70—Parmleed-Bidman loams, 2 to 10 percent slopes. This map unit is on relict ridge crests and tablelands. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Parmleed loam and 40 percent Bidman loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Ulm loam and Forkwood loam on the lower slopes and Renohill loam on the upper slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Parmleed soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is very pale brown loam about 5 inches thick. The subsoil is grayish brown clay about 9 inches thick. The substratum to a depth of 28 inches is grayish brown clay loam. Shale is at a depth of 28 inches.

Permeability of the Parmleed soil is very slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

The Bidman soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown loam about 4 inches thick. The subsoil is pale brown clay about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray clay loam.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years.

If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Livestock grazing should be managed to protect the unit from erosion. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

71—Parmleed-Bowbac complex, 6 to 15 percent slopes. This map unit is on moderately sloping to rolling foot slopes. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Parmleed loam and 30 percent Bowbac sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Renohill loam and Cushman loam on the upper slopes and Forkwood

loam on the lower slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Parmleed soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is very pale brown loam about 5 inches thick. The subsoil is grayish brown clay about 9 inches thick. The substratum to a depth of 28 inches is light brownish gray clay loam. Shale is at a depth of 28 inches.

Permeability of the Parmleed soil is very slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Bowbac soil is moderately deep and well drained. It formed in moderately coarse textured residuum derived dominantly from sandstone and shale. Typically, the surface layer is grayish brown sandy loam about 7 inches thick. The subsoil is pale brown sandy clay loam about 11 inches thick. The substratum to a depth of 33 inches is very pale brown sandy loam. Sandstone is at a depth of 33 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly needleandthread, threadleaf sedge, prairie sandreed, and western wheatgrass. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Livestock grazing should be managed to protect the unit from erosion. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Parmleed soil is in the Loamy, 10- to 14-inch ppt., Northern Plains range site. The Bowbac soil is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

72—Parmleed-Forkwood loams, 0 to 6 percent slopes. This map unit is on foot slopes and toe slopes. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Parmleed loam on the upper slopes and 35 percent Forkwood loam on the lower slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bidman loam, Cushman loam, and Renohill loam. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Parmleed soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is very pale brown loam about 5 inches thick. The subsoil is grayish brown clay about 9 inches thick. The substratum to a depth of 28 inches is light brownish gray clay loam. Shale is at a depth of 28 inches.

Permeability of the Parmleed soil is very slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

The Forkwood soil is deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is good. Where blue grama and bluegrass are the dominant vegetation, pitting, furrowing, chiseling, or

other such practices can be used to improve areas of deteriorated rangeland. Such practices increase water infiltration, reduce plant competition, and allow the desirable native plants to increase. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

73—Parmleed-Renohill complex, 0 to 6 percent slopes. This map unit is on foot slopes. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Parmleed loam and 40 percent Renohill clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cushman loam, Bidman loam, and Forkwood loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Parmleed soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is very pale brown loam about 5 inches thick. The subsoil is grayish brown clay about 9 inches thick. The substratum to a depth of 28 inches is light brownish gray clay loam. Shale is at a depth of 28 inches.

Permeability of the Parmleed soil is very slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

The Renohill soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from shale. Typically, the surface layer is light brownish gray clay loam about 4 inches thick. The subsoil is grayish brown clay loam about 8 inches thick. The substratum to a depth of 34 inches is light brownish gray clay loam. Shale is at a depth of 34 inches.

Permeability of the Renohill soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is good. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

74—Pesowyo-Paunsaugunt complex, 6 to 10 percent slopes. This map unit is on mountain foot slopes. Areas are 50 to 225 acres in size. The native vegetation is mainly coniferous trees, shrubs, and grasses. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Pesowyo channery clay loam and 30 percent Paunsaugunt loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Citadel loam, Corpening channery loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Pesowyo soil is moderately deep and well drained. It formed in residuum derived dominantly from limestone or sandstone. Typically, the surface is covered with a mat of decomposing forest litter about 1 inch thick. The surface layer is very dark grayish brown channery clay loam about 5 inches thick. The subsoil is dark grayish brown very channery clay loam about 9 inches thick. The substratum to a depth of 24 inches is light yellowish brown very channery clay loam. Limestone is at a depth of 24 inches.

Permeability of the Pesowyo soil is moderately slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Paunsaugunt soil is shallow and well drained. It formed in residuum derived dominantly from limestone.

Typically, the surface is covered with a mat of decomposing forest litter about one-half inch thick. The surface layer is grayish brown loam about 6 inches thick. The underlying material to a depth of 16 inches is light brownish gray very channery loam. Limestone is at a depth of 16 inches.

Permeability of the Paunsaugunt soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as woodland, rangeland, and wildlife habitat.

The Pesowyo soil is poorly suited to the production of wood products. The site index for ponderosa pine is about 50 to 60. The Paunsaugunt soil is poorly suited to the production of wood products. The site index for ponderosa pine ranges from 40 to 50. The main concern in producing and harvesting timber is the seasonal high water table during periods of snowmelt and high rainfall. Logging with heavy equipment should be restricted when soils are wet to reduce rutting and compaction. Trees are subject to windthrow because of limited rooting depth.

The understory vegetation on the Pesowyo soil consists mainly of Columbia needlegrass, sedge, snowberry, prairie thermopsis, and serviceberry. The potential plant community produces about 650 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 500 pounds in unfavorable years. The understory vegetation on the Paunsaugunt soil consists mainly of Kentucky bluegrass, western wheatgrass, timber danthonia, serviceberry, and Oregon-grape. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Pesowyo soil is in woodland suitability group 3F. The Paunsaugunt soil is in woodland suitability group 2F.

75—Pesowyo-Paunsaugunt complex, 10 to 60 percent slopes. This map unit is on mountains. Areas are 50 to 125 acres in size. The native vegetation is mainly coniferous trees, shrubs, and grasses. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Pesowyo channery clay loam and 30 percent Paunsaugunt loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Citadel loam, Corpening channery loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Pesowyo soil is moderately deep and well drained. It formed in residuum derived dominantly from limestone and sandstone. Typically, the surface is covered with a mat of decomposing forest litter about 1 inch thick. The surface layer is very dark grayish brown channery clay loam about 5 inches thick. The subsoil is dark grayish brown very channery clay loam about 9 inches thick. The substratum to a depth of 24 inches is light yellowish brown very channery clay loam. Limestone is at a depth of 24 inches.

Permeability of the Pesowyo soil is moderately slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Paunsaugunt soil is shallow and well drained. It formed in residuum derived dominantly from limestone. Typically, the surface is covered with a mat of decomposing forest litter about one-half inch thick. The underlying material to a depth of 16 inches is light brownish gray very channery loam. Limestone is at a depth of 16 inches.

Permeability of the Paunsaugunt soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as woodland, rangeland, and wildlife habitat.

The Pesowyo soil is poorly suited to the production of wood products. The site index for ponderosa pine ranges from 50 to 60. The Paunsaugunt soil is poorly suited to the production of wood products. The site index for ponderosa pine ranges from 40 to 50. The main concerns in producing and harvesting timber are steepness of slopes in some areas and susceptibility of the soils to landslides during periods of snowmelt and high rainfall. Landslides may occur naturally or in road cuts. Certain types of harvesting equipment are generally restricted. Trees are subject to windthrow because of limited rooting depth.

The understory vegetation on the Pesowyo soil consists mainly of Columbia needlegrass, sedge, snowberry, prairie thermopsis, and serviceberry. The potential plant community produces about 650 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 500 pounds in unfavorable years. The understory vegetation on the Paunsaugunt soil consists mainly of Kentucky bluegrass, western wheatgrass, timber danthonia, serviceberry, and Oregon-grape. The potential plant community produces about 800 pounds of air-dry vegetation per acre in

normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 2F.

76—Petrie clay loam, 0 to 3 percent slopes. This deep, well drained, strongly alkaline soil is on alluvial fans and toe slopes. It formed in calcareous alkaline sediment derived dominantly from sedimentary rock. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray clay loam about 4 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray clay loam.

Included in this unit are small areas of Cadoma silty clay loam and Bahl clay loam.

Permeability of this Petrie soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, inland saltgrass, greasewood, and gardner saltbush. As the range condition deteriorates, greasewood and gardner saltbush increase. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 250 pounds in unfavorable years. The production of forage is limited by salinity and alkalinity. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIs, nonirrigated. It is in the Saline Upland, 10- to 14-inch ppt., Northern Plains range site.

77—Petrie-Ustic Torriorthents complex, saline, 0 to 6 percent slopes. This map unit is on alluvial fans and toe slopes. Areas are 25 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Petrie clay loam and 40 percent Ustic Torriorthents, saline. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Savageton clay loam and Bahl clay loam. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Petrie soil is deep and well drained. It formed in calcareous alkaline sediment derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray clay loam about 4 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray clay loam.

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

The Ustic Torriorthents are deep and somewhat poorly drained. They formed in alluvium derived dominantly from sedimentary rock. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of light brownish gray loam about 2 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray clay.

Permeability of the Ustic Torriorthents is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, inland saltgrass, greasewood, and alkali sacaton. As the range condition deteriorates, greasewood and gardner saltbush increase. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 250 pounds in unfavorable years. The production of forage is limited by salinity. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the content of salts and alkali. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIw, nonirrigated. It is in the Saline Lowland, 10- to 14-inch ppt., Northern Plains range site.

78—Pits, bentonite. This map unit consists of mine pits and spoil banks of waste material in areas that have been strip mined for bentonite. Slopes are short and steep. The areas are 3 to 640 acres in size.

This unit is used for wildlife habitat.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals.

This map unit is in capability subclass VIIIe.

79—Pits, gravel. This map unit consists of pits and spoil areas of waste material in areas that have been mined for gravel. Slopes are short and steep. Areas are 3 to 25 acres.

This map unit is used for wildlife habitat.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals.

This map unit is in capability subclass VIIIe.

80—Recluse loam, 0 to 6 percent slopes. This deep, well drained soil is on alluvial fans. It formed in loamy alluvium derived dominantly from sedimentary rock. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is grayish brown loam about 8 inches thick. The upper part of the subsoil is light brownish gray clay loam about 12 inches thick, and the lower part is light gray clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is light gray sandy loam.

Included in this unit are small areas of Vonalee fine sandy loam and Forkwood loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, needleandthread, green needlegrass, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is good.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is a short growing season.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

81—Reicess loam, 0 to 6 percent slopes. This deep, well drained soil is on alluvial fans and terraces. It formed in loamy alluvium derived dominantly from sedimentary rock. Areas are 25 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is grayish brown loam about 10 inches thick. The subsoil is grayish brown clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is pale brown loam.

Included in this unit are small areas of Nunnston clay loam and Wages Variant loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and bluegrass increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is good.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is the short growing season.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

82—Reicess-Wages Variant loams, 2 to 6 percent slopes. This map unit is on alluvial fans and toe slopes. Areas are 25 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Reicess loam and 40 percent Wages Variant loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Nunnston clay loam on the lower slopes and Tanna Variant clay loam on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Reicess soil is deep and well drained. It formed in loamy alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown loam about 10 inches thick. The subsoil is grayish brown clay loam about 21 inches thick. The substratum to a depth of 60 inches or more is pale brown loam.

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

The Wages Variant soil is deep and well drained. It formed in alluvium derived dominantly from sandstone or shale. Typically, the surface layer is grayish brown loam about 5 inches thick. The subsoil is grayish brown clay loam about 7 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is good.

If this unit is used for nonirrigated small grain and hay, the main limitation is a short growing season.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, sharp-tailed grouse, bobcat, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

83—Reicess-Wages Variant loams, 6 to 10 percent slopes. This map unit is on alluvial fans and toe slopes. Areas are 25 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Reicess loam and 40 percent Wages Variant loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Nunnston clay loam on the lower slopes and Tanna Variant clay loam on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Reicess soil is deep and well drained. It formed in loamy alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown loam about 10 inches thick. The subsoil is grayish brown clay loam about 21 inches thick. The substratum to a depth of 60 inches or more is pale brown loam.

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

The Wages Variant soil is deep and well drained. It formed in alluvium derived from sandstone and shale. Typically, the surface layer is grayish brown loam about 5 inches thick. The subsoil is grayish brown clay loam about 7 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

Permeability of the Wages Variant soil is moderate. Available water capacity is high. Effective rooting depth

is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used mainly as rangeland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit is moderately suited to hay and pasture. The main limitation is slope.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, sharp-tailed grouse, bobcat, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

84—Regnaps-Crownest complex, 2 to 10 percent slopes. This map unit is on foothills. Areas are 50 to 250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 65 percent Regnaps loam on the lower slopes and 20 percent Crownest channery sandy loam on the upper slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Citadel and Lakoa loams. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Regnaps soil is moderately deep and well drained. It formed in slopewash alluvium and residuum derived dominantly from sandstone. Typically, the surface layer is pale brown loam about 4 inches thick. The subsoil is brown clay loam about 12 inches thick. The substratum to a depth of 21 inches is pale brown loam. Sandstone is at a depth of 21 inches. In some places the subsoil has accumulations of soft, powdery lime.

Permeability of the Regnaps soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is moderate.

The Crownest soil is shallow and well drained. It formed in residuum derived from sandstone. Typically, the surface layer is grayish brown channery sandy loam about 4 inches thick. The underlying material to a depth of 12 inches is grayish brown channery sandy loam. Sandstone is at a depth of 12 inches.

Permeability of the Crownest soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Regnaps soil is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years.

The potential plant community on the Crownest soil is mainly little bluestem, western wheatgrass, sideoats grama, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,000 pounds in unfavorable years.

If the range in this unit is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is poor. The main limitations for seeding are limited rooting depth and channery fragments on the surface.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, sharp-tailed grouse, bobcat, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Regnaps soil is in the Loamy, 15- to 19-inch ppt., Black Hills range site. The Crownest soil is in the Shallow Loamy, 15- to 19-inch ppt., Black Hills range site.

85—Regnaps-Norkool-Crownest complex, 2 to 10 percent slopes. This map unit is on foothills. Areas are 50 to 200 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Regnaps loam, 30 percent Norkool loam, and 20 percent Crownest channery sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lakoa loam on the lower slopes and Theedle Variant loam on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Regnaps soil is moderately deep and well drained. It formed in slopewash alluvium and residuum derived dominantly from sandstone. Typically, the surface layer is pale brown loam about 4 inches thick. The subsoil is brown clay loam about 12 inches thick. The substratum to a depth of 21 inches is pale brown loam. Sandstone is at a depth of 21 inches. In some places the subsoil has accumulations of soft, powdery lime.

Permeability of the Regnaps soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is moderate.

The Norkool soil is deep and well drained. It formed in alluvium derived dominantly from siltstone. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil is brown silty clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brownish gray silt loam.

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

The Crownest soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is grayish brown channery sandy loam about 4 inches thick. The underlying material to a depth of 12 inches is grayish brown channery sandy loam. Sandstone is at a depth of 12 inches.

Permeability of the Crownest soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Regnaps and Norkool soils is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. The potential plant community on the Crownest soil is mainly little bluestem, western wheatgrass, sideoats grama, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,000 pounds in unfavorable years.

If the range in this unit is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment. Brush management improves deteriorated areas of rangeland that are producing more woody shrubs than were present in the potential plant community.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, sharp-tailed grouse, bobcat, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. The Regnaps and Norkool soils and in the Loamy, 15- to 19-inch ppt., Black Hills range site. The Crownest soil is in the Shallow Loamy, 15- to 19-inch ppt., Black Hills range site.

86—Rekop Variant-Gypnevee Variant-Rock outcrop complex, 2 to 10 percent slopes. This map unit is on uplands. Areas are 100 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 25 percent Rekop Variant loam, 25 percent Gypnevee Variant silt loam, and 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Colnevee Variant silt loam and Sugakool silt loam. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Rekop Variant soil is shallow and somewhat excessively drained. It formed in thin, highly calcareous and gypsiferous material derived dominantly from red gypsiferous siltstone. Typically, the surface layer is light reddish brown loam about 5 inches thick. The underlying

material to a depth of 14 inches is light reddish brown loam. Siltstone is at a depth of 14 inches.

Permeability of the Rekop Variant soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Gypnevee Variant soil is deep and well drained. It formed in loamy residuum derived dominantly from gyprock. Typically, the surface layer is reddish gray silt loam about 6 inches thick. The substratum to a depth of 45 inches is yellowish red silt loam. Gyprock is at a depth of 45 inches.

Permeability of the Gypnevee Variant soil is moderate. Available water capacity is high. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

Rock outcrop is areas of exposed gyprock.

This unit is used as rangeland and wildlife habitat.

The Rekop Variant soil is poorly suited to the production of wood products. The site index for ponderosa pine is about 40 to 50. The Gypnevee Variant soil is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 50 to 60. The main concerns in producing and harvesting timber on this unit are high seedling mortality and erodibility of logging roads.

The understory vegetation on the Rekop Variant soil consists mainly of sideoats grama, green needlegrass, Kentucky bluegrass, western wheatgrass, and blue grama. The potential plant community produces about 650 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 500 pounds in unfavorable years. The understory vegetation on the Gypnevee Variant soil consists of green needlegrass, western wheatgrass, bearberry, snowberry, and serviceberry. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 400 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Rekop soil is in woodland suitability group 2D. The Gypnevee Variant soil is in woodland suitability group 3D.

87—Rekop Variant-Gypnevee Variant-Rock outcrop complex, 10 to 60 percent slopes. This map unit is on uplands. Areas are 100 to 500 acres in size. The native vegetation is mainly ponderosa pine, shrubs, and grasses. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 25 percent Rekop Variant loam, 25 percent Gypnevee Variant silt loam, and 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Sugakool silt loam and Colnevee Variant silt loam. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Rekop Variant soil is shallow and somewhat excessively drained. It formed in thin, highly calcareous and gypsiferous material derived dominantly from red gypsiferous siltstone. Typically, the surface layer is light reddish brown loam about 5 inches thick. The underlying material to a depth of 14 inches is light reddish brown loam. Siltstone is at a depth of 14 inches.

Permeability of the Rekop Variant soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Gypnevee Variant soil is deep and well drained. It formed in loamy residuum derived dominantly from gyprock. Typically, the surface layer is reddish gray silt loam about 6 inches thick. The substratum to a depth of 45 inches or more is pink silt loam. Gyprock is at a depth of 45 inches.

Permeability of the Gypnevee Variant soil is moderate. Available water capacity is high. Effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

Rock outcrop consists of areas of exposed gyprock.

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

The Rekop Variant soil is poorly suited to the production of wood products. The site index for ponderosa pine is about 40 to 50. The Gypnevee Variant soil is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 50 to 60. The main concerns in producing and harvesting timber on this unit are high seedling mortality and erodibility of logging roads.

The understory vegetation on the Rekop Variant soil consists mainly of sideoats grama, green needlegrass, Kentucky bluegrass, western wheatgrass, and blue grama. The potential plant community produces about 650 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 500 pounds in unfavorable years. The understory vegetation on the Gypnevee Variant soil consists of green needlegrass, western wheatgrass, bearberry, snowberry, and serviceberry. The potential plant community produces about 500 pounds of air-dry

vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 400 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Rekop soil is in woodland suitability group 2D. The Gypnevee Variant soil is in woodland suitability group 3D.

88—Renohill loam, 2 to 10 percent slopes. This moderately deep, well drained soil is on uplands. It formed in residuum and slopewash alluvium derived dominantly from shale. The native vegetation is mainly grasses and shrubs. Elevation is 3,500 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray loam about 4 inches thick. The subsoil is grayish brown clay loam about 8 inches thick. The substratum to a depth of 34 inches is light brownish gray clay loam. Shale is at a depth of 34 inches.

Included in this unit are small areas of Cushman loam, Savageton clay loam, Samday clay, Ulm loam, and Parmleed loam.

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

This unit is used as rangeland and wildlife.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama, Sandberg bluegrass, big sagebrush, and plains pricklypear increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years.

If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

89—Renohill clay loam, 2 to 10 percent slopes. This moderately deep, well drained soil is on fan aprons. It formed in slopewash alluvium derived dominantly from shale. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray clay loam about 4 inches thick. The subsoil is grayish brown clay loam about 8 inches thick. The substratum to a depth of 34 inches is light brownish gray clay loam. Shale is at a depth of 34 inches.

Included in this unit are small areas of Parmleed loam on the lower slopes and Samday clay on the upper slopes.

Permeability of the Renohill soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

90—Renohill-Savageton clay loams, 2 to 10 percent slopes. This map unit is on fan aprons. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Renohill clay loam and 40 percent Savageton clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Parmleed loam on the lower slopes and Samday clay on the upper slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Renohill soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from shale. Typically, the surface layer is light brownish gray clay loam about 4 inches thick. The subsoil is grayish brown clay loam about 8 inches thick. The substratum to a depth of 34 inches is light brownish gray clay loam. Shale is at a depth of 34 inches.

Permeability of the Renohill soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is moderate.

The Savageton soil is moderately deep and well drained. It formed in calcareous residuum derived dominantly from shale. Typically, the surface layer is light brownish gray clay loam about 5 inches thick. The underlying material to a depth of 29 inches is light brownish gray clay loam. Shale is at a depth of 29 inches.

Permeability of the Savageton soil is very slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, blue grama, and Cusick bluegrass. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,800 pounds in favorable years to 750 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IVe, irrigated, and VIe, nonirrigated. It is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

91—Rock outcrop. This map unit consists mainly of barren rock. The parent material varies. Elevation ranges from 3,600 to 5,000 feet.

Included in this unit is 10 percent shallow Torriorthents, 10 to 60 percent slopes, in drainageways. These soils support very sparse vegetation.

Runoff is slow to rapid, and the hazard of erosion is slight to severe.

This unit is used mainly as wildlife habitat.

This map unit is in capability subclass VIIIe.

92—Rock outcrop-Vanocker complex, very steep. This map unit is on canyons and steep mountains. Areas are 200 to 1,000 acres in size. The native vegetation is mainly coniferous trees, shrubs, and grasses. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Rock outcrop and 30 percent Vanocker gravelly loam, 50 to 60 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Crownest channery sandy loam on the upper slopes and Citadel and Lakoa loams on the lower slopes. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Rock outcrop consists of areas of exposed sandstone, limestone, and shale.

The Vanocker soil is deep and well drained. It formed in slopewash alluvium derived dominantly from sandstone and shale. Typically, the surface is covered with a mat of decomposing forest litter about 2 inches thick. The surface layer is brown gravelly loam about 2 inches thick. The subsoil is brown very channery clay loam about 14 inches thick. The substratum to a depth of 60 inches or more is light brown very channery clay loam.

Permeability of the Vanocker soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as woodland and wildlife habitat.

The Vanocker soil is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 60 to 65. The main concerns in producing and harvesting timber are the steepness of slope, the hazard of erosion, and susceptibility to landslides during periods of snowmelt and high rainfall. Landslides occur naturally or in road cuts.

The understory vegetation on the Vanocker soil is mainly Columbia needlegrass, bluebunch wheatgrass, sedges, snowberry, and little bluestem. The potential plant community produces about 150 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds per acre in favorable years to 250 pounds per acre in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Vanocker soil is in woodland suitability group 3R.

93—Rock outcrop-Wibaux complex, very steep. This map unit is on hills. Slopes are 30 to 75 percent. Areas are 50 to 125 acres in size. The native vegetation is mainly grasses, shrubs, and small areas of coniferous trees. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Rock outcrop and 30 percent Wibaux channery loam, 30 to 60 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Shingle loam, Samday clay, and Tassel fine sandy loam. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Rock outcrop consists of areas of exposed sandstone, shale, and porcellanite.

The Wibaux soil has a thin mantle of soil material over rock fragments and is somewhat excessively drained. It formed in thin very channery material derived dominantly from porcellanite. Typically, the surface layer is reddish gray channery loam about 4 inches thick. The subsoil is light reddish brown very channery loam about 12 inches thick. The substratum to a depth of 60 inches or more is fractured porcellanite, the voids of which are partially filled with soil material.

Permeability of the Wibaux soil is moderate. Available water capacity is low. Effective rooting depth is 60 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, needleandthread, blue grama, and junegrass. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. The production of forage is limited by shallow rooting depth. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site.

94—Rothican-Colhill complex, 2 to 10 percent slopes. This map unit is on upland terraces. Areas are 50 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Rothican loam and 30 percent Colhill gravelly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Sugakool silt loam and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Rothican soil is deep and well drained. It formed in gravelly alluvium derived from mixed sources. Typically, the surface layer is grayish brown loam about 8 inches thick. The subsoil is light brownish gray gravelly loam about 8 inches thick. The substratum to a depth of 60 inches or more is light brown gravelly loam.

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

The Colhill soil is deep and excessively drained. It formed in gravelly alluvium derived from mixed sources. Typically, the surface layer is light brownish gray gravelly loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light gray very gravelly loam.

Permeability of the Colhill soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and bluegrass. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

95—Samday-Grummit complex, 2 to 30 percent slopes. This map unit is on sloping uplands. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Samday clay and 40 percent Grummit clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Maggin clay loam and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Samday soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is olive gray clay about 4 inches thick. The underlying material to a depth of 16 inches is olive gray clay. Shale is at a depth of 16 inches.

Permeability of the Samday soil is slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Grummit soil is shallow and well drained. It formed in residuum derived dominantly from acid shale. Typically, the surface layer is gray clay loam about 4 inches thick. The underlying material to a depth of 15 inches is light brownish clay. Shale is at a depth of 15 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, blue grama, and birdfoot sagebrush. As the range condition deteriorates, blue grama and birdfoot sagebrush increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. The production of forage is limited by shallow rooting depth. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site.

96—Samday-Savageton complex, hilly. This map unit is on shoulders and ridgetops. Slope is 6 to 30 percent. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 60 percent Samday clay and 30 percent Savageton clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Shingle loam and Hilight clay loam on the upper slopes and Bahl clay loam on the lower slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Samday soil is shallow and well drained. It formed in residuum derived dominantly from calcareous shale. Typically, the surface layer is olive gray clay about 4 inches thick. The underlying material to a depth of 16 inches is olive gray clay. Shale is at a depth of 16 inches.

Permeability of the Samday soil is slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is slight.

The Savageton soil is moderately deep and well drained. It formed in calcareous residuum derived

dominantly from shale. Typically, the surface layer is grayish brown clay loam about 5 inches thick. The underlying material to a depth of 29 inches is light brownish gray clay loam. Shale is at a depth of 29 inches.

Permeability of the Savageton soil is very slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Samday soil is mainly rhizomatous wheatgrass, green needlegrass, blue grama, and birdfoot sagebrush. As the range condition deteriorates, blue grama and birdfoot sagebrush increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Samday soil is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site. The Savageton soil is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

97—Samday-Shingle-Worf complex, 3 to 15 percent slopes. This map unit is on ridgetops. Areas are 50 to 100 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 30 percent Samday clay, 30 percent Shingle loam, and 20 percent Worf loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cushman loam, Theedle loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Samday soil is shallow and well drained. It formed in residuum derived dominantly from calcareous shale. Typically, the surface layer is olive gray clay about 4 inches thick. The underlying material to a depth of 16 inches is olive gray clay. Shale is at a depth of 16 inches.

Permeability of the Samday soil is slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Shingle soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is pale brown loam about 6 inches thick. The underlying material to a depth of 17 inches is pale brown loam. Shale is at a depth of 17 inches.

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

The Worf soil is shallow and well drained. It formed in medium textured calcareous residuum derived dominantly from sandstone. Typically, the surface layer is light brownish gray loam about 3 inches thick. The underlying material to a depth of 16 inches is grayish brown loam. Shale is at a depth of 16 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and snakeweed increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. The production of forage is limited by shallow rooting depth. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Samday soil is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site. The Shingle and Worf soils are in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site.

98—Samoist-Colsavage clay loams, hilly. This map unit is on upland shoulder slopes and ridgetops. Slope is 10 to 30 percent. Areas are 50 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Samoist clay loam and 30 percent Colsavage clay loam. The components of this

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

Included in this unit are small areas of Shingle Variant loam on the upper slopes and Bahl Variant clay loam on the lower slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Samoist soil is shallow and well drained. It formed in residuum derived dominantly from calcareous clay shale. Typically, the surface layer is dark grayish brown clay loam about 5 inches thick. The underlying material to a depth of 12 inches is light brownish gray clay. Shale is at a depth of 12 inches. In some areas the surface layer is clay.

Permeability of the Samoist soil is very slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Colsavage soil is moderately deep and well drained. It formed in calcareous residuum derived dominantly from shale. Typically, the surface layer is grayish brown clay loam about 5 inches thick. The underlying material to a depth of 30 inches is light brownish gray clay. Shale is at a depth of 30 inches.

Permeability of the Colsavage soil is slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Samoist soil is mainly western wheatgrass, sideoats grama, little bluestem, and green needlegrass. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,000 pounds in unfavorable years.

The potential plant community on the Colsavage soil is mainly green needlegrass, western wheatgrass, Columbia needlegrass, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 2,900 pounds in favorable years to 1,400 pounds in unfavorable years.

If the range in this unit is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is poor.

This map unit is in capability subclass VIIe, nonirrigated. The Samoist soil is in the Shallow Clayey, 15- to 19-inch ppt., Black Hills range site. The Colsavage soil is in the Clayey, 15- to 19-inch ppt., Black Hills range site.

99—Savageton-Bahl clay loams, 2 to 10 percent slopes. This map unit is on fan aprons and terraces. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 45 percent Savageton clay loam and 35 percent Bahl clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Samday clay on the upper slopes and Renohill clay loam on the lower slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Savageton soil is moderately deep and well drained. It formed in calcareous residuum derived dominantly from shale. Typically, the surface layer is light brownish gray clay loam about 5 inches thick. The underlying material to a depth of 29 inches is light brownish gray clay loam. Shale is at a depth of 29 inches.

Permeability of the Savageton soil is very slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

The Bahl soil is deep and well drained. It formed in clayey alluvium derived dominantly from clay shale. Typically, the surface layer is light brownish gray clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray clay.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, Cusick bluegrass, and blue grama. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,800 pounds in favorable years to 750 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation

for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. It is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

100—Shingle-Samday-Rock outcrop complex, hilly. This map unit is on ridges. Slope is 10 to 45 percent. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 30 percent Shingle loam, 30 percent Samday clay, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Theedle loam on the upper slopes and Kishona loam on the lower slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Shingle soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is pale brown loam about 6 inches thick. The underlying material to a depth of 17 inches is pale brown loam. Shale is at a depth of 17 inches.

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

The Samday soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is olive gray clay about 4 inches thick. The underlying material to a depth of 16 inches is olive gray clay. Shale is at a depth of 16 inches.

Permeability of the Samday soil is slow. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

Rock outcrop consists of areas of exposed shale.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. Livestock grazing should be managed to protect the unit from erosion. The production of forage is limited by shallow rooting depth. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Shingle soil is in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site. The Samday soil is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site.

101—Shingle-Theedle loams, 6 to 30 percent slopes. This map unit is on ridges. Areas are 50 to 350 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 60 percent Shingle loam and 30 percent Theedle loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Kishona loam on the lower slopes and Cushman loam on the upper slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Shingle soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is pale brown loam about 6 inches thick. The underlying material to a depth of 17 inches is pale brown loam. Shale is at a depth of 17 inches.

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

The Theedle soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from soft sandstone. Typically, the surface layer is light brownish gray loam about 8 inches thick. The underlying material to a depth of 28 inches is pale brown loam. Shale is at a depth of 28 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Shingle soil is mainly rhizomatous wheatgrass, prairie junegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal

years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. The potential plant community on the Theedle soil is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Shingle soil is in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site. The Theedle soil is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

102—Shingle-Theedle-Cambria association, steeply sloping. This map unit is on uplands and toe slopes. Slope is 6 to 30 percent. Areas are 50 to 350 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 30 percent Shingle loam, 6 to 30 percent slopes, on ridgetops; 25 percent Theedle loam, 6 to 30 percent slopes, on back slopes and foot slopes; and 25 percent Cambria loam, 6 to 15 percent slopes, on toe slopes.

Included in this unit are small areas of Kishona loam, Cushman loam, and Forkwood loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Shingle soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is pale brown loam about 6 inches thick. The underlying material to a depth of 17 inches is pale brown loam. Shale is at a depth of 17 inches.

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

The Theedle soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from soft sandstone. Typically, the surface layer is light brownish gray loam about 8 inches thick. The underlying material to a depth of 28 inches is pale brown loam. Shale is at a depth of 28 inches.

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

The Cambria soil is deep and well drained. It formed in calcareous alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is brown loam about 8 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Shingle soil is mainly rhizomatous wheatgrass, needleandthread, blue grama, and junegrass. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. The potential plant community on the Theedle and Cambria soils is mainly rhizomatous wheatgrass, needleandthread, blue grama, and green needlegrass. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years.

If the range in this unit is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. The Shingle soil is in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site. The Theedle and Cambria soils are in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

103—Shingle Variant-Theedle Variant loams, 6 to 30 percent slopes. This map unit is on shoulder slopes and ridgetops. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation

is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 60 percent Shingle Variant loam and 30 percent Theedle Variant loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Tassel Variant fine sandy loam and Colsavage clay loam. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Shingle Variant soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is grayish brown loam about 5 inches thick. The underlying material to a depth of 16 inches is light gray loam. Shale is at a depth of 16 inches.

Permeability of the Shingle Variant soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Theedle Variant soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from soft shale. Typically, the surface layer is light brownish gray loam about 3 inches thick. The underlying material to a depth of 30 inches is light gray clay loam. Shale is at a depth of 30 inches.

Permeability of the Theedle Variant soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is moderate, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Shingle Variant soil is mainly little bluestem, western wheatgrass, sideoats grama, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,000 pounds in unfavorable years. The potential plant community on the Theedle Variant soil is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Shingle Variant soil is in the Shallow Loamy, 15- to 19-inch ppt., Black Hills range site. The Theedle Variant soil is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

104—Stetter clay, 0 to 3 percent slopes. This deep, well drained soil is on flood plains. It formed in clayey alluvium derived dominantly from clay shale. Areas are 5 to 60 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is grayish brown clay about 4 inches thick. The underlying material to a depth of 60 inches or more is grayish brown clay.

Included in this unit are small areas of Lohmiller clay loam and Topeman clay.

Permeability of the Stetter soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. This soil is subject to frequent periods of flooding during March to June.

This unit is used as rangeland, hayland, and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, western wheatgrass, big bluestem, and basin wildrye. As the range condition deteriorates, green needlegrass and silver sagebrush increase. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 2,000 pounds in unfavorable years. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the clayey texture of the soil.

If this unit is used for the production of hay crops, the main limitation is the clayey texture of the soil.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVw, irrigated and nonirrigated. It is in the Overflow, 10- to 14-inch ppt., Northern Plains range site.

105—Stovho Variant-Stovho complex, 3 to 30 percent slopes. This map unit is on mountains. Areas are 75 to 350 acres in size. The native vegetation is mainly coniferous trees, shrubs, and grasses. Elevation is 6,000 to 7,000 feet. The average annual precipitation

is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Stovho Variant loam and 20 percent Stovho silt loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Citadel and Lakoa loams. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Stovho Variant soil is deep and well drained. It formed in alluvium derived dominantly from reddish sedimentary rock. Typically, the surface is covered with a mat of decomposing forest litter about 2 inches thick. The surface layer is very dark reddish brown loam about 4 inches thick. The subsurface layer is pinkish gray loam about 5 inches thick. The subsoil is reddish brown clay about 11 inches thick. The substratum to a depth of 60 inches or more is reddish brown clay.

Permeability of the Stovho Variant soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Stovho soil is deep and well drained. It formed in silty sediment overlying residuum derived dominantly from limestone. Typically, the surface is covered with a mat of decomposing forest litter about 1 inch thick. Typically, the surface layer is grayish brown silt loam about 8 inches thick. The subsoil is grayish brown silty clay loam about 16 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown clay loam.

Permeability of the Stovho soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

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

This unit is moderately suited to the production of wood products. The site index for ponderosa pine ranges from 60 to 65. The main concerns in producing and harvesting timber are wetness in some areas during periods of snowmelt and high rainfall and susceptibility to landslides in the steeper areas. Logging with heavy equipment should be restricted when the soil is moist to reduce rutting and compaction.

The understory vegetation on the Stovho Variant soil is mainly timber danthonia, yellow wildrye, tufted hairgrass, and sedges. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 1,900 pounds in favorable years to 1,200 pounds in unfavorable years. The understory vegetation on the Stovho soil consists mainly of roughleaf ricegrass, yellow wildrye, sedges, and slender wheatgrass.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Stovho Variant soil is in woodland suitability group 3A. The Stovho soil is in woodland suitability group 4A.

106—Sugakool loam, 2 to 6 percent slopes. This deep, well drained soil is on fans and terraces. It formed in outwash material derived from mixed sources. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is reddish gray loam about 7 inches thick. The subsoil is light reddish brown silty clay loam about 9 inches thick. The substratum to a depth of 60 inches or more is light reddish brown gravelly and very gravelly loam.

Included in this unit are small areas of Colhill gravelly loam and Rothican loam.

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

This unit is used mainly as rangeland and hayland. It is also used as cropland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is good.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is a short growing season.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

107—Sugakool-Colhill complex, 2 to 6 percent slopes. This map unit is on valley sides. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Sugakool loam and 40 percent Colhill gravelly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rothican loam and Colnevee silt loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Sugakool soil is deep and well drained. It formed in outwash material derived from mixed sources. Typically, the surface layer is reddish gray loam about 7 inches thick. The subsoil is light reddish brown silty clay loam about 9 inches thick. The substratum to a depth of 60 inches or more is light reddish brown very gravelly loam.

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

The Colhill soil is deep and excessively drained. It formed in gravelly alluvium derived from mixed sources. Typically, the surface layer is light brownish gray gravelly loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light gray very gravelly loam.

Permeability of the Colhill soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used mainly as rangeland and hayland. It is also used as cropland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is good.

If this unit is used for nonirrigated small grain and hay crops, the main limitations are a short growing season and small stones on the surface.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

108—Sugakool-Colhill complex, 6 to 10 percent slopes. This map unit is on valley sides. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Sugakool loam and 40 percent Colhill gravelly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rothican loam, Colnevee Variant silt loam, and Corpening loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Sugakool soil is deep and well drained. It formed in outwash material derived from mixed sources. Typically, the surface layer is reddish gray loam about 7 inches thick. The subsoil is light reddish brown silty clay loam about 9 inches thick. The substratum to a depth of 60 inches or more is light reddish brown very gravelly loam.

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

The Colhill soil is deep and excessively drained. It formed in gravelly alluvium derived from mixed sources. Typically, the surface layer is light brownish gray gravelly loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light gray very gravelly loam.

Permeability of the Colhill soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is slight.

This unit is used mainly as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama

increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclasses IVe, irrigated, and VIe, nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

109—Tassel-Shingle complex, 2 to 30 percent slopes. This map unit is on ridges. Areas are 50 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Tassel fine sandy loam and 40 percent Shingle loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Theedle loam, Terro sandy loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Tassel soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is dark grayish brown fine sandy loam about 3 inches thick. The underlying material to a depth of 15 inches is light brownish gray fine sandy loam. Sandstone is at a depth of 15 inches.

Permeability of the Tassel soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

The Shingle soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is pale brown loam about 6 inches thick. The underlying material to a depth of 17 inches is pale brown loam. Soft shale is at a depth of 17 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Tassel soil is mainly prairie sandreed, threadleaf sedge, needleandthread, and blue grama. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production varies from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Shingle soil is mainly rhizomatous wheatgrass, needleandthread, blue grama, and prairie junegrass. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years.

Livestock grazing should be managed to protect the unit from erosion. The production of forage on this unit is limited by shallow rooting depth. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Tassel soil is in the Shallow Sandy, 10- to 14-inch ppt., Northern Plains range site. The Shingle soil is in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site.

110—Tassel-Terro-Rock outcrop complex, 15 to 30 percent slopes. This map unit is on shoulder slopes and ridgetops. Areas are 50 to 250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Tassel fine sandy loam, 25 percent Terro sandy loam, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Turnercrest sandy loam and Keeline sandy loam. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Tassel soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is grayish brown fine sandy loam about 3 inches thick. The underlying material to a depth of 15 inches is light brownish gray fine sandy loam. Sandstone is at a depth of 15 inches.

Permeability of the Tassel soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

The Terro soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is light brownish gray sandy loam about 8 inches thick. The subsoil is pale brown sandy loam about 16 inches thick. The substratum is light brownish gray sandy loam about 12 inches thick. Sandstone is at a depth of 36 inches.

Permeability of the Terro soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

Rock outcrop consists of areas of exposed sandstone.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Tassel soil is mainly needleandthread, prairie sandreed, blue grama, and threadleaf sedge. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. The potential plant community on the Terro soil is mainly western wheatgrass, prairie sandreed, needleandthread, and blue grama. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. Livestock grazing should be managed to protect the unit from erosion. The production of forage is limited by shallow rooting depth. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Tassel soil is in the Shallow Sandy, 10- to 14-inch ppt., Northern Plains range site. The Terro soil is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

111—Tassel-Turnercrest complex, 6 to 30 percent slopes. This map unit is on shoulder slopes and ridgetops. Areas are 75 to 500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Tassel fine sandy loam and 30 percent Turnercrest sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Shingle loam, Terro sandy loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Tassel soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is grayish brown fine sandy loam about 3 inches thick. The underlying material to a depth of 15 inches is light brownish gray fine sandy loam. Sandstone is at a depth of 15 inches.

Permeability of the Tassel soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

The Turnercrest soil is moderately deep and well drained. It formed in moderately coarse textured material derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 2 inches thick. The subsoil is brown fine sandy loam about 4 inches thick. The underlying material to a depth of 25 inches is light gray fine sandy loam. Sandstone is at a depth of 25 inches.

Permeability of the Turnercrest soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Tassel soil is mainly needleandthread, prairie sandreed, blue grama, and threadleaf sedge. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production varies from 1,400 pounds in favorable years to 600 pounds in unfavorable years. The potential plant community on the Turnercrest soil is mainly needleandthread, prairie sandreed, threadleaf sedge, and western wheatgrass. As the range condition deteriorates, threadleaf sedge and blue grama increase. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Tassel soil is in the Shallow Sandy, 10- to 14-inch ppt., Northern Plains range site. The Turnercrest soil is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

112—Tassel Variant-Shingle Variant complex, 2 to 30 percent slopes. This map unit is on ridges. Areas

are 5 to 50 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 50 percent Tassel Variant fine sandy loam and 30 percent Shingle Variant loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Chinook fine sandy loam, Theedle Variant loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Tassel Variant soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The underlying material to a depth of 16 inches is light gray fine sandy loam. Sandstone is at a depth of 16 inches.

Permeability of the Tassel Variant soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is severe.

The Shingle Variant soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is grayish brown loam about 5 inches thick. The underlying material to a depth of 16 inches is light gray loam. Shale is at a depth of 16 inches.

Permeability of the Shingle Variant soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Tassel Variant soil is mainly needleandthread, prairie sandreed, little bluestem, and blue grama. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,400 pounds of air-dry vegetation per acre in normal years. Production varies from 1,800 pounds in favorable years to 900 pounds in unfavorable years. The potential plant community on the Shingle Variant soil is mainly little bluestem, western wheatgrass, sideoats grama, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,000 pounds in unfavorable years. The production of forage is limited by shallow rooting depth. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Tassel Variant soil is in the Shallow Sandy, 15- to 19-inch ppt., Black Hills range site. The Shingle Variant is in the Shallow Loamy, 15- to 19-inch ppt., Black Hills range site.

113—Terro-Turnercrest sandy loams, 2 to 10 percent slopes. This map unit is on shoulders, back slopes, and foot slopes. Areas are 25 to 350 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Terro sandy loam and 30 percent Turnercrest sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Vonalee sandy loam and Keeline sandy loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Terro soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is light brownish gray sandy loam about 8 inches thick. The subsoil is pale brown sandy loam about 16 inches thick. The substratum is light brownish gray sandy loam about 12 inches thick. Sandstone is at a depth of 36 inches.

Permeability of the Terro soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

The Turnercrest soil is moderately deep and well drained. It formed in moderately coarse textured residuum derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 2 inches thick. The subsoil is brown fine sandy loam about 4 inches thick. The underlying material to a depth of 25 inches is light gray fine sandy loam. Sandstone is at a depth of 25 inches.

Permeability of the Turnercrest soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly needleandthread, prairie sandreed, threadleaf sedge, and western wheatgrass. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years

to 1,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IVe, irrigated, and VIe, nonirrigated. It is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

114—Theedle-Kishona loams, 2 to 15 percent slopes. This map unit is on gently sloping to rolling toe slopes. Areas are 50 to 350 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Theedle loam and 35 percent Kishona loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cushman, Cambria, and Zigweid loams. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Theedle soil is moderately deep and well drained. It formed in slopewash alluvium derived dominantly from soft shale or sandstone. Typically, the surface layer is light brownish gray loam about 8 inches thick. The underlying material to a depth of 28 inches is pale brown loam. Shale is at a depth of 28 inches.

Permeability of the Theedle soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is moderate.

The Kishona soil is deep and well drained. It formed in sediment derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray loam about 7 inches thick. The underlying material to a depth of 60 inches or more is pale brown loam.

Permeability of the Kishona soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

115—Thermopolis Variant-Rock outcrop complex, 10 to 60 percent slopes. This map unit is on uplands. Areas are 25 to 175 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 50 percent Thermopolis Variant silt loam and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Colnevee Variant silt loam and Corpening loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Thermopolis Variant soil is shallow and well drained. It formed in silty residuum derived dominantly from reddish shale. Typically, the surface layer is reddish brown silt loam about 3 inches thick. The underlying material to a depth of 13 inches is reddish brown silt loam. Shale is at a depth of 13 inches.

Permeability of the Thermopolis Variant soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

Rock outcrop consists of areas of exposed siltstone or shale.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly little bluestem, western wheatgrass, sideoats grama, and blue grama. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,000 pounds in unfavorable years.

The production of forage is limited by shallow rooting depth. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for white-tailed deer, mule deer, bobcat, coyote, Merriam's turkey, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Thermopolis Variant soil is in the Shallow Loamy, 15- to 19-inch ppt., Black Hills range site.

116—Topeman-Demar complex, 0 to 3 percent slopes. This map unit is on fan aprons. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Topeman clay and 30 percent Demar loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Absted loam and Renohill clay loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Topeman soil is deep and well drained. It formed in clayey alluvium derived dominantly from acid shale. Typically, the surface layer is light gray clay about 4 inches thick. The substratum to a depth of 40 inches is grayish brown clay. Shale is at a depth of 40 inches.

Permeability of the Topeman soil is very slow. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

The Demar soil is deep and moderately well drained. It formed in clayey alluvium derived dominantly from acid shale. Typically, the surface layer is light brownish gray loam about 6 inches thick. The subsoil is grayish brown silty clay about 14 inches thick. The substratum to a depth of 50 inches is grayish brown clay. Shale is at a depth of 50 inches.

Permeability of the Demar soil is very slow. Available water capacity is moderate. Effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly western wheatgrass, inland saltgrass, greasewood, and gardner saltbush. As the range condition deteriorates, greasewood and the size of areas devoid of vegetation increase. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 250 pounds in unfavorable years. The production of forage is limited by salinity and low annual precipitation. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIs, nonirrigated. It is in the Saline Upland, 10- to 14-inch ppt., Northern Plains range site.

117—Twotop clay, 0 to 6 percent slopes. This deep, well drained soil is fan aprons. It formed in alluvium derived dominantly from sedimentary rock. Areas are 50 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light olive gray clay about 5 inches thick. The subsoil is light olive gray clay about 20 inches thick. The substratum to a depth of 60 inches or more is light gray clay.

Included in this unit are small areas of Cadoma and Bahl clay loams.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, western wheatgrass, and thickspike wheatgrass. As the range condition deteriorates, Canby bluegrass and wild onion increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IVs, irrigated, and VIs, nonirrigated. It is in the Dense Clay, 10- to 14-inch ppt., Northern Plains range site.

118—Ulm loam, 1 to 6 percent slopes. This deep, well drained soil is on fan aprons. It formed in calcareous sediment derived dominantly from sedimentary rock. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray loam about 6 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is light gray clay loam.

Included in this unit are small areas of Forkwood loam and Bidman loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, needleandthread, and blue grama. As the range condition deteriorates, blue grama and Sandberg bluegrass increase. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 2,000 pounds in favorable years to 850 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is good.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is low annual precipitation.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy, 10- to 14-inch ppt., Northern Plains range site.

119—Ulm clay loam, 0 to 6 percent slopes. This deep, well drained soil is on alluvial fans and valley sides. It formed in calcareous alluvium derived dominantly from sedimentary rock. The native vegetation is mainly grasses and shrubs. Elevation is 3,500 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

Typically, the surface layer is light brownish gray clay loam about 6 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is light gray clay loam.

Included in this unit are small areas of Renohill clay loam, Bidman loam, Forkwood loam, and Absted fine sandy loam.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland, pastureland, and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, Cusick bluegrass, and blue grama. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,800 pounds in favorable years to 750 pounds in unfavorable years. Management practices suitable for use on this unit include proper range use, deferred grazing, rotation grazing, and aerial spraying for sagebrush management. Rangeland seeding is suitable if the range is in poor condition. The suitability of this unit for rangeland seeding is good.

If this unit is used as cropland or hayland, it is limited mainly by the clayey texture of the soil and low annual precipitation.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

120—Ulm-Renohill association, undulating. This map unit is on fan aprons. Slope is 2 to 15 percent. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Ulm clay loam, 2 to 6 percent slopes, and 30 percent Renohill clay loam, 2 to 15 percent slopes.

Included in this unit are small areas of Bidman loam, Forkwood loam, and Parmleed loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Ulm soil is deep and well drained. It formed in calcareous alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light brownish gray clay loam about 6 inches thick. The subsoil is grayish brown clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is light gray clay loam.

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

The Renohill soil is moderately deep and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is light brownish gray clay loam about 4 inches thick. The subsoil is grayish brown clay loam about 8 inches thick. The substratum is light brownish gray clay loam about 22 inches thick. Shale is at a depth of 34 inches.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, blue grama, and Cusick bluegrass. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,800 pounds in favorable years to 750 pounds in unfavorable years. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

The Ulm soil is in capability subclass IVe, irrigated and nonirrigated.

The Renohill soil is in capability subclass VIe, irrigated and nonirrigated. The soils are in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

121—Ustic Torrifluvents, 0 to 6 percent slopes. These deep, well drained soils are on flood plains. They formed in silty alluvium derived dominantly from red sandstone or shale. Areas are 50 to 100 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

No single profile of the Ustic Torrifluvents is typical, but one commonly observed in the survey area has a surface layer of reddish brown silt loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light red silt loam.

Included in this unit are small areas of Colnevee silt loam.

Permeability of these Ustic Torrifluvents is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is slight.

This unit is used mainly as cropland. It is also used as hayland, rangeland, and wildlife habitat.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is a short growing season.

The potential plant community on this unit is mainly green needlegrass, big bluestem, blue wildrye, and western wheatgrass. As the range condition deteriorates, snowberry and bluegrass increase. The potential plant community produces about 3,300 pounds of air-dry vegetation per acre in normal years. Production varies from 4,000 pounds in favorable years to 2,000 pounds in unfavorable years. The suitability of this unit for rangeland seeding is good.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, sharp-tailed grouse, bobcat, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Overflow, 15-to-19 inch ppt., Black Hills range site.

122—Ustic Torriorthents-Typic Eutroboralfs-Rock outcrop complex, 10 to 40 percent slopes. This map unit is on rolling to steep ridges and hillsides. Areas are 50 to 200 acres in size. This unit is characterized by barren areas and small areas that support ponderosa pine. Elevation is 4,500 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 40 percent Ustic Torriorthents, 25 percent Typic Eutroboralfs, and 25 percent Rock outcrop. The remaining 20 percent is components of minor extent. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

The Ustic Torriorthents are shallow to deep and are poorly drained to well drained. They formed in residuum and alluvium derived dominantly from sandstone and shale. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of light brownish gray loam about 2 inches thick.

The underlying material to a depth of 60 inches or more is light gray clay.

Permeability of the Ustic Torriorthents is moderately slow to moderate. Available water capacity is low to moderate. Effective rooting depth is 10 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is moderate.

The Typic Eutroboralfs are shallow to moderately deep and are moderately well drained to well drained. They formed in residuum derived dominantly from noncalcareous shale. No single profile of these soils is typical, but one commonly observed in the survey area is covered with a mat of pine needles and decomposing forest litter about 2 inches thick. The surface layer is grayish brown clay loam about 2 inches thick. The underlying material to a depth of 14 inches is grayish brown clay loam. Shale is at a depth of 14 inches.

Permeability of the Typic Eutroboralfs is slow to moderate. Available water capacity is low to moderate. Effective rooting depth is 10 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of wind erosion is low to moderate.

Rock outcrop consists of areas of exposed shale.

This unit is used as wildlife habitat.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Shallow Clayey, 10- to 14-inch ppt., Northern Plains range site.

123—Vanocker-Citadel complex, 20 to 60 percent slopes. This map unit is in canyons and on mountains. Areas are 50 to 350 acres in size. The native vegetation is mainly coniferous trees, shrubs, and grasses. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

This unit is 40 percent Vanocker gravelly loam, 20 to 60 percent slopes, and 20 percent Citadel loam, 20 to 40 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lakoa loam, Paunsaugunt loam, Pesowyo channery clay loam, and Rock outcrop. Included areas make up about 40 percent of the total acreage. The percentage varies from one area to another.

The Vanocker soil is deep and well drained. It formed in slopewash alluvium derived dominantly from sandstone or shale. Typically, the surface is covered with a mat of decomposing forest litter about 2 inches thick. The surface layer is brown gravelly loam about 2 inches thick. The subsoil is brown very channery clay loam about 14 inches thick. The substratum to a depth of 60 inches or more is light brown very channery clay loam.

Permeability of the Vanocker soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

The Citadel soil is deep and well drained. It formed in residuum derived dominantly from shale. Typically, the surface is covered with a mat of decomposing forest litter about 3 inches thick. The surface layer is pinkish gray loam about 5 inches thick. The subsoil is reddish brown clay about 16 inches thick. The substratum to a depth of 60 inches or more is red clay.

Permeability of the Citadel soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is slight.

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

This unit is poorly suited to the production of wood products. The site index for ponderosa pine ranges from 30 to 65. The main concerns in producing and harvesting timber are steepness of slope and susceptibility of the steeper areas to landslides during periods of snowmelt and high rainfall. Landslides occur naturally or in road cuts.

The understory vegetation on the Vanocker soil consists mainly of Columbia needlegrass, bluebunch wheatgrass, little bluestem, sedges, and snowberry. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 250 pounds in unfavorable years. The understory vegetation on the Citadel soil consists mainly of Kentucky bluegrass, green needlegrass, timber danthonia, sedges, and western snowberry. The potential plant community produces about 1,500 pounds of air-dry vegetation per acre in normal years. Production varies from 1,950 pounds in favorable years to 1,200 pounds in unfavorable years.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 3R.

124—Vassett silt loam, 2 to 6 percent slopes. This deep, well drained soil is on upland terraces. It formed in silty alluvium derived dominantly from red shale. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is brown silty clay loam

about 15 inches thick. The substratum to a depth of 60 inches or more is light reddish brown silt loam.

Included in this unit are small areas of Sugakool loam and soils that do not have a well developed subsoil.

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

This unit is used mainly as rangeland and cropland. It is also used as hayland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. The suitability of this unit for rangeland seeding is good.

If this unit is used for nonirrigated small grain and hay crops, the main limitation is a short growing season.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

125—Vassett silt loam, 6 to 10 percent slopes. This deep, well drained soil is on upland terraces. It formed in silty alluvium derived dominantly from red shale. Areas are 25 to 75 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 4,600 to 6,000 feet. The average annual precipitation is 15 to 19 inches, the average annual air temperature is 43 to 47 degrees F, and the average annual frost-free period is 90 to 110 days.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is brown silty clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is light reddish brown silt loam.

Included in this unit are small areas of Colnevee Variant silt loam and soils that do not have a well developed subsoil.

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

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly green needlegrass, rhizomatous wheatgrass, needleandthread, and blue grama. As the range condition deteriorates, bluegrass and blue grama increase. The potential plant community produces about 2,200 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,500 pounds in unfavorable years. The suitability of this unit for rangeland seeding is mainly fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for white-tailed deer, mule deer, coyote, Merriam's turkey, bobcat, sharp-tailed grouse, and other birds and small animals. Oak and hawthorn provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Loamy, 15- to 19-inch ppt., Black Hills range site.

126—Vonalee-Terro complex, 2 to 10 percent slopes. This map unit is on toe slopes and foot slopes. Areas are 25 to 250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Vonalee fine sandy loam and 30 percent Terro sandy loams. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Keeline and Turnercrest sandy loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Vonalee soil is deep and well drained. It formed in eolian sand and wind-reworked alluvium derived dominantly from sandstone. Typically, the surface layer is light brownish gray fine sandy loam about 6 inches thick. The subsurface layer is light brownish gray sandy loam about 4 inches thick. The upper 5 inches of the subsoil is brown sandy loam, and the lower 5 inches is light brownish gray coarse sandy loam. The substratum to a depth of 60 inches or more is light brownish gray sandy loam.

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

The Terro soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is light brownish gray sandy loam about 6 inches thick. The subsoil is pale brown sandy loam about 18 inches thick. The substratum is light gray sandy loam about 10 inches thick. Sandstone is at a depth of 34 inches.

Permeability of the Terro soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly needleandthread, prairie sandreed, threadleaf sedge, and western wheatgrass. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 1,600 pounds of air-dry vegetation per acre in normal years. Production varies from 2,100 pounds in favorable years to 1,000 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of erosion by wind and water during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass IVe, irrigated and nonirrigated. It is in the Sandy, 10- to 14-inch ppt., Northern Plains range site.

127—Winler-Savageton complex, 6 to 15 percent slopes. This map unit is on moderately sloping to rolling foot slopes. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 50 percent Winler clay, 6 to 10 percent slopes, and 30 percent Savageton clay loam, 6 to 15 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Samday clay, Renohill clay loam, and Bahl clay loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Winler soil is moderately deep and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is grayish brown clay about 6 inches thick. The subsoil is grayish brown clay about 10 inches thick. The substratum is light brownish gray clay about 16 inches thick. Shale is at a depth of 32 inches.

Permeability of the Winler soil is very slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Savageton soil is moderately deep and well drained. It formed in calcareous residuum derived dominantly from shale. Typically, the surface layer is light brownish gray clay loam about 5 inches thick. The subsoil is light brownish gray clay loam about 15 inches thick. The substratum is light brownish gray clay loam about 9 inches thick. Shale is at a depth of 29 inches.

Permeability of the Savageton soil is very slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on this unit is mainly rhizomatous wheatgrass, green needlegrass, blue grama, and Cusick bluegrass. As the range condition deteriorates, blue grama and big sagebrush increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. The suitability of this unit for rangeland seeding is fair. The main limitation for seeding is the hazard of water erosion during seedling establishment.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIe, nonirrigated. It is in the Clayey, 10- to 14-inch ppt., Northern Plains range site.

128—Worf-Shingle-Tassel complex, 3 to 30 percent slopes. This map unit is on ridges. Areas are 25 to 125 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 3,600 to 5,000 feet. The average annual precipitation is 10 to 14 inches, the average annual air temperature is 46 to 50 degrees F, and the average annual frost-free period is 110 to 130 days.

This unit is 30 percent Worf loam, 30 percent Shingle loam, and 20 percent Tassel fine sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cushman loam, Theedle loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Worf soil is shallow and well drained. It formed in medium textured calcareous residuum derived dominantly from sandstone. Typically, the surface layer is light brownish gray loam about 3 inches thick. The underlying material to a depth of 12 inches is pale brown loam. Shale is at a depth of 12 inches.

Permeability of the Worf soil is moderate. Available water capacity is low. Effective rooting depth is 10 to 20

inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is moderate.

The Shingle soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is pale brown loam about 6 inches thick. The underlying material to a depth of 17 inches is pale brown loam. Shale is at a depth of 17 inches.

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

The Tassel soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is grayish brown fine sandy loam about 3 inches thick. The underlying material to a depth of 15 inches is light brownish gray fine sandy loam. Sandstone is at a depth of 15 inches.

Permeability of the Tassel soil is moderately rapid. Available water capacity is low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of wind erosion is severe.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Worf and Shingle soils is mainly rhizomatous wheatgrass, needleandthread, blue grama, and threadleaf sedge. As the range condition deteriorates, threadleaf sedge and blue grama increase. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 450 pounds in unfavorable years. The potential plant community on the Tassel soil is mainly needleandthread, prairie sandreed, blue grama, and threadleaf sedge. As the range condition deteriorates, blue grama and threadleaf sedge increase. The potential plant community produces about 1,000 pounds of air-dry vegetation per acre in normal years. Production varies from 1,400 pounds in favorable years to 600 pounds in unfavorable years.

If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases; therefore, livestock grazing should be managed so that the desired balance of preferred species is maintained in the plant community. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. The suitability of this unit for rangeland seeding is poor.

This unit provides habitat for antelope, mule deer, coyote, fox, jackrabbit, sage grouse, and other birds and small animals. Sagebrush and forbs provide some food and cover for wildlife.

This map unit is in capability subclass VIIe, nonirrigated. The Worf and Shingle soils are in the Shallow Loamy, 10- to 14-inch ppt., Northern Plains range site. The Tassel soil is in the Shallow Sandy, 10- to 14-inch ppt., Northern Plains range site.

Prime Farmland

In this section, prime farmland is defined and discussed and the prime farmland soils in this survey area are listed.

Prime farmland is of major importance in providing the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, seed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. Adequate moisture and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal input of energy and other economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland.

Prime farmland soils commonly get an adequate and dependable supply of moisture from precipitation or irrigation. Temperature and length of growing season are favorable, and level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland soils if the limitations are overcome by drainage, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

There is presently no prime farmland in Weston County.

About 19,625 acres, or nearly 1.5 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The following map units would meet the soil requirements for prime farmland if irrigated. On some soils included in the list, measures have been used to overcome a hazard or limitation, such as flooding or wetness. The location of each map unit is shown on the detailed soil maps at the back of this publication. Soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

10 Chinook fine sandy loam, 2 to 10 percent slopes
28 Cordeston loam, 0 to 6 percent slopes
64 Nunnston clay loam, 0 to 6 percent slopes
81 Reicess loam, 0 to 6 percent slopes
82 Reicess-Wages Variant loams, 2 to 6 percent slopes
124 Vassett silt loam, 2 to 6 percent slopes

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The system of land capability classification used by the Soil Conservation Service is explained, and the estimated yields of the main crops and pasture plants are listed for each soil.

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

Most cropland in the survey area is dry-farmed, and winter wheat is the most common crop. Oats, barley, alfalfa hay, and grass hay are also grown. Summer fallow in alternate years is necessary to ensure a grain crop. Some small areas of the county are used for irrigated crops, mainly alfalfa hay. In 1980, 6,000 acres was used for winter wheat, 1,600 acres for barley, and 4,000 acres for oats. A total of 16,000 acres was used for hay.

Water erosion is the major conservation problem in the area. Application of a resource management system that includes such practices as terraces, contour stripcropping, grassed waterways, and stubble mulch tillage helps to overcome this problem.

Soil blowing is a concern on some soils. The risk of soil blowing can be reduced by using a resource management system that includes such practices as wind stripcropping, stubble mulch tillage, and windbreaks.

An adequate level of fertility can be maintained without addition of fertilizer when the soils are dry-farmed.

Compaction as a result of tillage is a concern on some of the soils. Avoiding tillage when the soils are wet helps to maintain soil tilth.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

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

residue, barnyard manure, and green-manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

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

Crops other than those shown in table 4 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

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

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined 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. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plant or that require moderate conservation practices.

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

Class IV soils have very severe limitations that reduce the choice of plants or that 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.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

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 very cold or very dry.

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

The capability classification of each map unit is given in the section "Detailed Soil Map Units."

The capability classification system is an interpretation. It depends on the probable interaction between the kind of soil and the alternative system of management. Management systems change because of changing economic conditions and growth in knowledge about use of the soils. From time to time, new criteria need to be applied in the system of capability classification. Therefore the capability classification of the soils of a survey area may differ somewhat from that of soils of an adjoining county surveyed at an earlier or later date.

Rangeland

Glen C. Mitchell, range conservationist, Soil Conservation Service, helped to prepare this section.

About 75 percent of the survey area is rangeland. More than 80 percent of the farm income is derived from livestock, principally cattle. Most ranches are cow-calf-yearling enterprises. The average size of ranches is 4,500 acres.

Most of the survey area is in the 10- to 14-inch ppt., Northern Plains, climatic zone. The northeastern corner is in the 15- to 19-inch ppt., Black Hills, climatic zone. The part in the 10- to 14-inch ppt. is well suited to cattle grazing. During most winters, snow cover is light and extended periods of supplemental feeding are not necessary. The 15- to 19-inch precipitation zone is at higher elevations, where the winter snow cover is heavy. This requires that 2 to 3 months of supplemental feed be provided for livestock.

In areas that have similar climate and topography, differences in the kind and amount of vegetation

produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

In the section "Detailed Soil Map Units,' each map unit description gives the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; and the characteristic vegetation.

A range site is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

In the southern and western parts of the survey area, most of the soils are loam and clay loam that are underlain by shale. These soils support short and mid grasses. In the northeastern corner of the area, the soils are shallow to moderately deep and are underlain by limestone. These soils support a mixture of tall, mid, and short grasses.

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

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

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

Range management practices that are important to maintain productivity are proper grazing use and planned grazing systems that include proper distribution, proper season of use, and deferred grazing. Practices such as watering facilities, fences, and proper salt placement are needed to obtain proper grazing use. Improvements such as brush management, range seeding, and range renovation are dependent on the soil and climate of a given site.

Woodland Management and Productivity

Richard C. Rintamaki, biologist, Soil Conservation Service, helped to prepare this section.

Woodland makes up about 25,000 acres of the survey area. Most of the woodland is in the northeastern quarter of the survey area, near Newcastle, Four Corners, and Upton. An area of woodland about 1,500 acres in size is in the southwestern corner of the survey area, near Rochelle. About 10 percent of the woodland is privately owned, and the rest is administered by the state and federal governments. Most of the harvested timber in the survey area is milled at a sawmill in Newcastle.

Ponderosa pine is the dominant tree species and has the greatest commercial value. Other tree species common to the area are bur oak, quaking aspen, plains cottonwood, willow, and Rocky Mountain juniper.

The potential of the soils for timber production is poor to very poor. Multiple-use objectives need to be considered for all woodland soils. The main uses for these soils are timber production, livestock grazing, woodland wildlife habitat, and recreation.

Table 5 can be used by woodland owners or forest managers in planning the use of the soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity. The first element in the ordination symbol is a number that denotes potential productivity in terms of cubic meters of wood per hectare per year for an indicator tree species. Potential productivity is based on site index. A mean annual increment of 1 cubic meter per hectare is equal to 14.3 cubic feet per acre. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *X* indicates stoniness or rockiness; *W*, excessive water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, high content of coarse fragments in the soil profile; and *R*, steep slopes. The letter *A* indicates that limitations or

restrictions are insignificant. If a soil has more than one limitation, the priority is as follows; X, W, T, D, C, S, F, and R.

In table 5, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Woodland Understory Vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some woodland, if well managed, can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Table 6 shows, for each soil suitable for woodland use, the potential for producing understory vegetation. The *total production* of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4.5 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, soil moisture is above average during the optimal part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average.

Table 6 also lists the common names of the *characteristic vegetation* on each soil and the percentage *composition*, by air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

Windbreaks and Environmental Plantings

Richard C. Rintamaki, biologist, Soil Conservation Service, helped to prepare this section.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Most of the southwestern two-thirds of Weston County is treeless. Trees grow naturally only on the flood plains along the streams. Windbreaks have been planted in the survey area since the time of settlement. Most of the early plantings were for farmstead and livestock

protection, and many farmsteads and ranch headquarters still need this kind of planting. In planting a windbreak, the purpose of the planting, the suitability of the soils, the adaptability of trees and shrubs to the site, and the location of the windbreak should be considered.

The establishment of a windbreak and the continued growth of the trees depend upon the careful selection of the site and of the trees and shrubs to be planted, adequate site preparation, and adequate maintenance of planted trees or seedlings. Grasses and weeds should be controlled before trees are planted, and regrowth of ground cover should be controlled during the life of the windbreak. Some replanting is generally needed after the first or second year. A supplemental watering system will ensure a higher rate of survival and promote vigorous growth.

A windbreak provides protection for a distance of about 10 times the height of the trees. Low-growing shrubs should be planted in the rows on the windward side, medium or tall shrubs in the next rows, and tall trees in the center, or in the leeward rows. For adequate protection in the winter, each windbreak should be made up of at least three rows. One of the rows should be Rocky Mountain juniper or redcedar. If the moisture supply is adequate, as in irrigated areas, Colorado blue spruce can be used advantageously. Evergreens live longer and provide more protection than broadleaf trees, but they are harder to establish and they grow more slowly. Among the deciduous trees suitable for use in windbreaks are Siberian elm, golden willow, green ash, Russian-olive, hackberry, cottonwood, honeylocust, and Siberian crabapple; among the coniferous trees are Ponderosa pine, Eastern redcedar, Rocky Mountain juniper, Scotch pine, Austrian pine, Black Hills spruce, and Colorado blue spruce; and among the shrubs are common lilac, caragana, skunkbush sumac, common chokecherry, American plum, Nanking cherry, and Tatarian honeysuckle.

The local office of the Soil Conservation Service can provided information for specific tree planting requirements on a particular soil.

Recreation

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey; for example, interpretations for dwellings without basements and for local roads and streets in table 9 and interpretations for septic tank absorption fields in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and

abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants. Additional information on planning wildlife habitat developments can be obtained from local offices of the Soil Conservation Service.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, wheatgrass, blue grama, prairie clover, pussytoes, and aster.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are ponderosa pine, Colorado blue spruce, and Rocky Mountain juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, bitterbrush, snowberry, and big sagebrush.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses and shrubs. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include meadowlark, field sparrow, cottontail, white-tailed deer, and red fox.

Habitat for woodland wildlife consists primarily of areas of coniferous plants intermingled with aspen, willow, and cottonwood as well as associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, flycatchers, woodpeckers, squirrels, porcupine, raccoon, white-tailed deer, and coyote.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include pronghorn antelope, white-tailed deer, mule deer, sage grouse, meadowlark, hawks, and golden eagle.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building Site Development, Sanitary Facilities, Construction Materials, and Water Management. The ratings are based on observed performance of the soils and on the estimated data and test data in the section "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage because of rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit

revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavation and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the taxonomic unit descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sandy and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

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

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

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

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

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

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

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 to 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under "Taxonomic Units and Their Morphology."

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

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials (*1*) and the Unified soil classification system (*2*).

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

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

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

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

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

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points)

across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under "Taxonomic Units and Their Morphology."

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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

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

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

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion.

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the amount of

stable aggregates 0.84 millimeters in size. These are represented idealistically by USDA textural classes. Soils containing rock fragments can occur in any group.

1. Sand, fine sand, and very fine sand. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish on them.
2. Loamy sand, loamy fine sand, and loamy very fine sand. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loam, coarse sandy loam, fine sandy loam, and very fine sandy loam. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
4. Clay, silty clay, clay loam, and silty clay loam that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. Loamy soils that are less than 18 percent clay and sandy clay loam and sandy clay that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. Loamy soils that are 18 to 35 percent clay, except silty clay loam. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loam that is less than 35 percent clay. These soils are very slightly erodible. Crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

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

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or

fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

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

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

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*4*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Aridisol.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplargids. (*Hapl*, meaning minimal horizonation, plus *Arg*, the suborder of the Aridisols that have an illuvial horizon).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplargids.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Haplargids.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Taxonomic Units and Their Morphology

In this section, each taxonomic unit recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each unit. A pedon, a small three-dimensional area of soil, that is typical of the unit in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*3*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*4*). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the taxonomic units.

The map units of each taxonomic unit are described in the section "Detailed Soil Map Units."

Absted Series

The Absted series consists of deep, well drained, slowly permeable soils on alluvial fans and valley sides. These soils formed in fine textured alluvial sediment derived from sedimentary rock. Slope is 0 to 6 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Haplustollic Natrargids.

Typical pedon of an Absted fine sandy loam in an area of Absted-Bone complex, 0 to 6 percent slopes, 15 miles west of Newcastle, near the center of sec. 28, T. 44 N., R. 63 W.

A—0 to 2 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common coarse and medium roots and few fine roots; neutral; clear smooth boundary.

E—2 to 6 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; common coarse and medium roots and few fine roots; mildly alkaline; abrupt smooth boundary.

Bt—6 to 14 inches; brown (10YR 5/3) clay, dark grayish brown (2.5Y 4/2) moist; moderate coarse columnar structure parting to strong fine and medium subangular blocky; extremely hard, very firm, very sticky and plastic; common coarse, medium, and fine roots; few thin clay films on faces of peds; slightly effervescent; moderately alkaline; clear wavy boundary.

Btnk—14 to 19 inches; light brownish gray (2.5Y 6/2) heavy clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and slightly plastic; few coarse and medium roots; slightly effervescent; strongly alkaline; clear wavy boundary.

Bnk—19 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and slightly plastic; few roots; strongly effervescent; disseminated calcium carbonate; very strongly alkaline.

Depth to calcareous material is 6 to 12 inches. Depth to zones of continuous calcium carbonate accumulation is 10 to 20 inches.

The A horizon is 2 to 7 inches thick. It is fine sandy loam, very fine sandy loam, or loam. It has hue of 10YR, 2.5Y, or 5Y.

The E horizon has hue of 5Y to 10YR. It is fine sandy loam, very fine sandy loam, or loam.

The Bt and Btnk horizons have hue of 2.5Y to 7.5YR, value of 5 to 7, and chroma of 2 to 4. They are clay or clay loam. The Btnk horizon is strongly alkaline or very strongly alkaline.

The Bnk horizon has hue of 5Y to 10YR. It is clay or clay loam. This horizon is moderately alkaline to very strongly alkaline.

Alice Variant

The Alice Variant consists of deep, well drained, moderately rapidly permeable soils on alluvial fans and stream terraces and in areas of valley fills. These soils formed in moderately coarse textured alluvial material derived from sedimentary rock. Slope is 2 to 10 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are coarse-loamy, mixed, mesic Aridic Haplustolls.

Typical pedon of Alice Variant fine sandy loam, 2 to 10 percent slopes, 15 miles west of Upton, in the NE1/4 SW1/4 of sec. 7, T. 47 N., R. 66 W.

A—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and nonplastic; common medium and fine roots; mildly alkaline; clear smooth boundary.

Bw—8 to 20 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate coarse angular blocky; slightly hard, very friable, slightly sticky and nonplastic; common medium and fine roots; mildly alkaline; clear smooth boundary.

Bk—20 to 60 inches; very pale brown (10YR 7/2) loamy very fine sand, pale brown (10YR 6/2) moist; massive; soft, very friable, nonsticky and nonplastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. Depth to calcium carbonate is 18 to 30 inches.

The A horizon has value of 4 to 6 when dry, and it has chroma of 2 or 3. It is mildly alkaline or moderately alkaline. It is fine sandy loam or sandy loam.

The Bw horizon has value of 6 or 7 when dry and 4 or 5 when moist, and it has chroma of 2 or 3. It is fine sandy loam or sandy loam.

The Bk horizon has value of 7 or 8 when dry, and it has chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Bahl Series

The Bahl series consists of deep, well drained, slowly permeable soils on flood plains and alluvial fan aprons. These soils formed in clayey alluvium derived primarily from clay shale. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents.

Typical pedon of a Bahl clay loam in an area of Savageton-Bahl clay loams, 2 to 10 percent slopes, 6 miles west of Newcastle, at the southeast corner of sec. 8, T. 45 N., R. 62 W.

A—0 to 6 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak angular blocky structure; very hard, very firm, very sticky and plastic; common fine and medium roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.

AC—6 to 12 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; weak angular blocky structure; very hard, very firm, very sticky and plastic; few fine and medium roots; violently effervescent; disseminated calcium carbonate; moderately alkaline; gradual wavy boundary.

C—12 to 60 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive; very hard, very firm, very sticky and plastic; few fine roots; violently effervescent; disseminated calcium carbonate; moderately alkaline.

The A horizon has hue of 10YR to 5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is clay loam or clay that is 30 to 45 percent clay. Reaction is neutral to moderately alkaline.

The AC horizon has the same ranges as allowed for the combined ranges of the A and C horizons. A Bw horizon is present in some pedons, but it does not meet the criteria for a cambic horizon.

The C horizon has hue of 10YR to 5Y, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

Bahl Variant

The Bahl Variant consists of deep, well drained, slowly permeable soils on flood plains and alluvial fans. These soils formed in clayey alluvium derived mainly from clay shale. Slope is 0 to 15 percent. The average annual precipitation is about 17 inches, and the average annual temperature is 43 degrees F.

These soils are fine, montmorillonitic (calcareous), frigid Ustertic Torriorthents.

Typical pedon of a Bahl Variant clay loam in an area of Colsavage-Bahl Variant clay loams, 2 to 10 percent slopes, 12 miles north of Osage, in the NE1/4NE1/4 of sec. 25, T. 48 N., R. 63 W.

Ap—0 to 8 inches; pale olive (5Y 6/3) clay loam, olive (5Y 5/3) moist; weak fine angular blocky structure; hard, firm, sticky and plastic; common fine and medium roots; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C—8 to 60 inches; olive (5Y 5/3) clay, olive (5Y 4/3) moist; massive; hard, firm, sticky and plastic; common fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The control section is clay or clay loam that is 35 to 55 percent clay.

The A horizon has hue of 10YR to 5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is clay or clay loam that is 30 to 45 percent clay. This horizon is neutral or mildly alkaline.

The C horizon has hue of 10YR to 5Y, and it has value of 5 to 7 when dry and 4 or 5 when moist. Texture is clay or clay loam that is 35 to 55 percent clay. This horizon is mildly alkaline to strongly alkaline.

Bidman Series

The Bidman series consist of deep, well drained, slowly permeable soils on alluvial fans, table lands, and valley sides. These soils formed in alluvium derived from sedimentary rock. Slope is 0 to 10 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Ustollic Paleargids.

Typical pedon of a Bidman loam in an area of Bidman-Ulm association, undulating, 35 miles southwest of Newcastle, in the SE1/4SE1/4 of sec. 36, T. 43 N., R. 66 W.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure; slightly hard, friable, slightly sticky and nonplastic; many fine and very fine roots; neutral; abrupt smooth boundary.

Bt—4 to 12 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; moderate medium columnar structure parting to moderate medium subangular blocky; common fine and very fine roots; many thick clay films on faces of peds; neutral; clear wavy boundary.

Btk—12 to 16 inches; pale brown (10YR 6/3) clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; common fine and very fine roots; few thin clay films on faces of peds; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk—16 to 20 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Bk2—20 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse angular blocky structure parting to massive; hard, very firm, sticky and plastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Depth to calcareous material is 8 to 20 inches.

The A horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. It typically has a platy structure but is granular in some pedons. Reaction is neutral or mildly alkaline.

An E horizon is present in some pedons.

The Bt horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is clay or clay loam. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. It is clay loam or loam. Reaction is moderately alkaline or strongly alkaline.

Bone Series

The Bone series consists of deep, well drained, very slowly permeable soils on alluvial fans. These soils formed in clayey alluvial sediment derived from saline shale. Slope is 0 to 6 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic (calcareous), mesic Ustic Torriorthents.

Typical pedon of a Bone loam in an area of Absted-Bone complex, 0 to 6 percent slopes, 50 miles southwest of Newcastle, in the SE1/4NW1/4 of sec. 11, T. 41 N., R. 68 W.

A—0 to 1 inch; light gray (10YR 7/2) loam, light brownish gray (10YR 6/2) moist; medium thin platy structure; hard, friable, slightly sticky and slightly plastic; few roots; mildly alkaline; abrupt smooth boundary.

Btn—1 to 4 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse columnar structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few roots; distinct clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bky—4 to 60 inches; pale yellow (10YR 7/4) clay loam, light olive brown (10YR 5/4) moist; massive; hard, firm, sticky and plastic; strongly effervescent; large irregularly shaped soft masses of calcium carbonate; very strongly alkaline.

The noncalcareous part of the solum and depth to the base of the Bt horizon are 2 to 5 inches.

The A horizon has hue of 10YR to 5Y, value of 6 to 8 when dry and 4 to 6 when moist, and chroma of 2 or 3. Reaction is neutral to moderately alkaline.

The E horizon, where present, has properties similar to those of the A horizon.

The Btn horizon has hue of 10YR to 5Y, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is clay loam or clay that is 35 to 50 percent. Reaction is moderately alkaline to very strongly alkaline.

The Bky horizon has hue of 10YR to 5Y, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 4 to 8.

Bowbac Series

The Bowbac series consists of moderately deep, well drained, moderately permeable soils on fan aprons and hillslopes. These soils formed in coarse textured residuum and slopewash alluvium derived from interbedded sandstone and shale. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of a Bowbac sandy loam in an area of Hiland-Bowbac complex, 0 to 10 percent slopes, 10 miles west of Upton, in the NE1/4SE1/4 of sec. 5I, T. 47 N., R. 66 W.

A—0 to 7 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium platy structure parting to moderate fine granular; slightly hard, friable, nonsticky and nonplastic; many fine and very fine roots; neutral; clear smooth boundary.

Bt—7 to 14 inches; pale brown (10YR 6/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; hard, firm, sticky and plastic; common fine and very fine roots; common moderately thick clay films on faces of peds; neutral; clear smooth boundary.

Btk—14 to 18 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; common thin clay films on faces of peds; strongly effervescent; many medium soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk—18 to 33 inches; very pale brown (10YR 7/3) sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

Cr—33 inches; soft calcareous sandstone.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is sandy loam or fine sandy loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2

to 4. Texture is sandy clay loam; it is more than 35 percent sand that is fine or coarser and is 20 to 35 percent clay. Reaction is neutral to moderately alkaline.

The Bk horizon has hue of 2.5Y to 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 6. Texture is sandy loam or sandy clay loam. Reaction is moderately alkaline or strongly alkaline.

Cadoma Series

The Cadoma Series consists of moderately deep, well drained, very slowly permeable soils on uplands. These soils formed in moderately deep, very strongly alkaline, calcareous residuum derived from sodic shale. Slope is 2 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Ustollic Camborthids.

Typical pedon of Cadoma silty clay loam, 2 to 10 percent slopes, 8 miles south of Newcastle, in the NW1/4SW1/4 of sec. 28, T. 44 N., R. 61 W.

A—0 to 3 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak medium platy structure; soft, very friable, sticky and nonplastic; few fine roots; neutral; abrupt smooth boundary.

Bn—3 to 11 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; strongly effervescent; strongly alkaline; gradual wavy boundary.

Bnky—11 to 28 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; strongly effervescent; moderate accumulation of secondary salts; very strongly alkaline; abrupt wavy boundary.

Cr—28 inches; calcareous strongly alkaline shale.

Depth to bedrock is 20 to 40 inches. Depth to calcareous material is 0 to 4 inches. The solum is 10 to 28 inches thick. Content of exchangeable sodium in the Bn and Bnky horizons is 15 to 25 percent.

The A horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is silty clay loam, clay, or clay loam. Reaction is neutral to very strongly alkaline.

The Bn horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 5. It is silty clay loam or clay. Reaction is strongly alkaline or very strongly alkaline.

The Bnky horizon has hue of 5Y to 10YR, value of 6 or 7 when dry and 4 to 6 when moist, and chroma of 2 or 3. Reaction is strongly alkaline or very strongly alkaline.

Cambria Series

The Cambria series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in calcareous alluvium derived from sedimentary rock. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of a Cambria loam in an area of Forkwood-Cambria-Cushman loams, 0 to 12 percent slopes, 50 miles west of Newcastle, near the center of sec. 27, T. 44 N., R. 67 W.

A1—0 to 4 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; neutral; clear wavy boundary.

Bt—4 to 10 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common moderately thick clay films on faces of peds; neutral; clear wavy boundary.

Bk1—10 to 12 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent; fine threads of calcium carbonate; mildly alkaline; clear smooth boundary.

Bk2—12 to 60 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few roots; strongly effervescent; medium irregularly shaped soft masses of calcium carbonate; moderately alkaline.

Depth to the base of the Bt horizon is 10 inches or less. Depth to calcium carbonate is 3 to 10 inches.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is loam or sandy loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is loam or clay loam. Reaction is neutral to moderately alkaline.

The Bk horizon has hue of 10YR or 2.5Y, value of 6 to 8 when dry and 4 to 6 when moist, and chroma of 2 to 4. Reaction is mildly alkaline to strongly alkaline.

Chinook Series

The Chinook series consists of deep, well drained, moderately rapidly permeable soils on alluvial fans,

terraces, hillslopes, and valley sides. These soils formed in moderately coarse textured alluvium derived from sedimentary rock. Slope is 1 to 15 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are coarse-loamy, mixed Aridic Haploborolls.

Typical pedon of Chinook fine sandy loam, 2 to 10 percent slopes, 10 miles northeast of Osage, in the NE1/4NE1/4 of sec. 25, T. 47 N., R. 63 W.

A—0 to 10 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and nonplastic; many medium and fine roots; mildly alkaline; clear smooth boundary.

Bt—10 to 20 inches; pale brown (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common medium and fine roots; few thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

Bk—20 to 60 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few roots; slightly effervescent; few soft masses; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. Depth to calcium carbonate is 18 to 30 inches.

The A horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. It is fine sandy loam or very fine sandy loam. Reaction is neutral or mildly alkaline.

The B horizon has value of 6 or 7 when dry and 4 or 5 when moist, and it has chroma of 2 or 3. Texture is fine sandy loam or sandy loam. Reaction is mildly alkaline or moderately alkaline.

Citadel Series

The Citadel series consists of deep, well drained, moderately slowly permeable soils on foothills and mountain slopes. These soils formed in residuum derived from calcareous sandstone, calcium limestone, and shale. Slope is 3 to 40 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine, montmorillonitic Typic Eutroboralfs.

Typical pedon of a Citadel loam in an area of Citadel-McCaffery complex, 3 to 10 percent slopes, 25 miles north of Newcastle, 0.5 mile east of the northwest corner of sec. 31, T. 48 N., R. 60 W.

O—3 to 2 inches; undecomposed forest litter.

Oe—2 inches to 0; partially decomposed organic matter.

E—0 to 5 inches; pinkish gray (7.5YR 7/2) loam, brown (7.5YR 4/2) moist; weak fine angular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine roots; neutral; abrupt wavy boundary.

B/E—5 to 10 inches; reddish brown (5YR 5/3) loam, reddish brown (5YR 4/4) moist; and pinkish gray (7.5YR 7/2) sandy coatings on faces of peds; moderate medium and fine angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; few thin clay films on faces of peds; neutral; abrupt wavy boundary.

Bt—10 to 26 inches; reddish brown (5YR 5/3) clay, reddish brown (5YR 4/4) moist; moderate medium angular blocky structure; very hard, very firm, very sticky and very plastic; many fine roots; many thick clay films on faces of peds; neutral; clear wavy boundary.

Bk—26 to 60 inches; red (2.5YR 4/8) clay, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few roots; 15 percent coarse fragments of limestone; strongly effervescent; disseminated calcium carbonate; mildly alkaline.

These soils are coarse fragment content of limestone or sandstone is as much as 25 percent in the control section and 50 percent in the Bk horizon. Depth to free calcium carbonate is 13 to 35 inches.

The E horizon has hue of 10YR to 5YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is loam, very fine sandy loam, or silt loam. Reaction is neutral or slightly acid.

The B/E horizon, where present, has the same color as do the E and Bt horizons.

The Bt horizon has hue of 7.5YR to 2.5YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 3 to 5. Texture is clay or clay loam. Reaction is neutral or mildly alkaline.

Clarkelen Series

The Clarkelen series consists of deep, well drained, moderately rapidly permeable soils on flood plains and terraces. These soils formed in stratified alluvium derived from mixed sources. Slope is 0 to 4 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents.

Typical pedon of a Clarkelen sandy loam in an area of Haverdad-Clarkelen complex, 0 to 4 percent slopes, along the Cheyenne River at the northwest corner of sec. 8, T. 41 N., R. 65 W.

A—0 to 5 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist;

moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many medium roots; mildly alkaline; abrupt smooth boundary.

C—5 to 60 inches; light brownish gray (10YR 6/2) sandy loam stratified with lenses of loamy sand and fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable; few fine and medium roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The profile commonly is calcareous throughout, but in some pedons the upper few inches is leached. Content of coarse fragments ranges from 0 to 15 percent but commonly is less than 5 percent. The profile is nonsaline to saline.

The A horizon has hue of 10YR or 2.5Y, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 or 3. Texture is sandy loam or fine sandy loam but is loamy sand to clay loam depending on the source of the most recent deposition. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 4 to 6 when moist, and chroma of 2 or 3. Reaction is mildly alkaline to strongly alkaline.

Clarkelen Variant

The Clarkelen Variant consists of deep, somewhat poorly drained, moderately rapidly permeable soils on flood plains and terraces. These soils are saline and calcareous. They formed in stratified loamy and sandy alluvium. Slope is 0 to 4 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents.

Typical pedon of a Clarkelen Variant sandy loam in an area of Haverdad-Clarkelen Variant complex, saline, 0 to 4 percent slopes, 8 miles southeast of Osage, in the SW1/4NE1/4 of sec. 6, T. 45 N., R. 62 W.

A—0 to 5 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure; slightly hard, very friable; common fine and very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

C—5 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam stratified with thin layers of very fine sandy loam, silt loam, and loamy sand, dark grayish brown (2.5Y 4/2) moist; massive; loose; few very fine roots; strongly effervescent; disseminated calcium carbonate; saline; strongly alkaline.

Depth to free calcium carbonate is 0 to 5 inches.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. It is sandy loam or fine sandy loam.

The C horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is fine sandy loam or sandy loam stratified with very fine sand, silt loam, and loamy sand. Reaction is moderately alkaline or strongly alkaline.

Colhill Series

The Colhill series consists of deep, excessively drained, moderately rapidly permeable soils on valley sides, terraces, and mesas. These soils formed in gravelly alluvium of mixed origin. Slope is 2 to 40 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Ustic Torriorthents.

Typical pedon of a Colhill gravelly loam in an area of Rothican-Colhill complex, 2 to 10 percent slopes, 5 miles east of Newcastle, at the SE1/4SE1/4 of sec. 19, T. 45 N., R. 60 W.

A—0 to 6 inches; light brownish gray (10YR 6/2) gravelly loam, grayish brown (10YR 4/2) moist; soft, very friable, nonsticky and nonplastic; common fine roots; 20 percent gravel; slightly effervescent; mildly alkaline; clear smooth boundary.

C—6 to 60 inches; light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; 40 percent gravel and 10 percent stones; strongly effervescent; common irregularly shaped seams of calcium carbonate; moderately alkaline.

Calcium carbonate content of the profile is 3 to 10 percent. The control section is 30 to 50 percent gravel and 10 to 15 percent stones.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is gravelly loam or very gravelly loam. Reaction is neutral or mildly alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

Colnevee Series

The Colnevee series consists of deep, well drained, moderately permeable soils on terraces, fans, and hillslopes. These soils formed in silty alluvium derived from reddish silty shale or sandstone. Slope is 2 to 20 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are coarse-silty, mixed (calcareous), frigid Ustic Torriorthents.

Typical pedon of Colnevee silt loam, 6 to 15 percent slopes, 4 miles west of Four Corners, at the southwest corner of sec. 9, T. 47 N., R. 61 W.

Ap—0 to 5 inches; reddish brown (5YR 5/4) silt loam, dark reddish brown (5YR 3/4) moist; weak fine angular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
Bw—5 to 8 inches; yellowish red (5YR 4/6) silt loam, dark reddish brown (5YR 3/4) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine roots; strongly effervescent; segregated soft masses of calcium carbonate; moderately alkaline; gradual smooth boundary.
Bk—8 to 48 inches; light red (2.5YR 6/6) silt loam, red (2.5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine roots; violently effervescent; segregated soft masses of calcium carbonate; moderately alkaline; gradual wavy boundary.
C—48 to 60 inches; reddish yellow (5YR 6/6) silt loam, red (5YR 4/6) moist; massive; 20 percent rock structure; hard, firm, slightly sticky and nonplastic; violently effervescent; disseminated calcium carbonate; moderately alkaline.

The A horizon has hue of 5YR to 10YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. Texture is silt loam or loam. Reaction is neutral to moderately alkaline.

The Bw horizon has hue of 2.5YR to 7.5YR, value of 3 to 5 when dry and 3 or 4 when moist, and chroma of 4 to 6. Texture is silt loam or loam. Reaction is mildly alkaline or moderately alkaline.

The Bk horizon has hue of 2.5YR to 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 3 to 6. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 2.5YR to 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 4 to 6. Reaction is moderately alkaline or strongly alkaline.

Colnevee Variant

The Colnevee Variant consists of moderately deep, well drained, moderately permeable soils on uplands, foot slopes, terraces, and fans. These soils formed in silty alluvium derived from reddish silty shale, siltstone, or sandstone. Slope is 1 to 30 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are coarse-silty, mixed (calcareous), frigid Ustic Torriorthents.

Typical pedon of Colnevee Variant silt loam, 2 to 10 percent slopes, 15 miles northwest of Four Corners, in the NE1/4SW1/4 of sec. 8, T. 48 N., R. 61 W.

A—0 to 5 inches; reddish brown (7.5YR 5/4) silt loam, dark reddish brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, friable, sticky and plastic; many roots; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.
AC—5 to 14 inches; light reddish yellow (5YR 6/6) silt loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; gradual smooth boundary.
C1—14 to 31 inches; light red (2.5YR 6/6) silt loam, red (2.5YR 4/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.
Cr—31 inches; red siltstone.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 5YR to 10YR, value of 4 to 6 when dry and 3 or 4 when moist, or dry and chroma of 2 to 4. Texture is silt loam or loam. Reaction is neutral to moderately alkaline.

The AC horizon, where present, has hue of 2.5YR to 7.5YR, value of 4 to 6 when moist or dry, and chroma of 4 to 6. Texture is silt loam or loam. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 2.5YR to 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 3 to 6. Reaction is mildly alkaline or moderately alkaline.

Colombo Variant

The Colombo Variant consists of deep, well drained, moderately permeable soils on flood plains and terraces. These soils formed in stratified alluvium derived from sedimentary rock. Slope is 0 to 2 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed, mesic Torrifluventic Haplustolls.

Typical pedon of Colombo Variant loam, 0 to 2 percent slopes, 12 miles west of Upton, in the SW1/4SW1/4 of sec. 7, T. 47 N., R. 66 W.

A—0 to 8 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and nonplastic; many fine roots; neutral; clear smooth boundary.
C—8 to 60 inches; light brownish gray (10YR 6/2) loam stratified with lenses of clay loam and sandy loam, dark grayish brown (10YR 4/2) moist; very weak subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine roots; slightly effervescent; moderately alkaline.

The profile commonly is calcareous throughout, but in some pedons it is leached in the upper few inches. The mollic epipedon is 7 to 10 inches thick.

The A horizon has hue of 2.5Y to 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The C horizon has hue of 2.5Y to 7.5YR. Reaction is moderately alkaline or strongly alkaline.

Colsavage Series

The Colsavage series consists of moderately deep, well drained, slowly permeable soils on hillslopes. These soils formed in calcareous residuum derived from shale. Slope is 2 to 30 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine, montmorillonitic (calcareous), frigid Ustic Torriorthents.

Typical pedon of a Colsavage clay loam, moist, in an area of Colsavage-Bahl Variant clay loams, 2 to 10 percent slopes, 14 miles northwest of Four Corners, in the SW1/4NE1/4 of sec. 7, T. 48 N., R. 66 W.

A—0 to 5 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, firm, sticky and plastic; many very fine roots; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

Bw—5 to 10 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; common roots; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C—10 to 30 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.

Cr—30 inches; soft calcareous shale.

Depth to bedrock is 20 to 40 inches. The profile commonly is calcareous at the surface, but in some pedons it is leached in the upper few inches.

The A horizon and the Bw horizon, where present, have hue of 5Y to 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 1 to 3. Texture is clay loam or clay that is 35 to 50 percent clay. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 5Y to 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is clay or clay loam that is 35 to 55 percent clay. Reaction is moderately alkaline or strongly alkaline.

Cordeston Series

The Cordeston series consists of deep, well drained, moderately permeable soils on alluvial fans. These soils formed in alluvium derived from sandstone or siltstone. Slope is 0 to 10 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine-loamy, mixed Cumulic Haploborolls.

Typical pedon of Cordeston loam, 0 to 6 percent slopes, near Buckhorn, in the SE1/4SE1/4 of sec. 8, T. 48 N., R. 60 W.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; mildly alkaline; clear smooth boundary.

A2—4 to 10 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; mildly alkaline; clear smooth boundary.

Bw—10 to 40 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; moderately alkaline; clear smooth boundary.

C—40 to 60 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; slightly effervescent; moderately alkaline.

The mollic epipedon is 30 to 50 inches thick. Depth to calcium carbonate is 40 to 60 inches. Coarse fragment content is 0 to 10 percent.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 1 or 2. It is loam, fine sandy loam, or silt loam. Reaction is neutral or mildly alkaline.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 1 or 2. Texture is loam, very fine sandy loam, or silt loam. Reaction is neutral to moderately alkaline.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is neutral to moderately alkaline.

Corpening Series

The Corpening series consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in residuum and colluvium derived from limestone. Slope is 2 to 30 percent. The average annual

precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy, mixed Lithic Haploborolls.

Typical pedon of a Corpening channery loam in an area of Corpening-Rock outcrop complex, 2 to 30 percent slopes, 2 miles north of Four Corners, in the NE1/4SE1/4 of sec. 25, T. 48 N., R. 61 W.

A—0 to 6 inches; brown (10YR 5/3) channery loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many roots; 20 percent coarse fragments; mildly alkaline; clear smooth boundary.

Bk—6 to 16 inches; brown (10YR 5/3) channery loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure parting to weak fine granular; slightly hard, friable, sticky and plastic; 15 percent semirounded limestone pebbles and 10 percent limestone channery fragments; common roots; strongly effervescent; seams and soft masses of calcium carbonate; moderately alkaline; abrupt wavy boundary.

R—16 inches; hard fractured limestone with cracks 6 to 12 inches apart.

Depth to bedrock is 10 to 20 inches. The profile is calcareous to the surface in places. The mollic epipedon is 4 to 10 inches thick.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture is channery loam or loam. Reaction is mildly alkaline or moderately alkaline.

The Bk horizon has hue of 10YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Reaction is moderately alkaline or strongly alkaline.

Crownest Series

The Crownest series consists of shallow, well drained, moderately rapidly permeable soils on uplands, including mountain foothills. These soils formed in loamy residuum derived from noncalcareous sandstone. Slope is 2 to 60 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy, mixed, nonacid, frigid Lithic Ustic Torriorthents.

Typical pedon of a Crownest channery sandy loam in an area of Crownest-Regnaps complex, 2 to 10 percent slopes, 13 miles north of Newcastle, in the NW1/4NW1/4 of sec. 9, T. 46 N., R. 62 W.

A—0 to 4 inches; grayish brown (10YR 5/2) channery sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; 20 percent channery fragments; neutral; clear smooth boundary.

C—4 to 12 inches; grayish brown (10YR 5/2) channery sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few roots; 20 percent channery fragments; neutral; clear wavy boundary.

R—12 inches; hard noncalcareous sandstone.

Depth to bedrock is 10 to 20 inches. Coarse fragments range in size from channery fragments to massive slabs 2 feet in diameter.

The A horizon has hue of 2.5Y or 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 to 7 when dry and 3 to 5 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

Cushman Series

The Cushman series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in calcareous loamy slopewash alluvium or residuum derived from weakly consolidated beds of sandstone or shale. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Cushman loam, 2 to 10 percent slopes, 10 miles northwest of Newcastle, 0.25 mile east of the center of sec. 4, T. 46 N., R. 62 W.

A—0 to 2 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; mildly alkaline; clear smooth boundary.

Bt—2 to 8 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common fine roots; common thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btk—8 to 12 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; strongly effervescent; fine threads of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk—12 to 34 inches; light brownish gray (2.5Y 7/2) loam, grayish brown (2.5Y 6/2) moist; massive; slightly hard, friable, sticky and plastic; few fine roots; violently effervescent; fine irregularly shaped soft masses of calcium carbonate; moderately alkaline, abrupt wavy boundary.

Cr—34 inches; gray shale.

The noncalcareous part of the solum is 6 to 10 inches thick. Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. Texture is loam, fine sandy loam, or very fine sandy loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

The Btk horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3. Texture is loam or clay loam. Reaction is mildly alkaline or moderately alkaline.

The Bk horizon has value of 6 or 7 when dry, and it has chroma of 2 to 4.

Demar Series

The Demar series consists of deep, moderately well drained, very slowly permeable soils on alluvial fan aprons. These soils formed in clayey alluvium derived from acid clay shale. Slope is 0 to 3 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Ustollic Paleargids.

Typical pedon of a Demar loam in an area of Topeman-Demar complex, 0 to 3 percent slopes, about 5 miles northwest of Osage, in the NW1/4NW1/4 of sec. 36, T. 47 N., R. 63 W.

E—0 to 6 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak thin platy structure; slightly hard, friable, sticky and plastic; common fine roots; neutral; abrupt wavy boundary.

Bt1—6 to 10 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse columnar structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and plastic; few fine roots; medium acid; clear smooth boundary.

Bt2—10 to 13 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky and plastic; few fine roots; medium acid; clear smooth boundary.

By1—13 to 20 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few fine roots; strongly acid; clear smooth boundary.

By2—20 to 50 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and nonplastic; few fine roots; 30 percent soft shale fragments and gypsum crystals that break down on pretreatment; very strongly acid; clear smooth boundary.

Cr—50 inches; dark gray strongly acid shale.

Depth to bedrock is 40 to 50 inches.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is loam or clay loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Clay content is 35 to 60 percent. Reaction is neutral to medium acid.

The By horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Reaction is strongly acid or very strongly acid.

Dwyer Series

The Dwyer series consists of deep, excessively drained, rapidly permeable soils on uplands. These soils formed in eolian material derived from mixed sources. Slope is 2 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are mixed, mesic Ustic Torripsamments.

Typical pedon of Dwyer fine sand, 3 to 15 percent slopes, along the Cheyenne River, in the NW1/4NW1/4 of sec. 25, T. 41 N., R. 67 W.

A—0 to 5 inches; pale brown (10YR 6/3) fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky; few fine roots; slightly effervescent; few soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

C—5 to 60 inches; very pale brown (10YR 7/3) fine sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky; few fine roots; strongly effervescent; few soft masses and seams of calcium carbonate; moderately alkaline.

The profile commonly is calcareous throughout, but in some pedons it is leached in the upper part. The control section is fine sand, loamy sand, or loamy fine sand. It is 0 to 15 percent coarse fragments.

The A horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 2.5Y to 7.5YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

Forkwood Series

The Forkwood series consists of deep, well drained, moderately permeable, gently sloping to rolling soils on terraces, toe slopes, and alluvial fans. These soils formed in alluvium derived from sedimentary rock. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of a Forkwood loam in an area of Forkwood-Cambria-Cushman loams, 0 to 12 percent slopes, 50 miles west of Newcastle, near the center of sec. 27, T. 44 N., R. 67 W.

A—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; clear smooth boundary.

Bt—4 to 18 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium angular blocky; hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common moderately thick clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btk—18 to 20 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate fine angular blocky; hard, firm, slightly sticky and nonplastic; few fine and medium roots; few thin clay films on faces of peds; slightly effervescent; few soft masses of calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bk—20 to 60 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and nonplastic; few fine roots; strongly effervescent; medium irregularly shaped soft masses of calcium carbonate; moderately alkaline.

Depth to calcareous material is 10 to 20 inches.

The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. It is loam, fine sandy loam, or very fine sandy loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 2.5Y to 7.5YR, value of 4 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is clay loam or loam that is 18 to 30 percent clay. Reaction is neutral to moderately alkaline.

The Bk horizon has hue of 5Y to 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. Texture is loam or light clay loam. Reaction is moderately alkaline or strongly alkaline.

Grummit Series

The Grummit series consist of shallow, well drained, moderately permeable soils on uplands. These soils formed in clayey residuum derived from acid shale. Slope is 2 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are clayey, montmorillonitic, acid, mesic, shallow Ustic Torriorthents.

Typical pedon of a Grummit clay loam in an area of Grummit-Snomo complex, 2 to 10 percent slopes, 5 miles east of Upton, in the SW1/4SW1/4 of sec. 17, R. 64 W., T. 47 N.

A—0 to 4 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine, medium, and coarse roots; 20 percent soft shale fragments; strongly acid; abrupt wavy boundary.

C—4 to 15 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, slightly sticky and nonplastic; common fine, medium, and coarse roots; 70 percent soft shale fragments; strongly acid; abrupt wavy boundary.

Cr—15 inches; brittle platy shale.

Depth to shale is 10 to 20 inches. The control section is 20 to 70 percent shale fragments that are brittle when dry but break down on pretreatment.

The fissile shale of the Cr horizon is very hard and brittle and does disperse in water or in sodium hexametaphosphate solution pretreatment.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 1 or 2. Reaction is medium acid or strongly acid.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 1 or 2. This horizon is 20 to 70 percent shale fragments that break down on pretreatment. Reaction is medium acid or strongly acid.

Gypnevee Variant

The Gypnevee Variant consists of deep, well drained, moderately permeable soils on uplands. These soils formed in residuum derived from gyprock. Slope is 2 to 60 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are coarse-silty, gypsic, frigid Ustic Torriorthents.

Typical pedon of a Gypnevee Variant silt loam in an area of Rekop Variant-Gypnevee Variant-Rock outcrop complex, 2 to 10 percent slopes, 6 miles east of Newcastle, in the SW1/4NW1/4 of sec. 16, T. 44 N., R. 60 W.

A—0 to 6 inches; reddish gray (5YR 5/2) silt loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; soft, very friable, slightly sticky and nonplastic; common fine and medium roots; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

AC—6 to 12 inches; reddish brown (5YR 5/4) silt loam, yellowish red (5YR 4/6) moist; massive; soft, very friable, slightly sticky and nonplastic; common fine and medium roots; violently effervescent; disseminated calcium carbonate; moderately alkaline; abrupt wavy boundary.
C1—12 to 17 inches; pinkish gray (5YR 7/2) silt loam, light reddish brown (5YR 6/4) moist; massive; soft, very friable, slightly sticky and nonplastic; few fine roots; violently effervescent; 60 percent gypsum and calcium carbonate, mainly disseminated throughout the mass; mildly alkaline; clear wavy boundary.
C2—17 to 25 inches; pink (5YR 7/4) silt loam, yellowish red (5YR 5/6) moist; massive; soft, very friable, slightly sticky and nonplastic; few fine roots; violently effervescent; 60 percent gypsum and calcium carbonate, mainly disseminated throughout the mass; mildly alkaline; clear wavy boundary.
C3—25 to 45 inches; yellowish red (5YR 5/6) silt loam, yellowish red (5YR 4/6) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; violently effervescent; 60 percent gypsum and calcium carbonate disseminated throughout the mass; mildly alkaline; abrupt wavy boundary.
Cr—45 inches; reddish brown gyprock.

Depth to bedrock is 40 to 60 inches. The control section is silt loam or very fine sandy loam. Content of gypsum and calcium carbonate is 40 to 60 percent.

The A horizon has hue of 10YR to 5YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 to 6. It is neutral to moderately alkaline.

The C horizon has hue of 7.5YR to 2.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 6. Reaction is mildly alkaline or moderately alkaline.

Haverdad Series

The Haverdad series consists of deep, well drained or moderately well drained, moderately permeable soils on flood plains and terraces of lowlands. These soils formed in alluvium derived from mixed sources. Slope is 0 to 6 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents.

Typical pedon of a Haverdad loam in an area of Haverdad-Clarkelen complex, 0 to 4 percent slopes, along the Cheyenne River, in the NE1/4NW1/4 of sec. 5, T. 41 N., R. 65 W.

A—0 to 9 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many coarse, medium, and fine roots; mildly alkaline; abrupt smooth boundary.
C—9 to 60 inches; light brownish gray (10YR 6/2) loam stratified with lenses of silty clay loam and fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common coarse and medium roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The profile commonly is calcareous throughout, but in some pedons the upper few inches is leached. Some pedons have small amounts of secondary calcium carbonate. Coarse fragment content is 0 to 15 percent.

The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 5. Texture is variable, but it averages loam or light clay loam that is 20 to 35 percent clay. Thin strata of very fine sandy loam, fine sandy loam, sandy loam, and silty clay loam commonly are present. Reaction is moderately alkaline or strongly alkaline.

Higgins Variant

The Higgins Variant consists of deep, very poorly drained, moderately permeable soils on flood plains. These soils formed in stratified silty alluvium containing gypsum. Slope is 0 to 2 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are coarse-silty, gypsic, mesic Typic Haplaquepts.

Typical pedon of a Higgins Variant silt loam in an area of Higgins Variant silt loam, 0 to 2 percent slopes, 5 miles east of Newcastle, in the SW1/4NW1/4 of sec. 12, T. 44 N., R. 61 W.

A—0 to 3 inches; pinkish gray (7.5YR 6/2) silt loam, brown (7.5YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few fine roots; violently effervescent; common soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.
Bky—3 to 30 inches; pinkish white (7.5YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; few fine faint white (10YR 8/2) mottles; weak coarse and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine roots; many fine gypsum crystals; violently effervescent; common fine soft masses of calcium carbonate; 16 percent calcium carbonate; moderately alkaline; clear smooth boundary.
C—30 to 60 inches; pinkish gray (7.5YR 7/2) silt loam, brown (7.5YR 5/4) moist; few faint reddish yellow (7.5YR 6/6) mottles; massive; soft, very friable, nonsticky and nonplastic; few roots; violently

effervescent; disseminated gypsum and calcium carbonate; moderately alkaline.

The percentage of calcium carbonate and gypsum is 40 to 60 percent in the Bky and C horizons. Mottles are faint to distinct and small to large. Texture of the control section is silt or silt loam.

The A horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 to 6 when moist and 5 to 7 when dry, and chroma of 1 or 2. Texture is silt loam or loam. Reaction is mildly alkaline or moderately alkaline.

The Bky horizon has hue of 5YR, 7.5YR, 10YR, or 2.5Y, value of 6 to 8 when dry and 5 to 7 when moist, and chroma of 1 or 2. Texture is silt, silt loam, or loam.

The C horizon has hue of 5YR, 7.5YR, 10YR, or 2.5Y, value of 5 to 7 when dry or moist, and chroma of 2 to 4. Texture is silt or silt loam. Reaction is neutral to moderately alkaline.

Hiland Series

The Hiland series consists of deep, well drained, moderately permeable, nearly level to moderately sloping or rolling soils on uplands. These soils formed in moderately coarse textured sediment derived from interbedded sandstone and shale. Slope is 0 to 10 percent. The average annual precipitation is about 13 inches, and the average annual temperature is about 48 degrees F.

These soils are fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of a Hiland fine sandy loam in an area of Hiland-Bowbac complex, 0 to 10 percent slopes, 10 miles west of Upton, in the NE1/4NE1/4 of sec. 5, T. 47 N., R. 66 W.

A—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; neutral; clear smooth boundary.

Bt—5 to 20 inches; light brownish gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to strong medium and fine angular blocky; hard, firm, sticky and plastic; common fine roots; many moderately thick clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btk—20 to 28 inches; light gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) moist; weak medium angular blocky structure; slightly hard, friable, nonsticky and nonplastic; few roots; few thin clay films on faces of peds; strongly effervescent; common fine and medium soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk—28 to 60 inches; light gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few roots; violently effervescent; common fine soft masses of calcium carbonate; moderately alkaline.

Depth to calcium carbonate is 10 to 24 inches.

The A horizon has hue of 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is fine sandy loam or sandy loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 2.5Y to 7.5YR, value of 4 to 7 when dry and 3 to 5 moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

The Btk horizon has properties similar to those of the Bt horizon. Reaction is moderately alkaline or strongly alkaline.

The Bk horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 to 7 when moist, and chroma of 2 to 4. Texture is sandy loam, loamy sand, or fine sandy loam. Reaction is moderately alkaline or strongly alkaline.

Hilight Series

The Hilight series consists of shallow, well drained, slowly permeable soils on uplands. These soils formed in residuum derived from noncalcareous shale. Slope is 3 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are clayey, montmorillonitic, nonacid, mesic, shallow Ustic Torriorthents.

Typical pedon of Hilight clay loam, 3 to 30 percent slopes, 9 miles northeast of Upton, in the NW1/4SW1/4 of sec. 2, T. 48 N., R. 64 W.

A1—0 to 4 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; neutral; clear smooth boundary.

C—4 to 16 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; 60 percent rock structure; very hard, firm, sticky and plastic; few fine roots; neutral; abrupt wavy boundary.

Cr—16 inches; dark colored platy shale.

Depth to bedrock is 10 to 20 inches. The control section is clay or clay loam.

The A horizon has hue of 2.5Y to 7.5YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 1 to 4. Reaction is slightly acid or moderately alkaline.

The C horizon has hue of 2.5Y to 7.5YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 1 to 4. Reaction is slightly acid or moderately alkaline.

Keeline Series

The Keeline series consists of deep, somewhat excessively drained, rapidly permeable soils on alluvial fans. These soils formed in alluvial sediment derived from sandstone. Slope is 2 to 10 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of a Keeline sandy loam in an area of Keeline-Turnercrest sandy loams, 2 to 10 percent slopes, 7 miles northwest of Dewey, South Dakota, in the NW1/4NW1/4 of sec. 16, T. 42 N., R. 60 W.

A—0 to 4 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

AC—4 to 11 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—11 to 60 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The profile commonly is calcareous at the surface, but in some pedons the upper 1 to 2 inches is leached. Coarse fragment content is 0 to 15 percent.

The A horizon has hue of 7.5YR to 2.5Y, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is sandy loam or fine sandy loam. Reaction is neutral or mildly alkaline.

The C horizon has hue of 7.5YR to 5Y, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. Texture is sandy loam or fine sandy loam.

Kishona Series

The Kishona series consists of deep, well drained and moderately well drained, moderately permeable soils on alluvial fans and upland slopes. These soils formed in sediment derived from a variety of sedimentary rock. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of Kishona loam, 0 to 6 percent slopes, 5 miles east of Newcastle, in the NW1/4NW1/4 of sec. 13, T. 44 N., R. 61 W.

Ap—0 to 7 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; moderately effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bw—7 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common fine and very fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C—11 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine and very fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The control section is loam or light clay loam that is 18 to 35 percent clay. It is nonsaline to saline.

The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is loam or clay loam. Reaction is mildly alkaline or moderately alkaline.

The Bw and C horizons have hue of 5Y to 10YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is loam or clay loam. Reaction is moderately alkaline or strongly alkaline.

Lakoa Series

The Lakoa series consists of deep, well drained, moderately permeable soils on foothills and mountain slopes. These soils formed in residuum derived from interbedded sandstone and shale. Slope is 3 to 60 percent. The average annual precipitation is about 17 inches. The average annual air temperature is about 43 degrees F.

These soils are fine-loamy, mixed Typic Eutroboralfs.

Typical pedon of a Lakoa loam in an area of Lakoa-Crownest complex, 10 to 60 percent slopes, 8 miles northeast of Osage, in the SW1/4NE1/4 of sec. 20, T. 47 N., R. 62 W.

O—1 inch to 0; decomposing forest litter.

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; 5 percent channery fragments; neutral; abrupt smooth boundary.

E—3 to 11 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; 5 percent channery fragments; neutral; clear smooth boundary.

B/E—11 to 14 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; many patches and coats of light brownish gray (10YR 6/2) fine sandy loam; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and medium roots; 5 percent channery fragments; common thin clay films on faces of peds; mildly alkaline; gradual wavy boundary.

Bt1—14 to 28 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to strong medium and fine subangular blocky; hard, firm, sticky and plastic; common fine and medium roots; many moderately thick clay films on faces of peds; mildly alkaline; clear smooth boundary.

Bt2—28 to 32 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; many thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bk—32 to 60 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; 15 percent channery fragments; violently effervescent; soft masses of calcium carbonate; moderately alkaline.

Depth to calcium carbonate is 30 to 50 inches. Coarse fragment content of the Bk horizon is 5 to 20 percent.

The A horizon has value of 4 or 5 when dry and 3 or 4 when moist, and it has chroma of 1 to 3. Reaction is slightly acid or neutral.

The E horizon has hue of 7.5YR or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3.

The Bt horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 6. Texture is clay loam or sandy clay loam. Reaction is mildly alkaline or moderately alkaline.

The Bk horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

Lohmiller Series

The Lohmiller series consists of deep, well drained or moderately well drained, slowly permeable soils on flood plains and terraces. These soils formed in calcareous alluvium derived from sedimentary rock. Slope is 0 to 4 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic (calcareous), mesic Ustic Torrifluvents.

Typical pedon of Lohmiller Haverdad complex, 1 to 4 percent slopes, 15 miles southwest of Newcastle, in the NE1/4SE1/4 of sec. 13. T. 44 N., R. 63 W.

A1—0 to 6 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; hard, firm, sticky and plastic; many fine, medium, and coarse roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

C—6 to 60 inches; grayish brown (10YR 5/2) clay loam stratified with loam and clay, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; few fine and medium roots; slightly effervescent; mildly alkaline.

The profile is nonsaline to saline. The control section is 35 to 45 percent clay.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is clay loam or silty clay loam. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Lohsman Series

The Lohsman series consists of moderately deep, well drained, slowly permeable soils on uplands. These soils formed in slopewash alluvium or residuum derived from sodic shale. Slope is 0 to 10 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Haplustollic Natrargids.

Typical pedon of Lohsman loam, 2 to 10 percent slopes, 22 miles southwest of Newcastle, in the NW1/4NE1/4 of sec. 2, T. 42 N., R. 63 W.

E—0 to 3 inches; light grayish brown (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; mildly alkaline, abrupt wavy boundary.

Bt—3 to 9 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium columnar structure parting to moderate medium angular blocky; hard, firm, sticky and plastic; many fine roots; common moderately thick clay films on faces of peds; slightly effervescent; mildly alkaline; clear wavy boundary.

Btnk—9 to 22 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to weak angular blocky; hard, firm, sticky and plastic; few fine roots; strongly effervescent; common fine filaments and threads of calcium carbonate; strongly alkaline; gradual wavy boundary.
Bk—22 to 38 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, very friable; strongly effervescent; common soft masses of calcium carbonate; strongly alkaline; gradual wavy boundary.
Cr—38 inches; calcareous strongly alkaline shale.

Depth to bedrock is 20 to 40 inches. Depth to calcareous material is 3 to 15 inches.

The E horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The Bt and Btnk horizons have hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is clay or heavy clay loam that is 35 to 50 percent clay. Reaction is mildly alkaline to strongly alkaline.

The Bk horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Reaction is strongly alkaline or very strongly alkaline.

Maggin Series

The Maggin series consists of moderately deep, well drained, moderately rapidly permeable soils on uplands. These soils formed in residuum derived from acid shale. Slope is 2 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Aridic Haplustolls.

Typical pedon of a Maggin clay loam in an area of Grummit-Maggin association, rolling, 3 miles east of Upton, in the SW1/4SW1/4 of sec. 7, T. 47 N., R. 64 W.

A1—0 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, sticky and plastic; many fine and medium roots; strongly acid; clear wavy boundary.
C—7 to 29 inches; pale brown (10YR 5/2) clay, dark brown (10YR 3/2) moist; massive; slightly hard, very friable, sticky and plastic; common fine and medium roots; 40 percent shale chips; strongly acid; abrupt wavy boundary.
Cr—29 inches; unweathered fractured acid shale with sulphur between some plates.

Depth to bedrock is 20 to 40 inches. The control section is 60 to 70 percent clay. Shale fragment content is 35 to 70 percent of the soil mass. The fragments break down on pretreatment.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 1 or 2. Texture is clay loam or clay. Reaction is medium acid or strongly acid.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 5 when dry and 2 to 4 when moist, and chroma of 1 or 2. Reaction is medium acid or strongly acid.

McCaffery Series

The McCaffery series consists of deep, excessively drained, rapidly permeable soils on foothills and mountains. These soils formed in residuum derived from sandstone. Slope is 2 to 30 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are mixed, frigid Alfic Ustipsamments.

Typical pedon of a McCaffery loamy sand in an area of Citadel-McCaffery complex, 10 to 30 percent slopes, 25 miles north of Newcastle, in the NW1/4NE1/4 of sec. 18, T. 48 N., R. 60 W.

O—3 inches to 1 inch; mulch of forest litter.
Oe—1 inch to 0; partially decomposed organic matter.
E1—0 to 10 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few medium roots; slightly acid; clear wavy boundary.
E2—10 to 30 inches; light gray (10YR 7/2) loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; common fine roots; slightly acid; clear wavy boundary.
E/B—30 to 60 inches; pinkish gray (7.5YR 7/2) loamy sand, light brown (7.5YR 6/4) moist; massive; soft, nonsticky and nonplastic; few reddish yellow (7.5YR 6/8) sandy loam bands that are 0.5 to 1.5 inches thick and occur in a wavy pattern; few fine roots; neutral; clear wavy boundary.
R—60 inches; soft yellowish red sandstone.

Depth to the E/B horizon is 20 to 40 inches. Lamellae are discontinuous. Coarse fragment content is 0 to 10 percent.

The E horizon has hue of 2.5Y to 7.5YR, value of 6 to 8 when dry and 4 to 6 when moist, and chroma of 2 to 4.

The E/B horizon has value of 6 or 7 when moist or dry, and it has chroma of 2 to 4. Reaction is neutral or slightly acid.

Nilrap Series

The Nilrap series consists of deep, well drained, moderately slowly permeable soils on alluvial fans and high terraces. These soils formed in stratified alluvium

derived from mixed sources. Slope is 0 to 10 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine, montmorillonitic Aridic Argiborolls.

Typical pedon of Nilrap loam, 0 to 6 percent slopes, 3 miles east of Four Corners, 5 miles south of the northeast corner of sec. 8, T. 47 N., R. 60 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark brown (10YR 2/2) moist; moderate medium and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; neutral; abrupt smooth boundary.

Bw—8 to 15 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; hard, friable, sticky and plastic; many fine roots; neutral; clear wavy boundary.

Bt1—15 to 32 inches; brown (7.5YR 5/2) clay loam, dark brown (7.5YR 4/2) moist; moderate fine angular blocky structure; hard, firm, sticky and plastic; common fine roots; thin continuous clay films on faces of peds; mildly alkaline; clear wavy boundary.

Bt2—32 to 37 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 5/4) moist; weak coarse angular blocky structure; very hard, firm, sticky and plastic; few fine roots; few thin clay films on faces of peds; mildly alkaline; clear wavy boundary.

Bk—37 to 60 inches; pink (7.5YR 7/4) very gravelly loam, light brown (7.5YR 6/4) moist; massive; hard, firm, sticky and plastic; few fine roots; 35 percent gravel; strongly effervescent; seams and soft masses of calcium carbonate; moderately alkaline.

The mollic epipedon is 7 to 16 inches thick. Depth to calcium carbonate is 20 to 37 inches. The argillic horizon is more than 20 inches thick. The Bk horizon is 35 to 50 percent gravel.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture is loam or silt loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 7.5YR or 5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is clay or clay loam that is 35 to 50 percent clay. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 7.5YR or 5YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 3 or 4. Reaction is mildly alkaline or moderately alkaline.

Norkool Series

The Norkool series consists of deep, well drained, moderately permeable soils on fan aprons and foothills. These soils formed in thick, calcareous alluvial material derived from siltstone. Slope is 2 to 10 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine-silty, mixed Aridic Argiborolls.

Typical pedon of Norkool loam, 2 to 10 percent slopes, 15 miles northwest of Newcastle, in the NE1/4SW1/4 of sec. 27, T. 47 N., R. 62 W.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many fine and medium roots; neutral; abrupt smooth boundary.

Bt1—4 to 12 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and slightly plastic; common fine and medium roots; common thin clay films on faces of peds; neutral; clear wavy boundary.

Bt2—12 to 14 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, slightly sticky and nonplastic; common fine and medium roots; many moderately thick clay films on faces of peds; neutral; abrupt smooth boundary.

Btk—14 to 21 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; few thin clay films; strongly effervescent; thin seams calcium carbonate; mildly alkaline; clear wavy boundary.

Bk—21 to 60 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; violently effervescent; segregated calcium carbonate; strongly alkaline.

Depth to calcium carbonate is 11 to 21 inches. The mollic epipedon is 10 to 16 inches thick.

The A horizon has value of 4 or 5 when dry and 3 or 4 when moist, and it has chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 or 3. Texture is silty clay loam or silt loam that is 20 to 35 percent clay. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. Reaction is moderately alkaline or strongly alkaline.

Nunnston Series

The Nunnston series consists of deep, well drained, slowly permeable soils on terraces and fan aprons. These soils formed in sediment derived from

sedimentary rock. Slope is 0 to 15 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine, montmorillonitic Aridic Argiborolls.

Typical pedon of a Nunnston clay loam in an area of Nunnston-Tanna Variant clay loams, 3 to 10 percent slopes, 15 miles northwest of Four Corners, 850 feet east and 520 feet north of the northwest quarter corner of sec. 7, T. 48 N., R. 62 W.

A—0 to 8 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium angular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; neutral; clear smooth boundary.

Bt—8 to 16 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, firm, sticky and plastic; common fine roots; many thick clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btk—16 to 20 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; moderate medium angular blocky structure; very hard, firm, sticky and plastic; common fine roots; common thin clay films on faces of peds; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—20 to 60 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; few fine roots; strongly effervescent; common irregularly shaped soft masses of calcium carbonate; moderately alkaline.

The mollic epipedon is 7 to 15 inches thick. Depth to calcium carbonate is 15 to 30 inches.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is clay or clay loam that is 35 to 45 percent clay. Reaction is mildly alkaline to strongly alkaline.

The Bk horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 4 to 6 when moist, and chroma of 2 or 3. Reaction is moderately alkaline or strongly alkaline.

Onita Variant

The Onita Variant consists of deep, well drained, slowly permeable soils on alluvial fans and valley sides. These soils formed in alluvium. Slope is 0 to 10 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine, montmorillonitic Pachic Argiborolls.

Typical pedon of Onita Variant loam, 0 to 3 percent slopes, about 12 miles northwest of Four Corners, in the SE1/4SE1/4 of sec. 5, T. 48 N., R. 62 W.

A1—0 to 12 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many roots; neutral; clear smooth boundary.

A2—12 to 22 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and fine subangular blocky structure; slightly hard, friable, sticky and plastic; many roots; neutral; clear smooth boundary.

Bt—22 to 38 inches; brown (7.5YR 5/3) silty clay loam, dark brown (7.5YR 4/3) moist; moderate coarse prismatic structure parting to strong medium and fine angular blocky; hard, firm, sticky and plastic; many roots; thick continuous clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bk—38 to 60 inches; pale brown (7.5YR 6/3) silt loam, brown (7.5YR 5/3) moist; massive; hard, firm, sticky; few roots; strongly effervescent; common fine masses, threads, and seams of secondary calcium carbonate; moderately alkaline.

Depth to calcareous material is 30 to 48 inches. The mollic epipedon is 20 to 40 inches thick.

The A horizon has value of 3 or 4 when dry and 2 or 3 when moist, and it has chroma of 1 or 2. Texture is loam or silt loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 3 to 5 when dry and 2 to 4 when moist, and chroma of 1 to 3. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

Orella Series

The Orella series consists of shallow, well drained, very slowly permeable soils on uplands. These soils formed in residuum derived from sodic shale. Slope is 2 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are clayey, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of an Orella silty clay loam in an area of Orella-Samday-Rock outcrop complex, 3 to 30 percent slopes, 8 miles south of Newcastle, in the NW1/4SW1/4 of sec. 28, T. 44 N., R. 61 W.

A—0 to 2 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak fine angular blocky structure; slightly hard, firm, sticky and

plastic; few fine roots; violently effervescent; few soft masses and seams of calcium carbonate; moderately alkaline; clear smooth boundary.
AC—2 to 6 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak coarse angular blocky structure; slightly hard, firm, sticky and plastic; few fine roots; violently effervescent; soft masses and seams of calcium carbonate; very strongly alkaline; clear smooth boundary.
C2—6 to 12 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; violently effervescent; common fine filaments of calcium carbonate; very strongly alkaline; abrupt wavy boundary.
Cr—12 inches; fractured alkaline shale.

Depth to bedrock is 10 to 20 inches. Exchangeable sodium content is 8 to 30 percent. Depth to free calcium carbonate is 0 to 15 inches.

The A horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

The AC horizon has the combined range of the A and C horizons.

The C horizon has hue of 7.5YR to 2.5Y, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3. Texture is silty clay or clay.

Parmleed Series

The Parmleed series consists of moderately deep, well drained, slowly permeable soils on upland slopes, ridges, and table lands. The soils formed in calcareous sediment derived from shale. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Ustollic Paleargids.

Typical pedon of a Parmleed loam in an area of Parmleed-Bidman loams, 2 to 10 percent slopes, 5 miles east of Osage, in the SW1/4SW1/4 of sec. 7, T. 46 N., R. 62 W.

A—0 to 5 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; common fine roots; neutral; abrupt smooth boundary.
Bt—5 to 14 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 5/2) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and plastic; common fine roots; mildly alkaline; clear smooth boundary.
Btk—14 to 24 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.
Bk—24 to 28 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few roots; violently effervescent; disseminated calcium carbonate; moderately alkaline.
Cr—28 inches; soft calcareous shale.

Depth to calcareous material is 10 to 20 inches. Depth to paralithic contact is 20 to 40 inches.

The A horizon has hue of 2.5Y or 10YR, value of 4 to 7 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is loam, clay loam, or sandy loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 5Y to 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is clay, clay loam, or silty clay. Clay content is 35 to 50 percent. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 5Y to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is mildly alkaline to strongly alkaline.

Paunsaugunt Series

The Paunsaugunt series consists of shallow, well drained, moderately permeable soils on mountain slopes. These soils formed in residuum derived from limestone or calcareous sandstone. Slope is 6 to 60 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy-skeletal, mixed Lithic Haploborolls.

Typical pedon of a Paunsaugunt loam in an area of Pesowyo-Paunsaugunt complex, 6 to 10 percent slopes, 5 miles north of Four Corners, in the SW1/4SE1/4 of sec. 18, T. 48 N., R. 61 W.

O—0.5 inch to 0; decomposing forest litter.
A—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky and nonplastic; common fine and coarse roots; 15 percent gravel and channery fragments; mildly alkaline; clear smooth boundary.
C1—6 to 16 inches; light brownish gray (10YR 6/2) very channery loam, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine and coarse roots; 50 percent gravel and channery fragments; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt wavy boundary.
Cr—16 inches; hard fractured limestone.

The mollic epipedon is 5 to 12 inches thick. It makes up more than a third of the soil above bedrock. Depth to bedrock is 10 to 20 inches. The control section is 35 to 50 percent coarse fragments.

The A horizon has value of 4 or 5 when dry, and it has chroma of 2 or 3. Texture is loam or channery loam. Reaction is neutral or mildly alkaline.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Pesowyo Series

The Pesowyo series consists of moderately deep, well drained, moderately slowly permeable soils on mountain slopes. These soils formed in residuum derived mainly from limestone or calcareous sandstone. Slope is 6 to 60 percent. The average annual precipitation is about 16 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Typical pedon of a Pesowyo channery clay loam in an area of Pesowyo-Paunsaugunt complex, 6 to 10 percent slopes, 5 miles north of Four Corners, in the SW1/4SE1/4 of sec. 18, T. 48 N., R. 61 W.

Oi—1 inch to 0; decomposing forest litter.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) channery clay loam, black (10YR 2/1) moist; moderate medium granular structure; soft, friable, slightly sticky and nonplastic; common fine and coarse roots; 20 percent channery fragments; moderately alkaline; clear smooth boundary.

Bw—5 to 14 inches; dark grayish brown (10YR 4/2) very channery clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; common fine and coarse roots; 35 percent gravel and channery fragments; slightly effervescent in lower part; few fine soft masses of calcium carbonate; mildly alkaline; clear smooth boundary.

Bk—14 to 24 inches; light yellowish brown (10YR 6/4) very channery clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, firm, sticky and plastic; few fine and coarse roots; 50 percent gravel and channery fragments; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt wavy boundary.

R—24 inches; hard fractured limestone.

Depth to bedrock is 20 to 40 inches. The control section is 35 to 60 percent coarse fragments.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 1 or 2. Texture is channery clay loam or clay loam. Reaction is neutral to moderately alkaline.

The Bw horizon has hue of 10YR or 2.5Y, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

The Bk horizon has hue of 10YR or 2.5Y, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is mildly alkaline to strongly alkaline.

Petrie Series

The Petrie series consists of deep, well drained, very slowly permeable soils on alluvial fans and toe slopes. These soils formed in calcareous alkaline sediment derived mainly from sedimentary rock. Slope is 0 to 6 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents.

Typical pedon of Petrie clay loam, 0 to 3 percent slopes, 7 miles south of Newcastle, in the SE1/4SW1/4 of sec. 28, T. 44 N., R. 61 W.

A—0 to 4 inches; light brownish gray (10YR 7/2) clay loam, dark grayish brown (10YR 4/2) moist; weak fine angular blocky structure; hard, firm, sticky and plastic; few fine roots; strongly effervescent; strongly alkaline; clear smooth boundary.

Bk1—4 to 12 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate fine angular blocky structure; hard, firm, sticky and plastic; few fine roots; violently effervescent; very strongly alkaline; clear smooth boundary.

Bk2—12 to 60 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few roots; violently effervescent; fine irregularly shaped soft masses of calcium carbonate; very strongly alkaline.

Conductivity is 1 to 3 millimhos per centimeter. Exchangeable sodium content is 15 to 30 percent throughout the control section.

The A horizon has hue of 2.5Y to 7.5YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 or 3.

The Bk horizon has hue of 2.5Y or 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Texture is clay loam or clay. Reaction is strongly alkaline or very strongly alkaline.

Recluse Series

The Recluse series consists of deep, well drained, moderately permeable soils on alluvial fans. These soils formed in loamy alluvium derived from sedimentary rock. Slope is 0 to 10 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed, mesic Aridic Argiustolls.

Typical pedon of Recluse loam, 0 to 6 percent slopes, 16 miles southwest of Upton, in the SW1/4NW1/4 of sec. 9, T. 47 N., R. 66 W.

A—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many coarse, medium, and fine roots; neutral; clear smooth boundary.

Bt—8 to 16 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; hard, firm, sticky and plastic; common fine roots; common moderately thick clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btk—16 to 20 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium angular blocky structure; hard, firm, very sticky and plastic; few fine roots; few thin clay films on faces of peds; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—20 to 40 inches; light gray (10YR 7/2) clay loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, sticky and plastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C—40 to 60 inches; light gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few roots; strongly effervescent; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. Depth to free calcium carbonate is 16 to 25 inches.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The Bk horizon has value of 6 or 7 when dry and 5 or 6 when moist, and it has chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Regnaps Series

The Regnaps series consists of moderately deep, well drained, moderately permeable soils on mountain foothills. These soils formed in slopewash alluvium or residuum derived from fine grained sandstone. Slope is 2 to 20 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine-loamy, mixed Borollic Haplargids.

Typical pedon of a Regnaps loam in an area of Crownest-Regnaps complex, 2 to 10 percent slopes, 5 miles east of Osage, in the NW1/4NW1/4 of sec. 4, T. 46 N., R. 62 W.

A—0 to 4 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; neutral; clear smooth boundary.

Bt1—4 to 9 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine roots; neutral; clear smooth boundary.

Bt2—9 to 16 inches; brown (10YR 5/3) clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse prismatic structure parting to strong medium angular blocky; hard, firm, sticky and plastic; few fine roots; common thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

Cl—16 to 21 inches; pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine roots; mildly alkaline; abrupt wavy boundary.

Cr—21 inches; hard, noncalcareous, argillaceous sandstone.

Depth to bedrock is 20 to 40 inches. Depth to the base of the Bt horizon is 14 to 26 inches.

The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is clay loam or sandy clay loam that is 27 to 35 percent clay. Reaction is neutral or mildly alkaline.

The C horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is neutral or mildly alkaline.

The Regnaps soil in map unit 84 is taxadjunct to the Regnaps series because it has accumulations of calcium carbonate in the lower part of the profile. This difference, however, does not significantly affect the use and management of the soil.

Reicess Series

The Reicess series consists of deep, well drained, moderately permeable soils on alluvial fans and terraces. These soils formed in loamy alluvium derived from sedimentary rock. Slope is 0 to 10 percent. The average annual precipitation is 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine-loamy, mixed Aridic Argiborolls.

Typical pedon of Reicess loam, 0 to 6 percent slopes, 20 miles northwest of Newcastle, in the SE1/4NW1/4 of sec. 14, T. 47 N., R. 63 W.

A—0 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; neutral; abrupt smooth boundary.

Bt1—10 to 24 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; hard, firm, sticky and plastic; many fine roots; thin continuous clay films; neutral; clear wavy boundary.

Bt2—24 to 30 inches; light brownish gray (2.5Y 6/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few medium roots; few thin clay films; mildly alkaline; clear wavy boundary.

Bk—30 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The mollic epipedon is 8 to 20 inches thick. Depth to free calcium carbonate is 15 to 36 inches.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is clay loam or sandy clay loam that is 27 to 35 percent clay. Reaction is neutral or mildly alkaline.

The Bk horizon has value of 6 or 7 when dry and 5 or 6 when moist, and it has chroma of 2 or 3. Lime is disseminated or segregated in seams. Reaction is mildly alkaline or moderately alkaline.

Rekop Variant

The Rekop Variant consists of shallow, somewhat excessively drained, moderately permeable soils on uplands. These soils formed in a thin layer of highly calcareous and gypsiferous material derived from reddish gypsiferous siltstone. Slope is 2 to 60 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy, gypsic, shallow Borollic Camborthids.

Typical pedon of a Rekop Variant loam in an area of Rekop Variant-Gypnevee Variant-Rock outcrop complex, 10 to 60 percent slopes, 8 miles southeast of Four Corners, in the NW1/4SW1/4 of sec. 5, T. 47 N., R. 60 W.

A—0 to 5 inches; light reddish brown (5YR 6/3) loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bky—5 to 14 inches; light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; violently effervescent; 40 percent gypsum and calcium carbonate disseminated throughout the soil mass; moderately alkaline; abrupt wavy boundary.

Cr—14 inches; soft gypsiferous siltstone.

Depth to bedrock is 10 to 20 inches. The control section is loam or silt loam.

The A horizon has hue of 10YR to 5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

The Bky horizon has hue of 7.5YR to 2.5YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 3 or 4. Reaction is mildly alkaline or moderately alkaline.

Renohill Series

The Renohill series consists of moderately deep, well drained, slowly permeable soils on uplands and fan aprons. These soils formed in residuum and slopewash alluvium derived from shale. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Ustollic Haplargids.

Typical pedon of a Renohill clay loam in an area of Renohill-Savageton clay loams, 2 to 10 percent slopes, 15 miles south of Moorcroft, near the center of sec. 3, T. 48 N., R. 67 W.

A—0 to 4 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; mildly alkaline; clear smooth boundary.

Bt—4 to 8 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and medium roots; common moderately thick clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btk—8 to 12 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; strongly effervescent; soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk—12 to 34 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; strongly effervescent; soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.
Cr—34 inches; soft gray shale.

Depth to bedrock is 20 to 40 inches. Depth to calcareous material is 6 to 20 inches.

The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is clay loam or loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 2.5Y or 10YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 2 to 5. Texture is clay loam or clay. Reaction is neutral to moderately alkaline.

The Bk horizon has hue of 2.5Y or 10YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is clay loam or clay. Reaction is moderately alkaline or strongly alkaline.

Rothican Series

The Rothican series consists of deep, well drained, moderately permeable soils on upland terraces and fans. These soils formed in gravelly alluvium of mixed origin. Slope is 2 to 40 percent. The average annual precipitation is about 16 inches, and the average annual temperature is about 46 degrees F.

These soils are fine-loamy, mixed Aridic Calciborolls.

Typical pedon of a Rothican loam in an area of Rothican-Colhill complex, 2 to 10 percent slopes, 6 miles northeast of Newcastle, in the SE1/4SE1/4 of sec. 19, T. 5 N., R. 60 W.

A—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.
Bt—8 to 16 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few thin clay films on faces of peds; 20 percent coarse fragments from a variety of sources; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
Bk—16 to 60 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; some coarse fragments are coated with calcium carbonate; 30 percent coarse fragments; strongly effervescent; common fine and medium soft masses of calcium carbonate; moderately alkaline.

Thickness of the mollic epipedon is 7 to 12 inches. Depth to a continuous horizon of secondary calcium carbonate accumulation is 16 to 24 inches. The solum is gravelly loam or loam that is 18 to 27 percent clay. This horizon is 15 to 35 percent gravel. Gravel content below a depth of 40 inches is 30 to 60 percent.

The A horizon has hue of 5YR to 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture is loam or gravelly loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 5YR to 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

The Bk horizon has hue of 7.5YR or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. Texture is gravelly loam or very gravelly loam below a depth of 40 inches.

Samday Series

The Samday series consists of shallow, well drained, slowly permeable soils on uplands. These soils formed in residuum derived from calcareous shale. Slope is 2 to 45 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are clayey, montmorillonitic (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of a Samday clay in an area of Samday-Savageton complex, hilly, 9 miles northwest of Upton, in the SE1/4SE1/4 of sec. 8, T. 48 N., R. 66 W.

A—0 to 4 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; common fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.
C—4 to 16 inches; olive gray (5Y 5/3) clay, olive gray (5Y 4/2) moist; massive; few fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.
Cr—16 inches; platy shale.

Depth to bedrock is 10 to 20 inches. The control section contains 45 to 60 percent clay.

The A horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Reaction is neutral to moderately alkaline.

The C horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Texture is clay or clay loam. Reaction is mildly alkaline to strongly alkaline.

Samoist Series

The Samoist series consists of shallow, well drained, very slowly permeable soils on uplands. These soils

formed in residuum derived from calcareous clay shale. Slope is 2 to 30 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents.

Typical pedon of a Samoist clay loam in an area of Samoist-Colsavage clay loams, hilly, 13 miles northwest of Four Corners, in the NW1/4NW1/4 of sec. 7, T. 48 N., R. 62 W.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; hard, firm, sticky and plastic; common fine roots; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Bw—2 to 5 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse angular blocky structure; hard, firm, sticky and plastic; common fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C—5 to 12 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; gradual wavy boundary.

Cr—12 inches; light brownish gray clay shale.

Depth to bedrock is 10 to 20 inches. The control section is clay or clay loam.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 or 3. Texture is clay loam or clay that is 35 to 45 percent clay. Reaction is mildly alkaline to strongly alkaline.

The Bw horizon, where present, has properties similar to those of the A horizon.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 when dry or moist, and chroma of 2 or 3. Texture is clay or clay loam. Reaction is moderately alkaline or strongly alkaline.

Savageton Series

The Savageton series consists of moderately deep, well drained, very slowly permeable soils on uplands and fan aprons. These soils formed in calcareous sediment derived from shale. Slope is 2 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Ustollic Camborthids.

Typical pedon of a Savageton clay loam in an area of Savageton-Bahl clay loams, 2 to 10 percent slopes, 8 miles northwest of Upton, in the SW1/4SW1/4 of sec. 10, T. 48 N., R. 66 W.

A—0 to 5 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; common fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bw—5 to 20 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; common fine roots; strongly effervescent; strongly alkaline; clear smooth boundary.

Bk—20 to 29 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; very hard, firm, sticky and plastic; few fine roots; strongly effervescent; common medium irregularly shaped soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

Cr—29 inches; platy calcareous shale.

Depth to bedrock is 20 to 40 inches. The profile commonly is calcareous at the surface, but in some pedons the upper few inches is leached.

The A horizon has hue of 2.5Y or 10YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Reaction is neutral to moderately alkaline.

The Bw horizon has hue of 2.5Y or 10YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

The Bk horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

Shingle Series

The Shingle series consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in residuum derived from soft interbedded sandstone and shale. Slope is 2 to 60 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of a Shingle loam in an area of Shingle-Theedle loams, 6 to 30 percent slopes, 19 miles south of Newcastle, in the SW1/4NE1/4 of sec. 30, T. 42 N., R. 61 W.

A—0 to 6 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.

C—6 to 17 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and

slightly plastic; common fine roots; violently effervescent; disseminated calcium carbonate; moderately alkaline; abrupt wavy boundary.
Cr—17 inches; soft calcareous sandstone.

Depth to bedrock is 10 to 20 inches. The control section is loam or clay loam that is 18 to 35 percent clay.

The A horizon has hue of 5Y to 7.5YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 1 to 6. Texture is loam or light clay loam. Reaction is mildly alkaline to strongly alkaline.

The C horizon has hue of 5Y to 7.5YR, value of 4 to 7 when dry and 3 to 6 when moist, and chroma of 2 to 4. Texture is loam or clay loam. Reaction is moderately alkaline or strongly alkaline.

Shingle Variant

The Shingle Variant consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in residuum derived from sandstone and shale. Slope is 2 to 30 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents.

Typical pedon of a Shingle Variant loam in an area of Shingle Variant-Theedle Variant loams, 6 to 30 percent slopes, 10 miles northwest of Four Corners, in the SW1/4NW1/4 of sec. 3, T. 48 N., R. 62 W.

A1—0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; mildly alkaline; clear smooth boundary.
A2—2 to 5 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
C—5 to 16 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.
Cr—16 inches; soft fine grained calcareous sandstone.

Depth to bedrock is 10 to 20 inches. The control section is loam or clay loam that is 18 to 35 percent clay.

The A horizon has hue of 5Y to 7.5YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 1 to 6. Texture is loam or clay loam. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 5Y to 7.5YR, value of 4 to 7 when dry and 3 to 6 when moist, and chroma of 1 to 6. Texture is loam or clay loam. Reaction is moderately alkaline or strongly alkaline.

Snomo Series

The Snomo series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in slopewash alluvium derived from acid shale. Slope is 2 to 20 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are very fine, montmorillonitic, mesic Ustollic Camborthids.

Typical pedon of a Snomo silty clay loam in an area of Grummit-Snomo complex, 2 to 10 percent slopes, 5 miles east of Upton, in the SW1/4NE1/4 of sec. 7, T. 47 N., R. 64 W.

O—0.5 inch to 0; decomposing forest litter.
A—0 to 4 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to moderate fine granular; slightly hard, firm, sticky and slightly plastic; few fine and very fine roots; strongly acid; abrupt smooth boundary.
Bw—4 to 9 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, firm, sticky and plastic; few coarse roots; 15 percent shale chips; few thin clay films on faces of peds; strongly acid; clear smooth boundary.
BC—9 to 28 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, firm, sticky and plastic; few coarse roots; 20 percent shale chips; strongly acid; gradual smooth boundary.
Cl—28 to 44 inches; dark grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; massive; soft, firm, sticky and plastic; few coarse roots; 25 percent shale chips; strongly acid; gradual wavy boundary.
Cr—44 inches; dark gray acid shale.

Depth to bedrock is 40 to 60 inches. Content of shale chips that break down on pretreatment is 15 to 50 percent.

The A horizon has value of 5 to 7 when dry and 3 or 4 when moist, and it has chroma of 1 or 2. Texture is silty clay loam, silty clay, or clay. Reaction is slightly acid to strongly acid.

The Bw horizon has hue of 10YR, 2.5Y, or 7.5YR, value of 5 or 6 when dry and 3 or 4 when moist, and

chroma of 2 to 4. Reaction is slightly acid to strongly acid.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 1 to 3. Reaction is medium acid or strongly acid.

Stetter Series

The Stetter series consists of deep, well drained, slowly permeable soils on flood plains and low terraces. These soils formed in alluvium. Slope is 0 to 3 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, nonacid, mesic Ustertic Torrifluvents.

Typical pedon of Stetter clay, 0 to 3 percent slopes, 5 miles east of Upton, in the NE1/4SW1/4 of sec. 6, T. 47 N., R. 64 W.

A—0 to 4 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to fine granular; hard, firm, sticky and plastic; many fine roots; neutral; clear smooth boundary.

C—4 to 60 inches; grayish brown (10YR 5/2) clay stratified with thin lenses of silty clay and clay loam, dark grayish brown (10YR 4/2) moist; massive; very hard, very firm, very sticky and plastic; common fine roots; mildly alkaline.

When dry, these soils have cracks 0.5 to 2.0 inches wide.

The A horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 1 or 2. Reaction is neutral or mildly alkaline.

The C horizon has hue of 2.5Y to 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 1 or 2. Reaction is mildly alkaline or moderately alkaline.

Stovho Series

The Stovho series consists of deep, well drained, moderately slowly permeable soils on mountains. These soils formed in silty sediment overlying calcareous residuum derived from limestone. Slope is 3 to 30 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine, montmorillonitic Mollic Cryoboralfs.

Typical pedon of a Stovho silt loam in an area of Stovho Variant-Stovho complex, 3 to 30 percent slopes, 2 miles east of Buckhorn, in the NE1/4NE1/4 of sec. 18, T. 48 N., R. 60 W.

O—1.5 inches to 1 inch; forest litter.

Oe—1 inch to 0; decomposed forest litter.

A—O to 3 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, slightly sticky and slightly plastic; many fine and few coarse roots; neutral; clear smooth boundary.

E—3 to 8 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and few coarse roots; neutral; clear smooth boundary.

B/E—8 to 10 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; light gray (10YR 7/2) silt loam coatings on faces of peds; moderate medium and coarse angular blocky structure; hard, firm, sticky and plastic; common fine and few coarse roots; mildly alkaline; clear wavy boundary.

Bt—10 to 24 inches; grayish brown (10YR 5/3) silty clay loam, dark grayish brown (10YR 4/3) moist; weak coarse prismatic structure parting to strong medium angular blocky; hard, firm, sticky and plastic; few fine and coarse roots; continuous moderately thick clay films on faces of peds; mildly alkaline; clear wavy boundary.

Bk—24 to 60 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, firm, sticky and plastic; few fine and coarse roots; 15 percent coarse fragments; violently effervescent; disseminated calcium carbonate; moderately alkaline.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 1 or 2. Texture is silt loam or loam. Reaction is neutral or slightly acid.

The E horizon has hue of 10YR or 7.5YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. Reaction is neutral or slightly acid.

The B/E horizon, where present, has colors similar to those of the E and Bt horizons.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is silty clay loam or silty clay. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 2.5Y to 7.5YR, value of 6 to 8 when dry and 5 to 7 when moist, and chroma of 3 or 4. Texture is clay loam or silty clay loam. Reaction is mildly alkaline or moderately alkaline.

Stovho Variant

The Stovho Variant consists of deep, well drained, slowly permeable soils on mountain slopes. There soils formed in thick deposits of calcareous alluvial fan material derived from soft sedimentary red beds. Slope is 3 to 30 percent. The average annual precipitation is

about 19 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine, montmorillonitic Mollic Cryoboralfs.

Typical pedon of a Stovho Variant loam in an area of Stovho Variant complex, 3 to 30 percent slopes, near Buckhorn, in the NE1/4SE1/4 of sec. 12, T. 48 N., R. 60 W.

O—2 inches to 0; partially decomposed grass and forest litter.

A—0 to 4 inches; very dark reddish brown (5YR 3/2) loam, black (5YR 2/1) moist; moderate medium granular structure; soft, friable, slightly sticky and slightly plastic; many fine and medium roots; mildly alkaline; clear smooth boundary.

E—4 to 9 inches; pinkish gray (5YR 6/2) loam, dark reddish brown (5YR 3/4) moist; weak coarse subangular blocky structure; soft, friable, slightly plastic; common fine and medium roots; 10 percent coarse fragments; mildly alkaline; clear wavy boundary.

Bt1—9 to 16 inches; reddish brown (2.5YR 4/4, dry or moist) clay; weak coarse prismatic structure parting to strong medium angular blocky; hard, firm, sticky and plastic; common fine and medium roots; 15 percent coarse fragments; many moderately thick clay films on faces of peds; moderately alkaline; clear wavy boundary.

Bt2—16 to 20 inches; reddish brown (2.5YR 5/4) clay, reddish brown (2.5YR 4/4) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; common fine and medium roots; 15 percent coarse fragments; few thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bk—20 to 60 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; massive; hard, firm, sticky and plastic; few coarse roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Depth to calcium carbonate is 20 to 60 inches. Content of coarse fragments is 0 to 20 percent.

The A horizon has hue of 5YR or 2.5YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 1 to 3. Texture is loam or silt loam. Reaction is neutral or mildly alkaline.

The E horizon has hue of 10YR to 5YR, value of 6 or 7 when dry and 3 to 6 when moist, and chroma of 2 to 4. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

The Bk horizon has hue of 5YR to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

Sugakool Series

The Sugakool series consists of deep, well drained, moderately permeable soils on valley sides, terraces, and alluvial fans. These soils formed in outwash material of mixed origin. Slope is 2 to 10 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine-loamy, mixed Aridic Argiborolls.

Typical pedon of Sugakool loam, 2 to 6 percent slopes, 20 miles north of Newcastle, in the SW1/4NW1/4 of sec. 18, T. 53 N., R. 61 W.

Ap—0 to 7 inches; reddish gray (5YR 5/2) loam, dark reddish brown (5YR 3/2) moist; moderate medium angular blocky structure; slightly hard, friable, sticky and plastic; many fine and common very fine roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.

Bt—7 to 13 inches; light reddish brown (5YR 5/3) silty clay loam, reddish brown (5YR 4/3) moist; weak medium prismatic structure parting to moderate medium angular blocky; hard, firm, sticky and plastic; many fine and common very fine roots; common thick clay films on faces of peds; neutral; clear smooth boundary.

Btk—13 to 16 inches; light reddish brown (5YR 6/3) silty clay loam, reddish brown (5YR 4/3) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; many fine roots; common thick clay films on faces of peds; 10 percent coarse fragments; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.

Bk1—16 to 40 inches; reddish yellow (5YR 6/6) gravelly loam, yellowish red (5YR 5/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; 20 percent coarse fragments; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear wavy boundary.

Bk2—40 to 60 inches; light reddish brown (5YR 6/4) very gravelly loam, reddish brown (5YR 5/4) moist; massive; loose, friable, nonsticky and nonplastic; few fine roots; 45 percent coarse fragments; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Depth to calcium carbonate is 13 to 26 inches. Thickness of the mollic epipedon is 7 to 14 inches.

The A horizon has hue of 10YR to 5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture is loam or silt loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 3 or 4. Texture is silty clay loam or clay loam that is 27 to 34 percent clay. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 7.5YR to 2.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 4 to 6. Texture is gravelly loam or gravelly clay loam. Reaction is moderately alkaline or strongly alkaline. Coarse fragment content is 20 to 50 percent.

Tanna Variant

The Tanna Variant consists of moderately deep, well drained, slowly permeable soils on bedrock-controlled foothills. These formed in residuum derived from sandstone and shale. Slope is 3 to 30 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine, montmorillonitic Aridic Argiborolls.

Typical pedon of a Tanna Variant clay loam in an area of Nunnston-Tanna Variant clay loams, 3 to 10 percent slopes, 16 miles north of Osage, in the NE1/4NE1/4 of sec. 12, T. 48 N., R. 63 W.

A—0 to 8 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; mildly alkaline; clear smooth boundary.

Bt—8 to 23 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong fine and medium subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium roots; moderately thick continuous clay films on faces of peds; mildly alkaline; clear smooth boundary.

Bk1—23 to 28 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; strongly effervescent; common medium filaments and soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

Bk2—28 to 36 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; violently effervescent; common fine filaments and soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

Cr—36 inches; soft shale.

Depth to bedrock is 20 to 40 inches. Depth to calcium carbonate is 10 to 23 inches.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture is clay loam or loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. Texture is clay or clay loam. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 10YR or 2.5Y.

Tassel Series

The Tassel series consists of shallow, well drained, moderately rapidly permeable soils on ridges and hills. These soils formed in residuum derived from sandstone. Slope is 2 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents.

Typical pedon of a Tassel fine sandy loam in an area of Tassel-Shingle complex, 2 to 30 percent slopes, 40 miles southwest of Newcastle, near the center of sec. 30, T. 44 N., R. 67 W.

A—0 to 3 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, nonsticky and nonplastic; many fine and medium roots; neutral; abrupt smooth boundary.

C1—3 to 15 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, nonsticky and nonplastic; many fine and medium roots; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

Cr—15 inches; soft calcareous sandstone.

The depth to bedrock is 10 to 20 inches. The control section is typically fine sandy loam loamy but it is very fine sand to very fine sandy loam in some pedons.

The A horizon has hue of 10YR or 2.5Y, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is fine sandy loam or loamy fine sand. Reaction is neutral or mildly alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Tassel Variant

The Tassel Variant consists of shallow, well drained, moderately rapidly permeable soils on hillslopes and ridge crests. These soils formed in residuum derived from sandstone. Slope is 2 to 30 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents.

Typical pedon of a Tassel Variant fine sandy loam in an area of Tassel Variant-Shingle Variant complex, 2 to 30 percent slopes, northwest of Newcastle, in the NW1/4SE1/4 of sec. 9, T. 48 N., R. 62 W.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; common roots; strongly effervescent; disseminated calcium

carbonate; moderately alkaline; clear smooth boundary.
A2—2 to 8 inches; light brownish gray (10YR 6/2) fine sandy loam, very dark grayish brown (10YR 4/2) moist; weak medium angular blocky structure; soft, very friable, nonsticky and nonplastic; common roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
C1—8 to 16 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive, soft, very friable, nonsticky and nonplastic; few roots; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
Cr—16 inches; soft calcareous sandstone.

Depth to bedrock is 10 to 20 inches. Texture is very fine sandy loam to loamy very fine sand.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. Texture is fine sandy loam or loamy fine sand. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3. Reaction is mildly alkaline or moderately alkaline.

Terro Series

The Terro series consists of moderately deep, well drained, moderately rapidly permeable soils on uplands and pediments. These soils formed in residuum derived from soft sandstone. Slope is 2 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are coarse-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of a Terro sandy loam in an area of Vonalee-Terro complex, 2 to 10 percent slopes, 45 miles southwest of Newcastle, in the NW1/4SW1/4 of sec. 27, T. 44 N., R. 68 W.

A—0 to 6 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary.
Bt—6 to 20 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; oriented clay occurs as bridges holding mineral grains together; mildly alkaline; clear wavy boundary.
Bk1—20 to 24 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable; slightly effervescent; few fine soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.
Bk2—24 to 34 inches; light gray (10YR 7/2) sandy loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable; strongly effervescent; common fine irregularly shaped soft masses of calcium carbonate; moderately alkaline; gradual wavy boundary.
Cr—34 inches; soft calcareous sandstone.
Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 1 to 3. Texture is sandy loam, fine sandy loam, or loamy fine sand. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is neutral or mildly alkaline.

The Bk1 horizon, where present, has value of 5 to 7 when dry and 4 to 6 when moist, and it has chroma of 2 or 3. Texture is sandy loam or fine sandy loam. Reaction is mildly alkaline or moderately alkaline.

The Bk2 horizon has hue of 7.5YR or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3. Texture is sandy loam or fine sandy loam. Reaction is mildly alkaline or moderately alkaline.

Theedle Series

The Theedle series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in residuum or slopewash alluvium derived from soft sandstone or shale. Slope is 2 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of a Theedle loam in an area of Kishona-Theedle-Zigweid loams, 2 to 10 percent slopes, 40 miles southwest of Newcastle, in the NE1/4 of sec. 35, T. 44 N., R. 67 W.

A1—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.
AC—4 to 8 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; violently effervescence; calcium carbonate is disseminated and in few fine filaments; moderately alkaline; clear smooth boundary.
C—8 to 28 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, sticky and nonplastic; few fine and very fine

roots; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
Cr—28 inches; light gray soft calcareous sandstone.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is loam, fine sandy loam, or clay loam. Reaction is neutral to moderately alkaline.

The AC horizon and the Bw horizon, where present, have hue of 10YR or 2.5Y, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is loam or clay loam. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 4 to 7 when moist, and chroma of 2 to 4. Texture is loam or clay loam. Reaction is mildly alkaline or moderately alkaline. Content of carbonates typically averages 5 to 14 percent of the horizon, with only incipient segregation in some pedons.

Theedle Variant

The Theedle Variant consists of moderately deep, well drained, moderately permeable soils on hillslopes and summits of hills. These soils formed in residuum or slopewash alluvium derived from sedimentary rock. Slope is 2 to 30 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine-loamy, mixed (calcareous), frigid Ustic Torriorthents.

Typical pedon of a Theedle Variant loam in an area of Shingle Variant-Theedle Variant loams, 6 to 30 percent slopes, 8 miles east of Newcastle, 0.25 mile south of the center of sec. 17, T. 44 N., R. 60 W.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; many fine roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.
AC—3 to 7 inches; light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse subangular blocky structure; hard, firm, sticky and plastic; common fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
C1—7 to 30 inches; light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; strongly effervescent; disseminated calcium carbonate; moderately alkaline; gradual wavy boundary.
Cr—30 inches; gray soft shale.

Depth to bedrock is 20 to 40 inches. Bedrock is shale, sandstone, or siltstone. The profile is mildly alkaline or moderately alkaline. Texture of the control section is clay loam to loam.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Texture is loam or clay loam. Reaction is neutral to moderately alkaline.

The AC horizon has hue of 10YR or 2.5Y, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is loam or clay loam. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. Texture is loam or clay loam. Reaction is mildly alkaline or moderately alkaline.

Thermopolis Variant

The Thermopolis Variant consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in residuum derived from red siltstone, sandstone, and shale. Slope is 10 to 60 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy, mixed, shallow Borollic Camborthids.

Typical pedon of a Thermopolis Variant silt loam in an area of Thermopolis Variant-Rock outcrop complex, 10 to 60 percent slopes, 8 miles northwest of Four Corners, in the SE1/4NW1/4 of sec. 12, T. 48 N., R. 62 W.

A1—0 to 3 inches; reddish brown (2.5YR 4/4) silt loam, dark reddish brown (2.5YR 3/4) moist; weak subangular blocky structure parting to weak granular; slightly hard, very friable, sticky and plastic; many fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.
Bw—3 to 13 inches; reddish brown (2.5YR 4/4) silt loam, dark reddish brown (2.5YR 3/4) moist; moderate medium angular blocky structure; slightly hard, very friable, sticky and plastic; many fine roots; 5 percent soft shale chips; strongly effervescent; few soft masses of calcium carbonate and disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.
Cr—13 inches; soft red shale.

Depth to bedrock is 6 to 20 inches. The control section is loam, silt loam, or very fine sandy loam.

The A horizon has hue of 2.5YR to 7.5YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. Texture is silt loam or loam. Reaction is neutral or mildly alkaline.

The Bw horizon has hue of 2.5YR to 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 4

to 6. Texture is silt loam or loam. Reaction is mildly alkaline or moderately alkaline.

Topeman Series

The Topeman series consists of deep, well drained, very slowly permeable soils on alluvial fan aprons. These soils formed in clayey alluvium derived from acid shale. Slope is 0 to 3 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, nonacid, mesic Ustic Torriorthents.

Typical pedon of a Topeman clay in an area of Topeman-Demar complex, 0 to 3 percent slopes, 5 miles northwest of Osage, in the NW1/4NW1/4 of sec. 36, T. 47 N., R. 63 W.

A1—0 to 1 inch; light gray (10YR 7/2) clay, dark grayish brown (10YR 4/2) moist; hard dispersed crust; hard, firm, sticky and plastic; few fine roots; medium acid; abrupt wavy boundary.

A2—1 to 4 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure parting to weak medium granular; hard, firm, sticky and plastic; few fine roots; slightly acid; clear smooth boundary.

C1—4 to 18 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; very weak coarse subangular blocky structure; extremely hard, very firm, very sticky and plastic; few very fine roots; 20 percent shale chips; slightly acid; clear smooth boundary.

C2—18 to 40 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; massive; very hard, very firm, very sticky and plastic; few fine roots; 30 percent soft shale chips that break down on pretreatment; slightly acid; few segregations of salts; clear smooth boundary.

Cr—40 inches; very strongly acid shale.

Depth to bedrock is 40 to 60 inches. The control section is clay or silty clay that is 15 to 35 percent soft shale chips that break down on pretreatment.

The A horizon has hue of 10YR or 2.5Y, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 1 or 2. Texture is clay, silty clay, or silty clay loam. Reaction is slightly acid or medium acid.

The C horizon has hue of 10YR to 5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 1 to 4. Texture is clay or silty clay. Reaction is slightly acid or medium acid.

Turnercrest Series

The Turnercrest series consists of moderately deep, well drained, moderately rapidly permeable soils on uplands. These soils formed in moderately coarse textured, calcareous residuum derived from sedimentary rock. Slope is 2 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of a Turnercrest sandy loam in an area of Tassel-Turnercrest complex, 6 to 30 percent slopes, 1,980 feet west and 330 feet south of the northeast corner of sec. 24, T. 34 N., R. 65 W.

A—0 to 2 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; many fine and very fine roots; noneffervescent; mildly alkaline; clear smooth boundary.

Bw—2 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; soft, friable; common fine and very fine roots; strongly effervescent; filaments and few soft masses of calcium carbonate; moderately alkaline; gradual smooth boundary.

C—6 to 25 inches; light gray (10YR 7/2) fine sandy loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable; few fine roots to a depth of 15 inches; strongly calcareous; calcium carbonate is mostly disseminated and in a few fine filaments; moderately alkaline; clear wavy boundary.

Cr—25 inches; soft, light gray and buff colored calcareous sandstone.

Depth to soft, calcareous sandstone is 20 to 40 inches. The control section is fine sandy loam or sandy loam that is 7 to 18 percent clay and 52 to 80 percent sand, of which more than 15 percent is fine or coarser. Electrical conductivity is 0 to 2 millimhos throughout the soil. Coarse fragments that break down on pretreatment and do not have lithic properties are present in some pedons.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. Texture is fine sandy loam or sandy loam. Reaction is mildly alkaline or moderately alkaline.

The Bw horizon, where present, has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Depth to the base of the Bw horizon is less than 10 inches. Texture is fine sandy loam or sandy loam. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Texture is fine sandy loam or sandy loam. Reaction is moderately alkaline or mildly alkaline.

Twotop Series

The Twotop series consists of deep, well drained, very slowly permeable soils in upland valleys and on alluvial fan aprons. These soils formed in clayey alluvium derived from sedimentary rock. Slope is 0 to 6 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are very fine, montmorillonitic, mesic Ustertic Camborthids.

Typical pedon of Twotop clay, 0 to 6 percent slopes, 9 miles northwest of Upton, in the SE1/4SW1/4 of sec. 9, T. 48 N., R. 66 W.

A—0 to 5 inches; light olive gray (5Y 6/2) clay, olive gray (5YR 4/2) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; common fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw—5 to 25 inches; light olive gray (5Y 6/2) clay, olive gray (5YR 4/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky and plastic; common fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bky—25 to 60 inches; light gray (5Y 7/2) clay, olive gray (5YR 5/2) moist; massive; hard, firm, sticky and plastic; few fine roots; strongly effervescent; large irregularly shaped soft masses of calcium carbonate; moderately alkaline.

The control section averages 40 to 60 percent clay. Thickness of solum is 20 to 40 inches. When the soil is dry, cracks 0.5 to 1.0 inch wide and several feet long extend to a depth of 20 inches or more.

The A horizon has hue of 2.5Y or 5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Reaction is neutral or mildly alkaline.

The Bw horizon has hue of 2.5Y or 5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Clay content is 40 to 60 percent. Reaction is neutral to moderately alkaline.

The Bky horizon has hue of 2.5Y or 5Y, value of 6 or 7 when dry and 5 or 6 moist. Clay content is 40 to 60 percent. Reaction is neutral to moderately alkaline.

Ulm Series

The Ulm series consists of deep, well drained, slowly permeable soils on alluvial fans or fan aprons and valley sides. These soils formed in calcareous alluvial sediment derived from sedimentary rock. Slope is 0 to 10 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine, montmorillonitic, mesic Ustollic Haplargids.

Typical pedon of an Ulm clay loam in an area of Forkwood-Ulm complex, 0 to 10 percent slopes, 26 miles west of Newcastle, in the SE1/4SE1/4 of sec. 9, T. 44 N., R. 65 W.

A1—0 to 2 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate thin platy structure; slightly hard, firm, sticky and plastic; many fine roots; mildly alkaline; abrupt smooth boundary.

A2—2 to 6 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; many roots; mildly alkaline; clear smooth boundary.

Bt—6 to 13 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to strong medium and fine angular blocky; hard, firm, very sticky and very plastic; many roots; many thick clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btk—13 to 16 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; few roots; few thin clay films on faces of peds; moderately effervescent; few soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk—16 to 60 inches; light gray (10YR 7/2) clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few roots; strongly effervescent; common soft masses and threads of calcium carbonate; strongly alkaline.

Depth to calcareous material is 12 to 30 inches. The control section is 35 to 50 percent clay.

The A horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 1 to 3. Texture is clay loam or loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is clay loam or clay that is 35 to 50 percent clay. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

Vanocker Series

The Vanocker series consists of deep, well drained, moderately permeable soils on mountains. These soils formed in residuum and slopewash alluvium in steep areas derived from calcareous sandstone and shale. Slope is 20 to 60 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are loamy-skeletal, mixed, frigid Typic Eutrochrepts.

Typical pedon of a Vanocker gravelly loam in an area of Rock outcrop-Vanocker complex, very steep, 5 miles northeast of Newcastle, in the SE1/4NE1/4 of sec. 20, T. 45 N., R. 60 W.

O—2 inches to 0; decomposing forest litter.
A—0 to 2 inches; brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and coarse roots; 20 percent coarse fragments; neutral; clear wavy boundary.
Bw1—2 to 8 inches; brown (7.5YR 5/4) very channery clay loam, dark brown (7.5YR 4/2) moist; weak coarse prismatic structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; common fine and coarse roots; 40 percent coarse fragments; neutral; clear smooth boundary.
Bw2—8 to 16 inches; light brown (7.5YR 6/4) very channery clay loam, brown (7.5YR 4/3) moist; weak coarse prismatic structure parting to weak coarse angular blocky; slightly hard, friable, nonsticky and nonplastic; few coarse roots; 60 percent channery fragments; slightly effervescent; mildly alkaline; gradual wavy boundary.
Bk—16 to 60 inches; light brown (7.5YR 6/4) very channery clay loam, brown (7.5YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few coarse roots; 60 percent channery fragments; strongly effervescent; disseminated calcium carbonate; mildly alkaline.

Depth to calcium carbonate is 8 to 25 inches. Coarse fragment content ranges from 10 percent in the A horizon to 80 percent in the Bk horizon.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 1 to 3. Reaction is neutral or mildly alkaline.

The Bw horizon has hue of 7.5YR or 5YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 5. Texture is channery clay loam or very channery clay loam. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 10YR to 2.5YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 3 or 4. Reaction is mildly alkaline or moderately alkaline.

Vassett Series

The Vassett series consists of deep, well drained, moderately permeable soils on relict fan aprons and terraces. These soils formed in alluvium derived from mixed sources. Slope is 0 to 10 percent. The average annual precipitation is 17 inches, and the average annual temperature is 46 degrees F.

These soils are fine-silty, mixed Aridic Argiborolls.

Typical pedon of Vassett silt loam, 2 to 6 percent slopes, 7 miles west of Four Corners, in the center of sec. 11, T. 47 N., R. 62 W.

A—0 to 9 inches; dark brown (7.5YR 4/2) silt loam, (7.5YR 3/2) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable; mildly alkaline; clear smooth boundary.
Bt—9 to 24 inches; brown (7.5YR 5/3) silty clay loam, dark brown (7.5YR 4/3) moist; moderate coarse prismatic structure parting to strong fine angular blocky; hard, firm; many moderately thick clay films on faces of peds; moderately alkaline; clear smooth boundary.
Bk1—24 to 36 inches; brown (7.5YR 5/3) silt loam, dark brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure; slightly hard, friable; violently effervescent; common fine masses, threads, and seams of calcium carbonate; strongly alkaline; clear smooth boundary.
Bk2—36 to 60 inches; light reddish brown (5YR 6/4) silt loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; violently effervescent; common fine masses, threads, and seams of calcium carbonate; strongly alkaline.

The A horizon has hue of 2.5YR to 7.5YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Texture is silt loam or loam that is 15 to 20 percent clay. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is silty clay loam or clay loam that is 18 to 35 percent clay and is less than 15 percent sand that is very fine or coarser. Structure is prismatic and blocky of moderate to strong grade. Reaction is mildly alkaline to moderately alkaline.

The Bk1 horizon has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. Texture is silt loam or silty clay loam. This horizon has moderate or strong, coarse or medium subangular blocky structure. Calcium carbonate equivalent is 5 to 10 percent. Reaction is moderately alkaline or strongly alkaline.

The Bk2 horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 6. Texture is silt loam or silty clay loam. Clay content is 15 to 30 percent. This horizon has few to common, fine or medium segregations of calcium carbonate. It is estimated to have 5 to 10 percent calcium carbonate equivalent. Reaction is moderately alkaline or strongly alkaline.

Vonalee Series

The Vonalee series consists of deep, well drained, moderately rapidly permeable soils on moderately

sloping or rolling uplands. These soils formed in eolian sand and wind-worked alluvial sediment. Slope is 0 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are coarse-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of a Vonalee fine sandy loam in an area of Vonalee-Terro complex, 2 to 10 percent slopes, 45 miles west of Newcastle, in the SE1/4SE1/4 of sec. 12, T. 43 N., R. 48 W.

A—0 to 6 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common fine and medium roots; neutral; gradual wavy boundary.

Bw—6 to 10 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak fine angular blocky structure; very friable, nonsticky and nonplastic; common fine and medium roots; mildly alkaline; clear wavy boundary.

Bt1—10 to 15 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; few thin clay bridges between sand grains; few fine and medium roots; neutral; clear wavy boundary.

Bt2—15 to 20 inches; light brownish gray (10YR 6/2) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few thin clay bridges between sand grains; few fine roots; neutral; gradual wavy boundary.

Bk—20 to 60 inches; light brownish gray (10YR 6/2) sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few roots; violently effervescent; mildly alkaline.

Depth to calcareous material is 8 to 24 inches.

The A horizon has hue of 7.5YR to 2.5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is fine sandy loam or sandy loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is sandy loam or fine sandy loam. Reaction is neutral or mildly alkaline.

The Bk horizon and the C horizon, where present, have hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Reaction is mildly alkaline to strongly alkaline.

Wages Variant

The Wages Variant consists of deep, well drained, moderately permeable soils on alluvial fans and toe slopes. These soils formed in alluvium derived from sandstone and shale. Slope is 2 to 12 percent. The average annual precipitation is about 17 inches, and the average annual air temperature is about 43 degrees F.

These soils are fine-loamy, mixed Typic Eutroboralfs.

Typical pedon of a Wages Variant loam in an area of Reicess-Wages Variant loams, 2 to 6 percent slopes, 7 miles north of Osage, in the SE1/4SW1/4 of sec. 11, T. 47 N., R. 63 W.

A—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; slightly acid; clear wavy boundary.

Bt—5 to 12 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; hard, firm, sticky and plastic; common fine roots; thin continuous clay films on faces of peds; mildly alkaline; clear smooth boundary.

Bk1—12 to 14 inches; light brownish gray (10YR 6/2) loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; slightly effervescent; few fine soft masses of calcium carbonate; mildly alkaline; clear smooth boundary.

Bk2—14 to 60 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly plastic; few fine roots; violently effervescent; common medium irregularly shaped soft masses of calcium carbonate; moderately alkaline.

The A horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. Reaction is neutral or slightly acid.

The Bt horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 2.5Y to 7.5YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

Wibaux Series

The Wibaux series consists of somewhat excessively drained, moderately permeable soils on hills. These soils formed in a thin mantle of noncalcareous, very channery material derived from porcellanite. Slope is 6 to 60 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are loamy-skeletal over fragmental, mixed, nonacid, mesic Ustic Torriorthents.

Typical pedon of a Wibaux channery loam in an area of Rock outcrop-Wibaux complex, very steep, 50 miles southwest of Newcastle, in the NW1/4NE1/4 of sec. 6, T. 41 N., R. 68 W.

A1—0 to 4 inches; reddish gray (5YR 5/2) channery loam, dark reddish brown (5YR 4/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; 20 percent channery porcellanite chips; mildly alkaline; clear smooth boundary.

C1—4 to 10 inches; light reddish brown (5YR 6/3) very channery loam, reddish brown (5YR 5/3) moist; weak medium granular structure; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; 40 percent channery porcellanite chips; mildly alkaline; clear smooth boundary.

C2—10 to 16 inches; light reddish brown (5YR 6/4) very channery loam, reddish brown (5YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few fine roots; 50 percent channery porcellanite chips; strongly effervescent; moderately alkaline; clear wavy boundary.

2C—16 to 60 inches; fractured porcellanite, interstices between coarse fragments are not completely filled with fine material.

The profile is noncalcareous to a depth of 10 inches or more. Depth to porcellanite is 10 to 20 inches.

The A horizon has hue of 7.5YR to 10R, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 2 to 6. Reaction is neutral or mildly alkaline.

The C horizon has hue of 7.5YR to 10R, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 2 to 4. Reaction is neutral to moderately alkaline.

Winler Series

The Winler series consists of moderately deep, well drained, very slowly permeable soils on uplands. These soils formed in clayey residuum derived from shale. Slope is 6 to 15 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are very fine, montmorillonitic, mesic Ustertic Camborthids.

Typical pedon of a Winler clay in an area of Winler-Savageton complex, 6 to 15 percent slopes, 9 miles northeast of Upton, in the NE1/4NW1/4 of sec. 11, T. 48 N., R. 64 W.

A—0 to 6 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; very hard, very firm, very sticky and plastic; common roots; moderately alkaline; clear smooth boundary.

Bw—6 to 16 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; pressure faces on peds; moderately alkaline; clear smooth boundary.

Cky—16 to 32 inches; light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; massive; very hard, very firm, very sticky and plastic; few fine roots; slightly effervescent; disseminated calcium carbonate; few fine accumulations of visible salt and gypsum; moderately alkaline; clear wavy boundary.

Cr—32 inches; dark colored clay shale.

Depth to bedrock is 20 to 40 inches. Depth to visible calcium carbonate is 16 to 40 inches. When the soil is dry, cracks 0.5 to 1.0 inch wide and several feet long extend to a depth of 20 inches or more.

The A horizon has hue of 2.5Y to 10YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. Clay content is 60 to 70 percent. Reaction is mildly alkaline or moderately alkaline.

The C horizon has hue of 2.5Y to 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 1 to 3.

Worf Series

The Worf series consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in medium textured calcareous residuum derived from sandstone. Slope is 3 to 30 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are loamy, mixed, mesic, shallow Ustollic Haplargids.

Typical pedon of a Worf loam in an area of Worf-Shingle-Tassel complex, 3 to 30 percent slopes, 20 miles west of Newcastle, in the NW1/4NW1/4 of sec. 9, T. 44 N., R. 64 W.

A—0 to 3 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; mildly alkaline; clear smooth boundary.

Bt—3 to 8 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, sticky and plastic; few fine roots; few thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

Bk—8 to 12 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; strongly effervescent; filaments and threads of calcium carbonate; moderately alkaline; abrupt wavy boundary.

Cr—12 inches; platy sandstone.

Depth to bedrock is 10 to 20 inches. Depth to calcareous material is 4 to 10 inches.

The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. Texture is loam or fine sandy loam. Reaction is neutral or mildly alkaline.

The Bt horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is loam or light clay loam that has a clay content of 18 to 35 percent. Reaction is neutral or mildly alkaline.

The Bk horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. Texture is loam or clay loam. Reaction is mildly alkaline or moderately alkaline.

Zigweid Series

The Zigweid series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in calcareous, medium textured sediment derived from sedimentary rock. Slope is 2 to 10 percent. The average annual precipitation is about 13 inches, and the average annual air temperature is about 48 degrees F.

These soils are fine-loamy, mixed, mesic Ustollic Camborthids.

Typical pedon of a Zigweid loam in an area of Kishona-Theedle-Zigweid loams, 2 to 10 percent slopes, 15 miles west of Newcastle, in the NE1/4NE1/4 of sec. 30, T. 45 N., R. 63 W.

A—0 to 5 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; common roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw—5 to 12 inches; light brownish gray (10YR 6/3) loam, grayish brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common roots; very few thin clay films on faces of peds; slightly effervescent; few fine soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk1—12 to 19 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, sticky and plastic; few roots; strongly effervescent; irregularly shaped medium-sized soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—19 to 60 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, sticky and plastic; few roots; violently effervescent; irregularly shaped fine filaments and threads of calcium carbonate; moderately alkaline.

Depth to calcium carbonate is 0 to 6 inches.

The A horizon has hue of 5Y to 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. Texture is loam or light clay loam. Reaction is mildly alkaline or moderately alkaline.

The Bw horizon has hue of 5Y to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

The Bk horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. Reaction is moderately alkaline or strongly alkaline.

Formation of the Soils

This section describes the processes of soil formation as they relate to soils in the survey area.

Soils form through the interaction of five major factors: Parent material, time, plant and animal life, climate, and relief. The relative influence of each factor varies from place to place. In some areas one factor dominates in the formation of a soil and determines most of its properties. Climate, relief, and parent material cause most of the variation in the soils of Weston County.

Parent Material

Parent material is the unconsolidated material from which a soil is formed by the other soil-forming factors. Parent material accumulates from the weathering of underlying rock or transportation by wind, water, or gravity or by a combination of these agents. The parent material of Weston County includes recent alluvium on flood plains and older alluvium of fans and terraces. The wind-transported material is mostly fine sand.

Soils inherit many physical and chemical properties from their parent material. In the mountains, the soils formed in residuum derived from igneous rock, limestone, and sandstone. Examples are Citadel, Lakoa, and McCaffery soils. These soils formed in a variety of material and vary greatly in texture and color and in soil development.

Soils of the foothills and uplands formed in material derived from sandstone and shale. For example, Crownest, Nunnston, and Recluse soils formed in sandy and loamy materials. They also vary greatly in degree of soil development.

Soils in areas of red beds formed in red siltstone and fine grained sandstone. Examples are Gypnevee Variant, Colnevee, Sugakool, and Vassett soils. These soils formed in red, silty material and vary greatly in their degree of development. They are also highly erodible.

Soils of the Plains, which cover the largest part of the survey area, formed in material weathered from sandstone and shale; for example, the sandy and calcareous Tassel soils formed over sandstone that is predominantly cemented with calcium carbonate. The fine textured, strongly alkaline Cadoma soils formed in material weathered from shale that contains gypsum and sodium. Other soils of the plains that formed in sandy and loamy alluvium are the Forkwood, Cambria, Hiland, and Terro soils. These soils vary greatly in their degree of development.

Soils of the flood plains, such as the Clarkelen, Lohmiller, and Haverdad soils, formed in mixed alluvium that ranges from sand to clay. These soils exhibit little development.

Time

Distinct soil horizons are formed by slow processes, particularly in the cool, dry climate typical of this survey area. A typical argillic horizon forms only on stable surfaces, and its stage of development reflects the relative age of the soil.

Lack of time necessary to form diagnostic horizons is the result of periodic additions of alluvium to the surface layer of the youthful Haverdad and Clarkelen soils on flood plains. The parent and soil material on steep hillsides may not remain stable long enough to allow an argillic horizon to form. The young Kishona soils on alluvial fans also do not have an argillic horizon such as that in the more mature Forkwood soils on older, higher lying fans.

The oldest soils in the survey area have a strongly developed argillic horizon with abrupt upper boundaries. Bidman and Parmleed soils are examples of aged soils on very old stable surfaces.

Plant and Animal Life

All living organisms, including vegetation, bacteria, fungi, and animals, are important to soil formation. Vegetation generally supplies the organic matter that decomposes and gives a dark color to the surface layer. Plant roots displace soil particles, recycle nutrients, distribute organic matter, and help form structural units, or aggregates. When these plants or parts of them decompose, the nutrients that have been stored in the roots are returned to the soil. Bacteria and fungi decompose the vegetation. Many of the organic reactions and processes of the bacteria also release material that affects the soil-forming processes. Earthworms, ants, and burrowing animals mix soils and affect soil structure, generally making the soils more open and porous.

Kinds of vegetation may influence the microclimate of the soil in the mountains and foothills. Forest is interspersed with parks of grass and shrubs. Where the tree cover is dense, Alfisols, such as Lakoa soils, form.

Because these soils have organic mulch on the surface and are shaded, they are cooler in summer. They have frigid and cryic soil temperature regimes. In the open parks, where the soils do not have an organic mulch layer and are warmer, Mollisols such as Recluse soils form. These soils have a mesic soil temperature regime.

Man also affects soil structure. He makes soils more porous in some areas by tillage and management practices. In other places, however, he compacts the soil by foot and vehicular traffic. Man's intensive use and disturbance of some soils have caused accelerated soil erosion losses, often accompanied by increased deposition on flood plains and in depressional areas. In other places, man has used practices that slow the rate of erosion. Man has also altered many soils chemically through the use of lime and fertilizer, which make the soils more favorable for desired plants.

Climate

Climate affects soil formation directly by controlling physical disintegration and chemical weathering and indirectly through the effects of the living organisms. Expansion and contraction accompanying freezing and thawing and wedging action of roots result in physical disintegration. The rate of chemical weathering depends on temperature, moisture content, and biological activity.

The climate of the survey area is temperate and semiarid. The effects of this climate are reflected in several soil properties. A large percentage of the annual precipitation falls during the growing season, when evaporation, which is increased by the relatively warm temperatures and air movement, removes much of the available soil moisture. Thus, downward movement of water in the soil profile is limited, which results in accumulation of silicate clay in the subsoil to form an argillic horizon and in deposition of calcium carbonate at the maximum depth to which water penetrates in the substratum. Weathering of bedrock is limited by the available moisture, which explains the moderate or shallow depth of many of the soils that formed in residuum. Many properties of the parent material are discernible because the material has not been completely altered in the cool, dry climate.

Relief

Relief, or lay of the land, is the result of differential weathering. In soil formation, relief controls exposure and surface drainage and affects the percolation of water into the soil, the plant and animal life, and some of the soil forming processes.

Runoff from ridges and steep hillsides reduces the amount of moisture moving through the soil profile and removes soil material from the surface layer. Soil development on such surfaces may not exceed the rate of geologic erosion, which results in the formation of soils that exhibit little horizonation. Examples are the Shingle and Theedle soils. Soils on toe slopes and fans receive moisture from the slopes above and typically are deep and have an argillic horizon such as that in the Forkwood and Cambria soils. Soils in depressional areas may receive a great deal of moisture from the surrounding landscape during intense storms. These soils typically are deep and clayey and are leached to a greater depth than are the soils of the surrounding areas; for example, the Ulm and Bidman soils. Relief affects the winds moving across areas of sandstone, where material may be removed from the surface of ridges and deposited as eolian sand on the leeward slopes. An example is the Dwyer soils.

Morphology of the Soils

The different layers, or horizons, in a soil profile are evidence of the interaction of the factors of soil formation. Most soils have three major horizons—the A, B, and C horizons. Some soils, such as the Lakoa soils, also have an organic horizon at the surface. This horizon is an accumulation of organic material, such as twigs and leaves, or of decomposed organic material that has little admixture of mineral material. The major horizons can be subdivided by the use of numbers and letters to indicate differences within the horizon. The Bt horizon, for example, represents the best developed part of a B horizon that has an accumulation of clay from overlying horizons. The Forkwood soils, for example, have a Bt horizon.

The A horizon is a mineral surface layer. An Ap horizon is a plow layer, commonly darkened with organic matter. The A horizon is the layer of maximum leaching or illuviation of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, the horizon is called the E horizon. The E horizon is normally the lightest colored horizon in the profile.

The B horizon, which underlies the A horizon, is commonly called the subsoil. It is the horizon of maximum accumulation of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils, such as the Zigweid soils, the B horizon is formed mainly by alteration of the original material rather than by illuviation. The alteration can be caused by the weathering of the parent material, the releasing of iron to give rusty colors, and the development of soil structure in place of the original rock or sediment structure. The B horizon commonly has blocky or prismatic structure; it generally is firmer and is lighter in color than the A horizon but is darker colored than the C or E horizon.

The C horizon is below the A or B horizon. It consists of materials that are little altered by the soil-forming processes but may be modified by weathering.

In youthful soils such as those that formed in recent alluvium, the C horizon may be very near the soil surface.

Processes of Soil Horizon Differentiation

Several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble constituents, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay mineral. These processes commonly take place simultaneously. They have been going on for thousands of years.

This accumulation and incorporation of organic matter takes place as plant residue and animal deposited organic material decompose and are mixed into the soil. These additions darken the mineral soil material and are responsible for forming the A horizon.

In order for soils to have a distinct subsoil, lime and other soluble materials must be leached. Once this has taken place, the clay can disperse more easily and be moved as part of the percolate. Clay has accumulated in the Bt horizon of those soils classified as Argiustolls. It has been leached from overlying horizons and deposited in the B horizon as a result of flocculation and the drying up of the percolating water. Also, clay from dissolved silica and aluminum has accumulated in these horizons. More inert materials, such as silt and sand sized quartz, are concentrated in the A horizon as the more soluble materials and clay are leached out.

The naturally well drained and moderately well drained soils in the county generally have a yellowish brown or reddish brown subsoil. These colors come from finely divided iron oxide minerals that coat the sand, silt, and clay particles. These iron oxides formed from iron released during the weathering of silicate minerals. In poorly drained soils, such as the Higgins Variant soils, gray colors in the subsoil indicate the absence of free iron oxide coatings.

Survey Procedures

Before the actual fieldwork for this survey was began, the preliminary slope and landform boundaries had been plotted stereoscopically on 1958 aerial photographs at a scale of 1:15,840, or 4 inches to 1 mile. As more up-to-date photography became available, the mapping was transferred to quad-centered 1976 aerial photographs flown at a scale of 1:80,000 and enlarged to a scale of 1:24,000, or 2.6 inches to 1 mile.

Traverses were made on foot in the Black Hills area. In the rest of the survey area traverses were made on foot in areas that were inaccessible by truck and by truck on the existing road and trail network.

Most of the traverses were made at intervals of about 0.25 mile. Soil examinations along the traverses were made 100 to 250 yards apart, depending on the landscape and soil pattern. The soil material was examined with the aid of a hand auger or shovel to a depth of about 5 feet or to bedrock if the bedrock was at a depth of less than 5 feet. The pedons described as typical were observed and studied in pits that were dug with a shovel or a backhoe.

Three delineations of each map unit were chosen to be typical of the map unit and were transected to determine map unit composition. A random transect method was used in forested areas and in areas of limited accessibility.

After completion of the soil mapping and transfer to quad-centered aerial photographs, map unit delineations were transferred to orthophotographs at a scale of 1:24,000. Surface drainage was mapped in the field. Cultural features are from U.S. Geological Survey 7.5 minute topographic maps.

References

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

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

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	More than 7.5

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

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

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

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition of woody vegetation to allow understory grasses and forbs to recover, or to make conditions favorable for reseeding. It increases production of forage, which reduces erosion. Brush management may improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

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

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

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation by use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter, in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil material. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

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

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

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

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

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

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

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

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

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and low water holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and low water holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have intermediate water holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless artificial drainage is provided. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is

provided. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. They are wet enough to prevent the growth of important crops (except rice) unless artificially drained.

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

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

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature; for example, fire that exposes the surface.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

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

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

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

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

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

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

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

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

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

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

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

Gyprock. A sedimentary rock composed chiefly of gypsum varying from coarsely crystalline to fine granular masses; it usually displays disturbed

bedding due to expansion during hydration of anhydrite.

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

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

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

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

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

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

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

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

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

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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

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

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

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

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

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

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

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

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded 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 of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color in hue of 10YR, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed. (See climax plant community.)

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This increases the vigor and reproduction of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata mainly red in color and composed largely of sandstone and shale.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

	Percent
Nearly level	0 to 3
Gently sloping	3 to 6
Moderately sloping	6 to 10
Strongly sloping	10 to 15
Moderately steep	15 to 30
Steep	30 to 45
Very steep	45 and higher

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

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

Soil. A natural, three-dimensional body at the Earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive*

(the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1940-71 at Newcastle, WY]

Month	Temperature	Precipitation
	°F	In
January	22.9	0.39
February	26.9	0.42
March	32.1	0.68
April	44.7	1.50
May	55.1	2.48
June	64.1	2.94
July	73.0	1.77
August	71.6	1.38
September	59.9	1.03
October	49.2	0.61
November	34.6	0.45
December	26.3	0.45
Annual	46.7	14.10

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1926-70 at Newcastle, WY]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than	May 9	May 23	June 2
2 years in 10 later than	May 2	May 16	May 25
5 years in 10 later than	April 21	May 5	May 15
First freezing temperature in fall:			
1 year in 10 earlier than	October 2	September 20	September 11
2 years in 10 earlier than	October 9	September 27	September 17
5 years in 10 earlier than	October 20	October 8	September 28

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Absted-Bone complex, 0 to 6 percent slopes	35,250	2.3
2	Alice Variant fine sandy loam, 2 to 10 percent slopes	320	*
3	Bidman loam, 0 to 6 percent slopes	2,680	0.2
4	Bidman-Bone loams, 0 to 2 percent slopes	1,550	0.1
5	Bidman-Ulm association, undulating	28,270	1.8
6	Bone loam, 0 to 3 percent slopes	1,520	0.1
7	Bowbac-Tassel-Rock outcrop complex, 3 to 20 percent slopes	4,550	0.3
8	Cadoma silty clay loam, 2 to 10 percent slopes	6,520	0.4
9	Cambria loam, 2 to 6 percent slopes	4,275	0.3
10	Chinook fine sandy loam, 2 to 10 percent slopes	425	*
11	Chinook-Tassel Variant fine sandy loams, 2 to 10 percent slopes	850	0.1
12	Chinook-Tassel Variant fine sandy loams, 10 to 30 percent slopes	1,625	0.1
13	Chinook-Theedle Variant complex, 3 to 10 percent slopes	3,295	0.2
14	Chinook-Theedle Variant complex, 10 to 30 percent slopes	290	*
15	Citadel-Lakoa loams, 3 to 10 percent slopes	27,465	1.8
16	Citadel-Lakoa loams, 10 to 60 percent slopes	16,650	1.1
17	Citadel-McCaffery complex, 3 to 10 percent slopes	5,210	0.3
18	Citadel-McCaffery complex, 10 to 30 percent slopes	13,250	0.9
19	Colhill-Rothican complex, 10 to 40 percent slopes	7,510	0.5
20	Colnevee silt loam, 2 to 6 percent slopes	1,225	0.1
21	Colnevee silt loam, 6 to 15 percent slopes	3,785	0.2
22	Colnevee silt loam, eroded, 2 to 6 percent slopes	785	0.1
23	Colnevee silt loam, eroded, 6 to 15 percent slopes	3,755	0.2
24	Colnevee Variant silt loam, 2 to 10 percent slopes	1,425	0.1
25	Colombo Variant loam, 0 to 2 percent slopes	1,825	0.1
26	Colombo Variant loam, occasionally flooded, 0 to 2 percent slopes	380	*
27	Colsavage-Bahl Variant clay loams, 2 to 10 percent slopes	5,225	0.3
28	Cordeston loam, 0 to 6 percent slopes	8,735	0.6
29	Corpening-Rock outcrop complex, 2 to 30 percent slopes	14,610	0.9
30	Crownest-Regnaps complex, 2 to 10 percent slopes	18,675	1.2
31	Crownest-Regnaps complex, 10 to 30 percent slopes	12,320	0.8
32	Cushman loam, 2 to 10 percent slopes	5,420	0.4
33	Cushman-Cambria loams, 2 to 10 percent slopes	6,475	0.4
34	Cushman-Renohill loams, 2 to 12 percent slopes	1,635	0.1
35	Cushman-Shingle loams, 6 to 15 percent slopes	8,890	0.6
36	Cushman-Terro complex, 2 to 10 percent slopes	8,595	0.6
37	Dwyer fine sand, 3 to 15 percent slopes	1,565	0.1
38	Forkwood loam, 2 to 6 percent slopes	3,780	0.2
39	Forkwood-Cambria-Cushman loams, 0 to 12 percent slopes	57,250	3.7
40	Forkwood-Cushman-Terro complex, 2 to 10 percent slopes	61,875	4.0
41	Forkwood-Ulm complex, 0 to 10 percent slopes	10,280	0.7
42	Grummit-Maggin association, rolling	7,105	0.5
43	Grummit-Snomo complex, 2 to 10 percent slopes	15,160	1.0
44	Grummit-Snomo complex, 10 to 30 percent slopes	5,210	0.3
45	Gullied land-Torriorthents complex, 10 to 60 percent slopes	83,175	5.4
46	Haverdad-Clarkelen complex, 0 to 4 percent slopes	15,250	1.0
47	Haverdad-Clarkelen Variant complex, saline, 0 to 4 percent slopes	6,430	0.4
48	Higgins Variant silt loam, 0 to 2 percent slopes	2,150	0.1
49	Hiland-Bowbac complex, 0 to 10 percent slopes	7,450	0.5
50	Hiland-Vonalee association, rolling	1,980	0.1
51	Hilight clay loam, 3 to 30 percent slopes	3,210	0.2
52	Keeline-Turnercrest sandy loams, 2 to 10 percent slopes	2,680	0.2
53	Kishona loam, 0 to 6 percent slopes	8,090	0.5
54	Kishona clay loam, saline, 0 to 2 percent slopes	4,220	0.3
55	Kishona-Shingle-Theedle loams, 6 to 15 percent slopes	50,550	3.3
56	Kishona-Theedle-Zigweid loams, 2 to 10 percent slopes	25,495	1.7
57	Lakoa-Crownest complex, 10 to 60 percent slopes	36,510	2.4
58	Lohmiller clay loam, occasionally flooded, 0 to 3 percent slopes	2,810	0.2
59	Lohmiller-Haverdad complex, 1 to 4 percent slopes	11,910	0.8
60	Lohmiller-Haverdad complex, saline, 1 to 4 percent slopes	10,250	0.7
61	Lohsman loam, 2 to 10 percent slopes	3,250	0.2
62	Nilrap loam, 0 to 6 percent slopes	5,105	0.3
63	Norkool loam, 2 to 10 percent slopes	5,445	0.4
64	Nunnston clay loam, 0 to 6 percent slopes	1,015	0.1

See footnote at end of table.

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
65	Nunnston-Tanna Variant clay loams, 3 to 10 percent slopes	1,180	0.1
66	Nunnston-Tanna Variant clay loams, 10 to 20 percent slopes	5,590	0.4
67	Onita Variant loam, 0 to 3 percent slopes	750	*
68	Orella-Cadoma silty clay loams, 2 to 15 percent slopes	12,435	0.8
69	Orella-Samday-Rock outcrop complex, 3 to 30 percent slopes	52,175	3.4
70	Parmleed-Bidman loams, 2 to 10 percent slopes	5,625	0.4
71	Parmleed-Bowbac complex, 6 to 15 percent slopes	1,120	0.1
72	Parmleed-Forkwood loams, 0 to 6 percent slopes	780	0.1
73	Parmleed-Renohill complex, 0 to 6 percent slopes	1,275	0.1
74	Pesowyo-Paunsaugunt complex, 6 to 10 percent slopes	6,280	0.4
75	Pesowyo-Paunsaugunt complex, 10 to 60 percent slopes	2,120	0.1
76	Petrie clay loam, 0 to 3 percent slopes	18,280	1.2
77	Petrie-Ustic Torriorthents complex, saline, 0 to 6 percent slopes	8,290	0.5
78	Pits, bentonite	4,265	0.3
79	Pits, gravel	205	*
80	Recluse loam, 0 to 6 percent slopes	3,580	0.2
81	Reicess loam, 0 to 6 percent slopes	1,650	0.1
82	Reicess-Wages Variant loams, 2 to 6 percent slopes	2,550	0.2
83	Reicess-Wages Variant loams, 6 to 10 percent slopes	3,460	0.2
84	Regnaps-Crownest complex, 2 to 10 percent slopes	6,535	0.4
85	Regnaps-Norkool-Crownest complex, 2 to 10 percent slopes	2,130	0.1
86	Rekop Variant-Gypnevee Variant-Rock outcrop complex, 2 to 10 percent slopes	3,200	0.2
87	Rekop Variant-Gypnevee Variant-Rock outcrop complex, 10 to 60 percent slopes	7,250	0.5
88	Renohill loam, 2 to 10 percent slopes	5,425	0.4
89	Renohill clay loam, 2 to 10 percent slopes	3,690	0.2
90	Renohill-Savageton clay loams, 2 to 10 percent slopes	21,350	1.4
91	Rock outcrop	2,500	0.2
92	Rock outcrop-Vanocker complex, very steep	33,350	2.2
93	Rock outcrop-Wibaux complex, very steep	1,885	0.1
94	Rothican-Colhill complex, 2 to 10 percent slopes	2,600	0.2
95	Samday-Grummit complex, 2 to 30 percent slopes	20,050	1.3
96	Samday-Savageton complex, hilly	50,575	3.3
97	Samday-Shingle-Worf complex, 3 to 15 percent slopes	2,850	0.2
98	Samoist-Colsavage clay loams, hilly	12,220	0.8
99	Savageton-Bahl clay loams, 2 to 10 percent slopes	39,660	2.6
100	Shingle-Samday-Rock outcrop complex, hilly	40,250	2.6
101	Shingle-Theedle loams, 6 to 30 percent slopes	40,625	2.6
102	Shingle-Theedle-Cambria association, steeply sloping	16,775	1.1
103	Shingle Variant-Theedle Variant loams, 6 to 30 percent slopes	1,750	0.1
104	Stetter clay, 0 to 3 percent slopes	1,850	0.1
105	Stovho Variant-Stovho complex, 3 to 30 percent slopes	3,410	0.2
106	Sugakool loam, 2 to 6 percent slopes	750	*
107	Sugakool-Colhill complex, 2 to 6 percent slopes	2,600	0.2
108	Sugakool-Colhill complex, 6 to 10 percent slopes	1,475	0.1
109	Tassel-Shingle complex, 2 to 30 percent slopes	69,515	4.5
110	Tassel-Terro-Rock outcrop complex, 15 to 30 percent slopes	6,225	0.4
111	Tassel-Turnercrest complex, 6 to 30 percent slopes	80,250	5.2
112	Tassel Variant-Shingle Variant complex, 2 to 30 percent slopes	690	*
113	Terro-Turnercrest sandy loams, 2 to 10 percent slopes	15,040	1.0
114	Theedle-Kishona loams, 2 to 15 percent slopes	13,175	0.9
115	Thermopolis Variant-Rock outcrop complex, 10 to 60 percent slopes	2,450	0.2
116	Topeman-Demar complex, 0 to 3 percent slopes	5,720	0.4
117	Twotop clay, 0 to 6 percent slopes	2,400	0.2
118	Ulm loam, 1 to 6 percent slopes	2,500	0.2
119	Ulm clay loam, 0 to 6 percent slopes	2,650	0.2
120	Ulm-Renohill association, undulating	1,800	0.1
121	Ustic Torrifluvents, 0 to 6 percent slopes	3,275	0.2
122	Ustic Torriorthents-Typic Eutroboralfs-Rock outcrop complex, 10 to 40 percent slopes	2,200	0.1
123	Vanocker-Citadel complex, 20 to 60 percent slopes	7,100	0.5
124	Vassett silt loam, 2 to 6 percent slopes	5,250	0.3
125	Vassett silt loam, 6 to 10 percent slopes	1,980	0.1
126	Vonalee-Terro complex, 2 to 10 percent slopes	37,500	2.4
127	Winler-Savageton complex, 6 to 15 percent slopes	4,500	0.3

See footnote at end of table.

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
128	Worf-Shingle-Tassel complex, 3 to 30 percent slopes	7,250	0.5
	Water	1,580	0.1
	Denied Access	96,230	5.9
	Total	1,541,120	100.0

* Less than 0.1 percent.

TABLE 4.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Land capability	Winter wheat	Spring wheat	Alfalfa hay	Grass hay	Oats	Barley
		Bu	Bu	Tons	Tons	Bu	Bu
1---------- Absted-Bone	VIs	---	---	---	---	---	---
2---------- Alice Variant	IVe	25	---	1.3	0.7	---	---
3---------- Bidman	IVe	35	---	1.5	1.0	---	---
4---------- Bidman-Bone	IVe	---	---	---	---	---	---
5*: Bidman---------	IVe	35	---	1.5	1.0		
Ulm----------	IVe	---	25	---	0.7	---	---
6---------- Bone	VIs	---	---	---	---	---	---
7*---------- Bowbac-Tassel-Rock outcrop	VIe	---	---	---	---	---	---
8---------- Cadoma	VIs	---	---	---	---	---	---
9---------- Cambria	IVe	25	---	0.7	0.5	---	---
10---------- Chinook	IVe	28	22	0.8	1.0	---	
11---------- Chinook-Tassel Variant	VIe	---	---	---	---	---	---
12---------- Chinook-Tassel Variant	VIIe	---	---	---	---	---	---
13---------- Chinook-Theedle Variant	IVe	---	---	---	---	---	---
14---------- Chinook-Theedle Variant	VIe	---	---	---	---	---	---
15---------- Citadel-Lakoa	IVe	---	---	---	---	---	---
16---------- Citadel-Lakoa	VIIe	---	---	---	---	---	---
17---------- Citadel-McCaffery	IVe	---	---	---	---	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Winter wheat	Spring wheat	Alfalfa hay	Grass hay	Oats	Barley
		Bu	Bu	Tons	Tons	Bu	Bu
18---------- Citadel-McCaffery	VIe	---	---	---	---	---	---
19---------- Colhill-Rothican	VIIe	---	---	---	---	---	---
20---------- Colnevee	IIIe	25	---	1.0	1.0	30	---
21---------- Colnevee	IVe	---	---	---	---	---	---
22---------- Colnevee	IVe	25	---	1.0	1.0	30	---
23---------- Colnevee	VIe	---	---	---	---	---	---
24---------- Colnevee Variant	IVe	---	---	---	---	---	---
25---------- Colombo Variant	IIIe	---	---	1.0	0.7	---	---
26---------- Columbo Variant	IIIw	---	---	1.0	0.7	---	---
27---------- Colsavage-Bahl Variant	VIe	---	---	---	---	---	---
28---------- Cordeston	IIIe	25	---	1.5	1.2	60	40
29*---------- Corpening-Rock outcrop	VIIs	---	---	---	---	---	---
30---------- Crownest-Regnaps	VIe	---	---	---	---	---	---
31---------- Crownest-Regnaps	VIIe	---	---	---	---	---	---
32---------- Cushman	IVe	---	---	0.5	0.5	---	---
33---------- Cushman-Cambria	IVe	---	---	0.5	0.5	---	---
34---------- Cushman-Renohill	IVe	---	---	---	---	---	---
35---------- Cushman-Shingle	VIe	---	---	---	---	---	---
36---------- Cushman-Terro	IVe	---	---	0.5	0.5	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Winter wheat	Spring wheat	Alfalfa hay	Grass hay	Oats	Barley
		Bu	Bu	Tons	Tons	Bu	Bu
37---------- Dwyer	VIe	---	---	---	---	---	---
38---------- Forkwood	IVe	25	---	0.7	0.5	---	---
39---------- Forkwood-Cambria-Cushman	IVe	25	---	0.7	0.5	---	---
40---------- Forkwood-Cushman-Terro	IVe	---	---	0.5	0.5	---	---
41---------- Forkwood-Ulm	---	---	---	---	---	---	---
42*---------- Grummit-Maggin	VIe	---	---	---	---	---	---
43, 44---------- Grummit-Snomo	VIIe	---	---	---	---	---	---
45*---------- Gullied land-Torriorthents	VIIe	---	---	---	---	---	---
46---------- Haverdad-Clarkelen	IVe	---	---	1.0	1.0	---	---
47---------- Haverdad-Clarkelen Variant	IVw	---	---	---	---	---	---
48---------- Higgins Variant	Vw	---	---	---	---	---	---
49---------- Hiland-Bowbac	IVe	---	---	0.5	0.5	---	---
50*: Hiland---------	IVe	---	---	0.5	0.5	---	---
Vonalee--------	IVe	---	---	---	---	---	---
51---------- Hilight	VIIe	---	---	---	---	---	---
52---------- Keeline-Turnercrest	IVe	---	---	---	---	---	---
53---------- Kishona	IVe	---	---	---	---	---	---
54---------- Kishona	VIw	---	---	---	---	---	---
55---------- Kishona-Shingle-Theedle	VIe	---	---	---	---	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Winter wheat	Spring wheat	Alfalfa hay	Grass hay	Oats	Barley
		Bu	Bu	Tons	Tons	Bu	Bu
56---------- Kishona-Theedle-Zigweid	IVe	---	---	---	---	---	---
57---------- Lakoa-Crownest	VIIe	---	---	---	---	---	---
58---------- Lohmiller	IVw	---	---	---	---	---	---
59---------- Lohmiller-Haverdad	IVe	---	---	---	---	---	---
60---------- Lohmiller-Haverdad	VIs	---	---	---	---	---	---
61---------- Lohsman	IVs	---	---	---	---	---	---
62---------- Nilrap	IIIe	25	---	1.0	1.0	---	---
63---------- Norkool	IVe	25	---	1.0	1.0	---	---
64---------- Nunnston	IIIe	25	---	1.0	1.0	---	---
65---------- Nunnston-Tanna Variant	IVe	---	---	---	---	---	---
66---------- Nunnston-Tanna Variant	VIe	---	---	---	---	---	---
67---------- Onita Variant	IIIe	---	---	---	---	---	---
68---------- Orella-Cadoma	VIIs	---	---	---	---	---	---
69---------- Orella-Samday-Rock outcrop	VIIe	---	---	---	---	---	---
70---------- Parmleed-Bidman	IVe	---	---	---	---	---	---
71---------- Parmleed-Bowbac	VIe	---	---	---	---	---	---
72---------- Parmleed-Forkwood	IVe	---	---	---	---	---	---
73---------- Parmleed-Renohill	VIe	---	---	---	---	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Winter wheat	Spring wheat	Alfalfa hay	Grass hay	Oats	Barley
		Bu	Bu	Tons	Tons	Bu	Bu
74---------- Pesowyo-Paunsaugunt	VIe	---	---	---	---	---	---
75---------- Pesowyo-Paunsaugunt	VIIe	---	---	---	---	---	---
76---------- Petrie	VIs	---	---	---	---	---	---
77---------- Petrie-Ustic Torriorthents	VIw	---	---	---	---	---	---
78*---------- Pits, bentonite	VIIIe	---	---	---	---	---	---
79*---------- Pits, gravel	VIIIe	---	---	---	---	---	---
80---------- Recluse	IIIe	25	---	---	---	---	---
81---------- Reicess	IIIe	25	---	1.0	1.0	---	---
82---------- Reicess-Wages Variant	IIIe	25	---	1.0	1.0	---	---
83---------- Reicess-Wages Variant	IVe	---	---	---	---	---	---
84---------- Regnaps-Crownest	VIe	---	---	---	---	---	---
85---------- Regnaps-Norkool-Crownest	IVe	---	---	---	---	---	---
86---------- Rekop Variant-Gypnevee Variant-Rock outcrop	VIe	---	---	---	---	---	---
87---------- Rekop Variant-Gypnevee Variant-Rock outcrop	VIIe	---	---	---	---	---	---
88, 89---------- Renohill	IVe	---	---	---	0.6	---	15
90---------- Renohill-Savageton	VIe	---	---	---	---	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Winter wheat	Spring wheat	Alfalfa hay	Grass hay	Oats	Barley
		Bu	Bu	Tons	Tons	Bu	Bu
91*---------- Rock outcrop	VIIIe	---	---	---	---	---	---
92*---------- Rock outcrop-Vanocker	VIIe	---	---	---	---	---	---
93*---------- Rock outcrop-Wibaux	VIIe	---	---	---	---	---	---
94---------- Rothican-Colhill	VIe	---	---	---	---	---	---
95---------- Samday-Grummit	VIIe	---	---	---	---	---	---
96---------- Samday-Savageton	VIIe	---	---	---	---	---	---
97---------- Samday-Shingle-Worf	VIIe	---	---	---	---	---	---
98---------- Samoist-Colsavage	VIIe	---	---	---	---	---	---
99---------- Savageton-Bahl	VIe	---	---	---	---	---	---
100---------- Shingle-Samday-Rock outcrop	VIIe	---	---	---	---	---	---
101---------- Shingle-Theedle	VIIe	---	---	---	---	---	---
102---------- Shingle-Theedle-Cambria	VIe	---	---	---	---	---	---
103---------- Shingle Variant-Theedle Variant	VIIe	---	---	---	---	---	---
104---------- Stetter	IVw	---	---	1.3	---	25	---
105---------- Stovho Variant-Stovho	VIIe	---	---	---	---	---	---
106---------- Sugakool	IVe	2.5	---	1.0	1.0	---	---
107---------- Sugakool-Colhill	IVe	---	---	---	---	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Winter wheat	Spring wheat	Alfalfa hay	Grass hay	Oats	Barley
		Bu	Bu	Tons	Tons	Bu	Bu
108---------- Sugakool-Colhill	VIe	---	---	---	---	---	---
109---------- Tassel-Shingle	VIIe	---	---	---	---	---	---
110---------- Tassel-Terro-Rock outcrop	VIIe	---	---	---	---	---	---
111---------- Tassel-Turnercrest	VIIe	---	---	---	---	---	---
112---------- Tassel Variant-Shingle Variant	VIIe	---	---	---	---	---	---
113---------- Terro-Turnercrest	VIe	---	---	---	---	---	---
114---------- Theedle-Kishona	VIe	---	---	---	---	---	---
115---------- Thermopolis Variant-Rock outcrop	VIIe	---	---	---	---	---	---
116---------- Topeman-Demar	VIs	---	---	---	---	---	---
117---------- Twotop	VIs	---	---	---	---	---	---
118, 119-------- Ulm	IVe	---	25	---	0.7	---	---
120*:							
Ulm----------	IVe	---	25	---	0.7	---	---
Renohill-------	VIe	---	---	---	---	---	---
121---------- Ustic Torrifluvents	IVe	---	---	---	---	---	---
122---------- Ustic Torrifluvents-Typic Eutroboralfs-Rock outcrop	VIIs	---	---	---	---	---	---
123---------- Vanocker-Citadel	VIIe	---	---	---	---	---	---
124---------- Vassett	IIIe	25	---	---	---	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Winter wheat	Spring wheat	Alfalfa hay	Grass hay	Oats	Barley
		Bu	Bu	Tons	Tons	Bu	Bu
125---------- Vassett	IVe	---	---	---	---	---	---
126---------- Vonalee-Terro	IVe	---	---	---	---	---	---
127---------- Winler-Savageton	VIe	---	---	---	---	---	---
128---------- Worf-Shingle-Tassel	VIIe	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
15*: Citadel	3A	Moderate	Moderate	Slight	Slight	Ponderosa pine	60	Ponderosa pine.
						Bur oak	---	
						Quaking aspen	---	
						Eastern hophornbeam	---	
						Paper birch	---	
Lakoa	3A	Slight	Moderate	Slight	Slight	Ponderosa pine	60	Ponderosa pine.
						Bur oak	---	
						Quaking aspen	---	
						Eastern hophornbeam	---	
						Paper birch	---	
						Black Hills spruce	---	
16*: Citadel	3R	Severe	Moderate	Slight	Slight	Ponderosa pine	60	Ponderosa pine.
						Bur oak	---	
						Quaking aspen	---	
						Eastern hophornbeam	---	
						Paper birch	---	
Lakoa	3R	Severe	Moderate	Slight	Slight	Ponderosa pine	60	Ponderosa pine.
						Bur oak	---	
						Quaking aspen	---	
						Eastern hophornbeam	---	
						Paper birch	---	
						Black Hills spruce	---	
17, 18*: Citadel	3A	Severe	Moderate	Slight	Slight	Ponderosa pine	60	Ponderosa pine.
						Quaking aspen	---	
						Black Hills spruce	---	
McCaffery	3S	Slight	Severe	Moderate	Severe	Ponderosa pine	60	Ponderosa pine.
						Quaking aspen	---	
57*: Lakoa	3A	Severe	Moderate	Slight	Slight	Ponderosa pine	60	Ponderosa pine.
						Bur oak	---	
						Quaking aspen	---	
						Eastern hophornbeam	---	
						Paper birch	---	
Crownest.								
74*: Pesowyo	3F	Moderate	Severe	Severe	Severe	Ponderosa pine	55	Ponderosa pine.
Paunsaugunt	2F	Moderate	Severe	Severe	Severe	Ponderosa pine	45	Ponderosa pine.
75*: Pesowyo	2F	Severe	Severe	Severe	Severe	Ponderosa pine	45	Ponderosa pine.
Paunsaugunt	2F	Severe	Severe	Severe	Severe	Ponderosa pine	45	Ponderosa pine.
86, 87*: Rekop Variant	2D	Moderate	Moderate	Severe	Moderate	Ponderosa pine	45	Ponderosa pine.
Gypnevee Variant	3D	Moderate	Moderate	Severe	Moderate	Ponderosa pine	55	Ponderosa pine.
Rock outcrop.								

See footnote at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
92*:								
Rock outcrop.								
Vanocker-------	3R	Severe	Moderate	Slight	Slight	Ponderosa pine------	60	Ponderosa pine.
						Quaking aspen-------	---	
						Black Hills spruce--	---	
105*:								
Stovho Variant-	3A	Moderate	Severe	Slight	Moderate	Lodgepole pine------	70	Ponderosa pine.
						Ponderosa pine------	60	
Stovho---------	4A	Moderate	Slight	Slight	Slight	Ponderosa pine------	80	Ponderosa pine, Black Hills spruce.
						Black Hills spruce--	---	
						Quaking aspen-------	---	
						Paper birch---------	---	
123*:								
Vanocker-------	3R	Severe	Moderate	Slight	Slight	Ponderosa pine------	60	Ponderosa pine.
Citadel--------	3R	Severe	Moderate	Slight	Slight	Ponderosa pine------	60	Ponderosa pine.
						Bur oak-------------	---	
						Quaking aspen-------	---	
						Eastern hophornbeam-	---	
						Paper birch---------	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
15*:				
Citadel	Favorable	1,950	Kentucky bluegrass	50
	Normal	1,500	Green needlegrass	10
	Unfavorable	1,200	Sedges	5
			Timber danthonia	5
			Western snowberry	5
Lakoa	Favorable	800	Little bluestem	20
	Normal	600	Sedges	20
	Unfavorable	400	Oregon-grape	15
			Sideoats grama	15
			Western wheatgrass	10
16*:				
Citadel	Favorable	1,800	Kentucky bluegrass	50
	Normal	1,400	Green needlegrass	10
	Unfavorable	900	Sedges	5
			Timber danthonia	5
			Western snowberry	5
Lakoa	Favorable	800	Little bluestem	20
	Normal	600	Sedges	20
	Unfavorable	400	Oregon-grape	15
			Sideoats grama	15
			Western wheatgrass	10
57*:				
Lakoa	Favorable	800	Little bluestem	20
	Normal	600	Sedges	20
	Unfavorable	400	Oregon-grape	15
			Sideoats grama	15
			Western wheatgrass	10
Crownest.				
74*:				
Pesowyo	Favorable	800	Sedges	25
	Normal	650	Columbia needlegrass	20
	Unfavorable	500	Snowberry	15
			Prairie thermopsis	10
			Serviceberry	5
Paunsaugunt	Favorable	1,000	Kentucky bluegrass	20
	Normal	800	Oregon-grape	20
	Unfavorable	500	Serviceberry	20
			Western wheatgrass	10
			Timber danthonia	5
75*:				
Pesowyo	Favorable	800	Sedges	25
	Normal	650	Columbia needlegrass	20
	Unfavorable	500	Snowberry	15
			Prairie thermopsis	10
			Serviceberry	5
Paunsaugunt	Favorable	1,000	Kentucky bluegrass	20
	Normal	800	Oregon-grape	20
	Unfavorable	500	Serviceberry	20
			Western wheatgrass	10
			Timber danthonia	5

See footnote at end of table.

TABLE 6.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
86, 87*:				
Rekop Variant-----	Favorable	800	Sideoats grama----------	---
	Normal	650	Green needlegrass----------	---
	Unfavorable	500	Kentucky bluegrass----------	---
			Western wheatgrass----------	---
			Blue grama----------	---
Gypnevee Variant--	Favorable	650	Green needlegrass----------	---
	Normal	500	Western wheatgrass----------	---
	Unfavorable	400	Bearberry----------	---
			Snowberry----------	---
			Serviceberry----------	---
Rock outcrop.				
92*:				
Rock outcrop.				
Vanocker----------	Favorable	600	Bluebunch wheatgrass----------	30
	Normal	450	Sedges----------	20
	Unfavorable	250	Little bluestem----------	20
			Western snowberry----------	15
			Columbia needlegrass----------	10
105*:				
Stovho Variant----	Favorable	1,900	Timber danthonia----------	15
	Normal	1,500	Yellow wildrye----------	15
	Unfavorable	1,200	Tufted hairgrass----------	10
			Sedges----------	5
			Serviceberry----------	5
Stovho----------	Favorable	1,900	Roughleaf ricegrass----------	50
	Normal	1,500	Yellow wildrye----------	20
	Unfavorable	1,200	Oregon-grape----------	10
			Sedges----------	5
			Slender wheatgrass----------	5
123*:				
Vanocker----------	Favorable	600	Bluebunch wheatgrass----------	30
	Normal	450	Sedges----------	20
	Unfavorable	250	Snowberry----------	20
			Little bluestem----------	20
			Columbia needlegrass----------	10
Citadel----------	Favorable	1,800	Kentucky bluegrass----------	50
	Normal	1,400	Green needlegrass----------	10
	Unfavorable	900	Timber danthonia----------	5
			Sedges----------	5
			Western snowberry----------	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1*: Absted	Slight	Slight	Severe: excess sodium.	Slight.
Bone	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: slope, percs slowly, dusty.	Moderate: dusty.
2---- Alice Variant	Slight	Slight	Severe: slope.	Slight.
3---- Bidman	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
4*: Bidman	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Moderate: dusty.
Bone	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: dusty.
5*: Bidman	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Ulm	Slight	Slight	Moderate: slope.	Slight.
6---- Bone	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: dusty.
7*: Bowbac	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Tassel	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Rock outcrop.				
8---- Cadoma	Severe: excess salt.	Severe: excess salt.	Severe: slope, excess salt.	Severe: erodes easily.
9---- Cambria	Slight	Slight	Moderate: slope.	Slight.
10---- Chinook	Slight	Slight	Severe: slope.	Slight.
11*: Chinook	Slight	Slight	Severe: slope.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
11*: Tassel Variant	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
12*: Chinook	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Tassel Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
13*: Chinook	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Theedle Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
14*: Chinook	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Theedle Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
15*: Citadel	Slight	Slight	Severe: slope.	Slight.
Lakoa	Slight	Slight	Severe: slope.	Slight.
16*: Citadel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Lakoa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
17*: Citadel	Slight	Slight	Severe: slope.	Slight.
McCaffery	Slight	Slight	Severe: slope.	Slight.
18*: Citadel	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
McCaffery	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
19*: Colhill	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Rothican	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
20--- Colnevee	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
21--- Colnevee	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
22--- Colnevee	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
23--- Colnevee	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
24--- Colnevee Variant	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
25--- Colombo Variant	Severe: flooding.	Slight---	Moderate: small stones.	Slight.
26--- Colombo Variant	Severe: flooding.	Slight---	Moderate: small stones.	Slight.
27*: Colsavage---	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Bahl Variant---	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
28--- Cordeston	Severe: flooding.	Slight---	Moderate: slope, small stones.	Slight.
29*--- Corpening	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.
Rock outcrop.				
30*: Crownest---	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
Regnaps---	Slight---	Slight---	Severe: slope.	Slight.
31*: Crownest---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
Regnaps---	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
32--- Cushman	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
33*: Cushman---	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
33*:				
Cambria	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
34*:				
Cushman	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
Renohill	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.
35*:				
Cushman	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
Shingle	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.
36*:				
Cushman	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
Terro	Slight	Slight	Severe: slope.	Slight.
37 Dwyer	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
38 Forkwood	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
39*:				
Forkwood	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Cambria	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
Cushman	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
40*:				
Forkwood	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Cushman	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
Terro	Slight	Slight	Severe: slope.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
41*: Forkwood	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Ulm	Slight	Slight	Moderate: slope.	Slight.
42*: Grummit	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Maggin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
43*: Grummit	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Snomo	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
44*: Grummit	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Snomo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.
45*: Gullied land. Torriorthents.				
46* Haverdad	Severe: flooding.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Clarkelen	Severe: flooding.	Slight	Moderate: slope.	Slight.
47*: Haverdad	Severe: flooding.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Clarkelen Variant	Severe: flooding, excess salt.	Severe: excess salt.	Severe: excess salt.	Slight.
48 Higgins Variant	Severe: flooding.	Slight	Slight	Severe: erodes easily.
49*: Hiland	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
49*:				
Bowbac	Slight	Slight	Moderate: slope, depth to rock.	Slight.
50*:				
Hiland	Slight	Slight	Moderate: slope.	Slight.
Vonalee	Slight	Slight	Moderate: slope.	Slight.
51--- Hilight	Severe: slope, percs slowly, depth to rock.	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, percs slowly.	Moderate: slope.
52*:				
Keeline	Slight	Slight	Severe: slope.	Slight.
Turnercrest	Slight	Slight	Severe: slope.	Slight.
53--- Kishona	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
54--- Kishona	Moderate: excess salt.	Moderate: excess salt.	Moderate: small stones.	Slight.
55*:				
Kishona	Moderate: slope, dusty, excess salt.	Moderate: slope, excess salt, dusty.	Severe: slope.	Moderate: dusty.
Shingle	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.
Theedle	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Slight.
56*:				
Kishona	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Severe: slope.	Moderate: dusty.
Theedle	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Slight.
Zigweid	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
57*:				
Lakoa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Crowmest	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe, slope, depth to rock, small stones.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
58---------- Lohmiller	Severe: flooding.	Slight----------	Moderate: flooding.	Slight.
59*, 60*: Lohmiller----------	Severe: flooding.	Slight----------	Moderate: slope.	Slight.
Haverdad----------	Severe: flooding.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
61---------- Lohsman	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Slight.
62---------- Nilrap	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
63---------- Norkool	Slight----------	Slight----------	Severe: slope.	Severe: erodes easily.
64---------- Nunnston	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
65*: Nunnston----------	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Tanna Variant--------	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
66*: Nunnston----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
Tanna Variant--------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
67---------- Onita Variant	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight.
68*: Orella----------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Cadoma----------	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Severe: erodes easily.
69*: Orella----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Samday----------	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: to clayey, erodes easily.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
69*: Rock outcrop.				
70*: Parmleed	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Severe: slope.	Severe: erodes easily.
Bidman	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
71*: Parmleed	Moderate: slope, percs slowly, dusty.	Moderate: slope, percs slowly, dusty.	Severe: slope.	Severe: erodes easily.
Bowbac	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
72*: Parmleed	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.
Forkwood	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
73*: Parmleed	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.
Renohill	Slight	Slight	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.
74*: Pesowyo	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
Paunsaugunt	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
75*: Pesowyo	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Paunsaugunt	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
76 Petrie	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: small stones, percs slowly.	Severe: erodes easily.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
77*: Petrie	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Severe: erodes easily.
Ustic Torriorthents.				
78*. Pits, bentonite				
79*. Pits, gravel				
80--- Recluse	Slight	Slight	Moderate: slope, small stones.	Slight.
81--- Reicess	Slight	Slight	Moderate: slope, small stones.	Slight.
82*: Reicess	Slight	Slight	Moderate: slope, small stones.	Slight.
Wages Variant	Slight	Slight	Moderate: slope, small stones.	Slight.
83*: Reicess	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Wages Variant	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
84*: Regnaps	Slight	Slight	Severe: slope.	Slight.
Crownest	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.
85*: Regnaps	Slight	Slight	Severe: slope.	Slight.
Norkool	Slight	Slight	Severe: slope.	Severe: erodes easily.
Crownest	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, small stones, slope.	Slight.
86*: Rekop Variant	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Gypnevee Variant	Slight	Slight	Severe: slope.	Severe: erodes easily.
Rock outcrop.				

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
87*:				
Rekop Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Gypnevee Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Rock outcrop.				
88 Renohill	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.
89 Renohill	Slight	Slight	Severe: slope.	Severe: erodes easily.
90*:				
Renohill	Slight	Slight	Severe: slope.	Severe: erodes easily.
Savageton	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight.
91*. Rock outcrop				
92*: Rock outcrop.				
Vanocker	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
93*: Rock outcrop.				
Wibaux	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
94*:				
Rothican	Slight	Slight	Severe: slope.	Slight.
Colhill	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.
95*:				
Samday	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: too clayey, erodes easily.
Grummit	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: too clayey.
96*:				
Samday	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: too clayey, erodes easily.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
96*:				
Savageton	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Moderate: slope.
97*:				
Samday	Severe: too clayey, depth to rock.	Severe: too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: too clayey, erodes easily.
Shingle	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.
Worf	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.
98*:				
Samoist	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, depth to rock.	Severe: erodes easily.
Colsavage	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
99*:				
Savageton	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight.
Bahl	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
100*:				
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Samday	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, erodes easily.
Rock outcrop.				
101*:				
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
Theedle	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
102*:				
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
Theedle	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Cambria	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
103*: Shingle Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Theedle Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
104 Stetter	Severe: flooding.	Moderate: flooding, too clayey, percs slowly.	Severe: flooding.	Moderate: too clayey, flooding.
105*: Stovho Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily
Stovho	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
106 Sugakool	Slight	Slight	Moderate: slope.	Slight.
107*: Sugakool	Slight	Slight	Moderate: slope.	Slight.
Colhill	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.
108*: Sugakool	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Colhill	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.
109*: Tassel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
110*: Tassel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Terro	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Rock outcrop.				
111*: Tassel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
111*: Turnercrest	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
112*: Tassel Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Shingle Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
113*: Terro	Slight	Slight	Severe: slope.	Slight.
Turnercrest	Slight	Slight	Severe: slope.	Slight.
114*: Theedle	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Slight.
Kishona	Moderate: slope, dusty, excess salt.	Moderate: slope, excess salt, dusty.	Severe: slope.	Moderate: dusty.
115*: Thermopolis Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Rock outcrop.				
116*: Topeman	Severe: flooding.	Severe: too clayey, percs slowly.	Severe: flooding.	Severe: erodes easily.
Demar	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: dusty.
117--- Twotop	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey, percs slowly.	Moderate: too clayey.
118--- Ulm	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
119--- Ulm	Slight	Slight	Moderate: slope.	Slight.
120*: Ulm	Slight	Slight	Moderate: slope.	Slight.
Renohill	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
121. Ustic Torrifluvents				
122*: Ustic Torriorthents.				
Typic Eutroboralfs.				
Rock outcrop.				
123*:				
Vanocker	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Citadel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
124 Vassett	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
125 Vassett	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
126*:				
Vonalee	Slight	Slight	Severe: slope.	Slight.
Terro	Slight	Slight	Severe: slope.	Slight.
127*:				
Winler	Moderate: slope, percs slowly, too clayey.	Moderate: slope, too clayey, percs slowly.	Severe: slope.	Severe: erodes easily.
Savageton	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight.
128*:				
Worf	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
Tassel	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
1*:								
Absted	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Bone	Poor	Poor	Very poor	---	Very poor	Poor	---	Very poor.
2 Alice Variant	Fair	Good	Good	---	Good	Fair	---	Good.
3 Bidman	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
4*:								
Bidman	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Bone	Poor	Poor	Very poor	---	Very poor	Poor	---	Very poor.
5*:								
Bidman	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Ulm	Fair	Good	Fair	---	Fair	Fair	---	Fair.
6 Bone	Poor	Poor	Very poor	---	Very poor	Poor	---	Very poor.
7*:								
Bowbac	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Tassel	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Rock outcrop.								
8 Cadoma	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
9 Cambria	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
10 Chinook	Fair	Good	Good	---	Good	Good	---	Good.
11*, 12*:								
Chinook	Fair	Good	Good	---	Good	Good	---	Good.
Tassel Variant	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
13*:								
Chinook	Fair	Good	Good	---	Good	Good	---	Good.
Theedle Variant	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
14*:								
Chinook	Fair	Good	Good	---	Good	Good	---	Good.
Theedle Variant	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
15*:								
Citadel	Very poor	Very poor	Poor	Good	Good	Very poor	Good	---
Lakoa	Poor	Fair	Very poor	Good	---	Poor	Good	---

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
16*:								
Citadel	Very poor	Very poor	Poor	Good	Good	Very poor	Good	---
Lakoa	Very poor	Very poor	Very poor	Good	---	Very poor	Good	---
17*:								
Citadel	Poor	Poor	Fair	Good	---	Poor	Good	---
McCaffery	Poor	Poor	Good	Good	---	Fair	Good	---
18*:								
Citadel	Very poor	Very poor	Poor	Good	---	Very poor	Good	---
McCaffery	Poor	Poor	Fair	Good	---	Poor	Good	---
19*:								
Colhill	Very poor	Fair	Fair	---	Fair	Very poor	---	Fair.
Rothican	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
20--- Colnevee	Poor	Fair	Fair	---	Fair	Poor	---	Fair.
21--- Colnevee	Very poor	Poor	Fair	---	Fair	Very poor	---	Fair.
22--- Colnevee	Poor	Fair	Fair	---	Fair	Poor	---	Fair.
23--- Colnevee	Very poor	Poor	Fair	---	Fair	Very poor	---	Fair.
24--- Colnevee Variant	Very poor	Poor	Fair	---	Fair	Very poor	---	Fair.
25, 26--- Colombo Variant	Fair	Good	Fair	---	Fair	Fair	---	Fair.
27*:								
Colsavage	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Bahl Variant	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
28--- Cordeston	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
29*:								
Corpening	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Rock outcrop.								
30*, 31*:								
Crownest	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Regnaps	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
32--- Cushman	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
33*:								
Cushman	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Cambria	Fair	Fair	Fair	---	Fair	Fair	---	Fair.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
34*:								
Cushman	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Renohill	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
35*:								
Cushman	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
36*:								
Cushman	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Terro	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
37---------- Dwyer	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
38---------- Forkwood	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
39*:								
Forkwood	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Cambria	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Cushman	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
40*:								
Forkwood	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Cushman	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Terro	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
41*:								
Forkwood	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Ulm	Fair	Good	Fair	---	Fair	Fair	---	Fair.
42*:								
Grummit	Very poor	Very poor	Fair	Very poor	Fair	Very poor	---	Fair.
Maggin	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
43*, 44*:								
Grummit	Very poor	Very poor	Fair	Very poor	Fair	Very poor	---	Fair.
Snomo	Very poor	Very poor	Good	Poor	Good	Very poor	---	Good.
45*. Gullied land Torriorthents								
46*:								
Haverdad	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Clarkelen	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
47*:								
Haverdad	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Clarkelen Variant	Poor	Fair	Poor	Fair	Poor	Poor	---	Poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
48---------- Higgins Variant	Very poor	Poor	Poor	Poor	Poor	Poor	---	Poor.
49*:								
Hiland----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Bowbac----------	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
50*:								
Hiland----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Vonalee----------	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
51---------- Hilight	Very poor	Very poor	Fair	---	Fair	Very poor	---	Fair.
52*:								
Keeline----------	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Turnercrest--------	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
53, 54---------- Kishona	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
55*:								
Kishona----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Shingle----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Theedle----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
56*:								
Kishona----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Theedle----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Zigweid----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
57*:								
Lakoa----------	Very poor	Very poor	Very poor	Good	---	Very poor	Good	---
Crownest----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
58---------- Lohmiller	Fair	Good	Good	Poor	Good	Good	---	Good.
59*, 60*:								
Lohmiller----------	Fair	Good	Good	Poor	Good	Good	---	Good.
Haverdad----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
61---------- Lohsman	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
62---------- Nilrap	Fair	Fair	Good	---	Good	Fair	---	Good.
63---------- Norkool	Fair	Good	Fair	---	Poor	Fair	---	Fair.
64---------- Nunnston	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
65*:								
Nunnston----------	Fair	Fair	Fair	---	Fair	Fair	---	Fair.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
65*: Tanna Variant------	Fair	Good	Fair	---	Fair	Fair	---	Fair.
66*: Nunnston----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Tanna Variant------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
67---------- Onita Variant	Fair	Good	Fair	---	Fair	Fair	---	Fair.
68*: Orella----------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Cadoma----------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
69*: Orella----------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Samday----------	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Rock outcrop.								
70*: Parmleed----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Bidman----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
71*: Parmleed----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Bowbac----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
72*: Parmleed----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Forkwood----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
73*: Parmleed----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Renohill----------	Fair	Good	Fair	---	Fair	Fair	---	Fair.
74*: Pesowyo----------	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Very poor	---
Paunsaugunt--------	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Poor	---
75*: Pesowyo----------	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Very poor	---
Paunsaugunt--------	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Poor	---
76---------- Petrie	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
77*: Petrie----------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Ustic Torriorthents.								
78*. Pits, bentonite								

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
79*. Pits, gravel								
80---------- Recluse	Fair	Good	Good	---	Good	Good	---	Good.
81---------- Reicess	Fair	Good	Good	---	Good	Good	---	Good.
82*, 83*:								
Reicess----------	Fair	Good	Good	---	Good	Good	---	Good.
Wages Variant------	Fair	Good	Fair	---	Fair	Fair	---	Fair.
84*:								
Regnaps----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Crownest----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
85*:								
Regnaps----------	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Norkool----------	Fair	Good	Fair	---	Poor	Fair	---	Fair.
Crownest----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
86*, 87*:								
Rekop Variant------	Very poor	Very poor	Fair	---	Fair	Very poor	---	Fair.
Gypnevee Variant---	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Rock outcrop.								
88, 89---------- Renohill	Fair	Good	Fair	---	Fair	Fair	---	Fair.
90*:								
Renohill----------	Fair	Good	Fair	---	Fair	Fair	---	Fair.
Savageton----------	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
91*. Rock outcrop								
92*: Rock outcrop.								
Vanocker----------	Very poor	Very poor	Very poor	Good	---	Very poor	Good	---
93*: Rock outcrop.								
Wibaux----------	Very poor	Poor	Fair	---	Fair	Very poor	---	Fair.
94*:								
Rothican----------	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Colhill----------	Very poor	Fair	Fair	Very poor	Fair	Very poor	---	Fair.
95*:								
Samday----------	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Grummit----------	Very poor	Very poor	Fair	Very poor	Fair	Very poor	---	Fair.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
96*:								
Samday	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Savageton	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
97*:								
Samday	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Worf	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
98*:								
Samoist	Very poor	Very poor	Fair	---	Fair	Very poor	---	Fair.
Colsavage	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
99*:								
Savageton	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Bahl	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
100*:								
Shingle	Poor	Poor	Fair	---	Fair	Fair	---	Fair.
Samday	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Rock outcrop.								
101*:								
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Theedle	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
102*:								
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Theedle	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Cambria	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
103*:								
Shingle Variant	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
Theedle Variant	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
104 Stetter	Poor	Fair	Fair	---	Fair	Poor	---	Fair.
105*:								
Stovho Variant	Poor	Fair	Fair	---	Fair	Fair	Fair	---
Stovho	Very poor	Very poor	Very poor	Good	---	Very poor	Good	---
106 Sugakool	Fair	Fair	Good	---	Good	Fair	---	Good.
107*:								
Sugakool	Fair	Fair	Good	---	Good	Fair	---	Good.
Colhill	Poor	Fair	Fair	---	Fair	Poor	---	Fair.
108*:								
Sugakool	Fair	Fair	Good	---	Good	Fair	---	Good.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
108*:								
Colhill	Very poor	Fair	Fair	---	Fair	Very poor	---	Fair.
109*:								
Tassel	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
110*:								
Tassel	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Terro	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Rock outcrop.								
111*:								
Tassel	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Turnercrest	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
112*:								
Tassel Variant	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
Shingle Variant	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
113*:								
Terro	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Turnercrest	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
114*:								
Theedle	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Kishona	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
115*:								
Thermopolis Variant	Very poor	Poor	Fair	---	Fair	Poor	---	Fair.
Rock outcrop.								
116*:								
Topeman	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Demar	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
117---- Twotop	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
118, 119---- Ulm	Fair	Good	Fair	---	Fair	Fair	---	Fair.
120*:								
Ulm	Fair	Good	Fair	---	Fair	Fair	---	Fair.
Renohill	Fair	Good	Fair	---	Fair	Fair	---	Fair.
121. Ustic Torrifluvents								
122*: Ustic Torriorthents.								

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for---		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
122*: Typic Eutroboralfs.								
Rock outcrop.								
123*: Vanocker	Very poor	Very poor	Very poor	Good	---	Very poor	Good	---
Citadel	Very poor	Very poor	Poor	Good	---	Very poor	Good	---
124 Vassett	Poor	Fair	Fair	Very poor	---	Poor	---	Fair.
125 Vassett	Very poor	Poor	Fair	Very poor	---	Very poor	---	Fair.
126*: Vonalee	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Terro	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
127*: Winler	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Savageton	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
128*: Worf	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Tassel	Poor	Poor	Poor	---	Poor	Poor	---	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1*: Absted	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
Bone	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: droughty.
2--- Alice Variant	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
3--- Bidman	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
4*: Bidman	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Bone	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: droughty.
5*: Bidman	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Ulm	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
6--- Bone	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: droughty.
7*: Bowbac	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
Tassel	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: thin layer.
Rock outcrop.						
8--- Cadoma	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
9--- Cambria	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.
10--- Chinook	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
11*:						
Chinook	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
Tassel Variant	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: thin layer.
12*:						
Chinook	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Tassel Variant	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
13*:						
Chinook	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
Theedle Variant	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength.	Moderate: thin layer.
14*:						
Chinook	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Theedle Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
15*:						
Citadel	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Lakoa	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
16*:						
Citadel	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Lakoa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
17*:						
Citadel	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
McCaffery	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
18*:						
Citadel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
McCaffery	Severe: cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See foootnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
19*:						
Colhill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rothican	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
20--- Colnevee	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
21--- Colnevee	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
22--- Colnevee	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
23--- Colnevee	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
24--- Colnevee Variant	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
25--- Colombo Variant	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action, shrink-swell.	Slight.
26--- Colombo Variant	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
27*:						
Colsavage	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: thin layer.
Bahl Variant	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
28--- Cordeston	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, shrink-swell.	Slight.
29*--- Corpening	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
30*:						
Crownest	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Regnaps	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
31*:						
Crownest	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
31*: Regnaps	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
32--- Cushman	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
33*: Cushman	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
Cambria	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.
34*: Cushman	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
Renohill	Moderate: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: depth to rock.
35*: Cushman	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
Shingle	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Severe: depth to rock.
36*: Cushman	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
Terro	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: large stones, thin layer.
37--- Dwyer	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
38--- Forkwood	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
39*: Forkwood	Slight	Slight	Slight	Slight	Severe: low strength.	Slight.
Cambria	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.
Cushman	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
40*:						
Forkwood	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
Cushman	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
Terro	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: large stones, thin layer.
41*:						
Forkwood	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
Ulm	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
42*:						
Grummit	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock.
Maggin	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: droughty, slope, thin layer.
43*:						
Grummit	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: depth to rock.
Snomo	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
44*:						
Grummit	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock.
Snomo	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
45*:						
Gullied land.						
Torriorthents.						
46*:						
Haverdad	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
Clarkelen	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
47*: Haverdad	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
Clarkelen Variant	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: excess salt.
48 Higgins Variant	Moderate: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: frost action.	Slight.
49*: Hiland	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
Bowbac	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: depth to rock.
50*: Hiland	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
Vonalee	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
51 Hilight	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, thin layer.
52*: Keeline	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Turnercrest	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: thin layer.
53, 54 Kishona	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: excess salt.
55*: Kishona	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: excess salt, slope.
Shingle	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Severe: depth to rock.
Theedle	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, depth to rock.
56*: Kishona	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Moderate: excess salt.
Theedle	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Moderate: depth to rock.
Zigweid	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
57*:						
Lakoa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Crownest	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
58 Lohmiller	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Moderate: flooding.
59*, 60*:						
Lohmiller	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Haverdad	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
61 Lohsman	Moderate: depth to rock.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Severe: excess sodium.
62 Nilrap	Moderate: too clayey.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: low strength.	Slight.
63 Norkool	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
64 Nunnston	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
65*:						
Nunnston	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Tanna Variant	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: thin layer.
66*:						
Nunnston	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Tanna Variant	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
67 Onita Variant	Slight	Slight	Moderate: shrink-swell.	Slight	Moderate: low strength, frost action.	Slight.
68*:						
Orella	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: depth to rock.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
68*: Cadoma	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: too clayey.
69*: Orella	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, depth to rock.
Samday	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, depth to rock, too clayey.
Rock outcrop.						
70*: Parmleed	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Moderate: depth to rock.
Bidman	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
71*: Parmleed	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Moderate: slope, depth to rock.
Bowbac	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
72*: Parmleed	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: depth to rock.
Forkwood	Slight	Slight	Slight	Slight	Severe: low strength.	Slight.
73*: Parmleed	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: depth to rock.
Renohill	Moderate: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: depth to rock.
74*: Pesowyo	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, shrink-swell.	Moderate: small stones, droughty, slope.
Paunsaugunt	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
75*:						
Pesowyo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Paunsaugunt	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
76 Petrie	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
77*:						
Petrie	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Ustic Torriorthents.						
78*. Pits, bentonite						
79*. Pits, gravel						
80 Kecluse	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
81 Reicess	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: low strength.	Slight.
82*:						
Reicess	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Wages Variant	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.
83*:						
Reicess	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Wages Variant	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Moderate: slope.
84*:						
Regnaps	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
Crownest	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
85*:						
Regnaps	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
85*:						
Norkool	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Crownest	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
86*:						
Rekop Variant	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: thin layer.
Gypnevee Variant-	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
Rock outcrop.						
87*:						
Rekop Variant	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Gypnevee Variant-	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
88, 89 Renohill	Moderate: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: depth to rock.
90*:						
Renohill	Moderate: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: depth to rock.
Savageton	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: thin layer.
91*.						
Rock outcrop						
92*:						
Rock outcrop.						
Vanocker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
93*:						
Rock outcrop.						
Wibaux	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: small stones, droughty.
94*:						
Rothican	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
Colhill	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: large stones.	Moderate: small stones, droughty.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
95*:						
Samday	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, depth to rock, too clayey.
Grummit	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, too clayey.
96*:						
Samday	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, depth to rock, too clayey.
Savageton	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
97*:						
Samday	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: depth to rock, too clayey.
Shingle	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Severe: depth to rock.
Worf	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: thin layer.
98*:						
Samoist	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, thin layer.
Colsavage	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
99*:						
Savageton	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: thin layer.
Bahl	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
100*:						
Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, depth to rock.
Samday	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, depth to rock, too clayey.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
100*: Rock outcrop.						
101*: Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, depth to rock.
Theedle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
102*: Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, depth to rock.
Theedle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cambria	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Moderate: slope.
103*: Shingle Variant	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, thin layer.
Theedle Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
104--- Stetter	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: flooding, too clayey.
105*: Stovho Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Stovho	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
106--- Sugakool	Slight---	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
107*: Sugakool	Slight---	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
Colhill	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: large stones.	Moderate: small stones, droughty.
108*: Sugakool	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
108*: Colhill	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Moderate: small stones, droughty, slope.
109*: Tassel	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, depth to rock.
110*: Tassel	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Terro	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
111*: Tassel	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Turnercrest	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
112*: Tassel Variant	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Shingle Variant	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, thin layer.
113*: Terro	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: large stones, thin layer.
Turnercrest	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: thin layer.
114*: Theedle	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, depth to rock.
Kishona	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: excess salt, slope.
115*: Thermopolis Variant	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
115*: Rock outcrop.						
116*: Topeman	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
Demar	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: droughty.
117 Twotop	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
118, 119 Ulm	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
120*: Ulm	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Renohill	Moderate: depth to rock, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, depth to rock.
121. Ustic Torrifluvents						
122*: Ustic Torriorthents. Typic Eutroboralfs. Rock outcrop.						
123*: Vanocker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Citadel	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
124 Vassett	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
125 Vassett	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
126*: Vonalee	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
126*:						
Terro	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: large stones, thin layer.
127*:						
Winler	Moderate: too clayey, depth to rock, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
Savageton	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
128*:						
Worf	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, depth to rock.
Tassel	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1*:					
Absted	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
Bone	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
2					
Alice Variant	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
3					
Bidman	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
4*:					
Bidman	Severe: percs slowly.	Slight	Slight	Slight	Good.
Bone	Severe: percs slowly.	Slight	Slight	Slight	Poor: hard to pack.
5*:					
Bidman	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
Ulm	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
6					
Bone	Severe: percs slowly.	Slight	Slight	Slight	Poor: hard to pack.
7*:					
Bowbac	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Tassel	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
Rock outcrop.					
8					
Cadoma	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
9					
Cambria	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
10					
Chinook	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
11*:					
Chinook	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
11*:					
Tassel Variant-----	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
12*:					
Chinook----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
Tassel Variant-----	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
13*:					
Chinook----------	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Theedle Variant----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
14*:					
Chinook----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
Theedle Variant----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
15*:					
Citadel----------	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
Lakoa----------	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, large stones.
16*:					
Citadel----------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Lakoa----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
17*:					
Citadel----------	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
McCaffery----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
18*:					
Citadel----------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
18*: McCaffery	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy, slope.	Severe: seepage, slope.	Severe: slope.
19*: Colhill	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Rothican	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
20--- Colnevee	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
21--- Colnevee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
22--- Colnevee	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
23--- Colnevee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
24--- Colnevee Variant	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
25--- Colombo Variant	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good.
26--- Colombo Variant	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good.
27*: Colsavage	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Bahl Variant	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
28--- Cordeston	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good.
29*: Corpening	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop.					
30*: Crownest	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.

See footnote at end of tables.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
30*:					
Regnaps	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
31*:					
Crownest	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Regnaps	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
32 Cushman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
33*:					
Cushman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Cambria	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
34*:					
Cushman	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Renohill	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
35*:					
Cushman	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Shingle	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
36*:					
Cushman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Terro	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
37 Dwyer	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy.	Moderate: slope.	Poor: seepage, too sandy.
38 Forkwood	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
39*:					
Forkwood	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Cambria	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
39*:					
Cushman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
40*:					
Forkwood	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Cushman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Terro	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
41*:					
Forkwood	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Ulm	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
42*:					
Grummit	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
Maggin	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, too clayey, hard to pack.
43*:					
Grummit	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock, hard to pack.
Snomo	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: hard to pack.
44*:					
Grummit	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
Snomo	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: hard to pack, slope.
45*:					
Gullied land.					
Torriorthents.					
46*:					
Haverdad	Moderate: flooding, percs slowly.	Moderate: seepage, slope.	Moderate: flooding.	Moderate: flooding.	Good.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
46*: Clarkelen	Severe: poor filter.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
47*: Haverdad	Moderate: flooding, percs slowly.	Moderate: seepage, slope.	Moderate: flooding.	Moderate: flooding.	Good.
Clarkelen Variant	Moderate: flooding.	Severe: seepage, flooding.	Severe: seepage, excess salt.	Severe: seepage.	Fair: too sandy.
48 Higgins Variant	Moderate: flooding, wetness, percs slowly.	Severe: flooding.	Severe: wetness.	Moderate: flooding, wetness.	Good.
49*: Hiland	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
Bowbac	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
50*: Hiland	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
Vonalee	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Fair: too sandy.
51 Hilight	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
52*: Keeline	Slight	Severe: seepage.	Slight	Slight	Good.
Turnercrest	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
53 Kishona	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
54 Kishona	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
55*: Kishona	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Shingle	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Theedle	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
56*:					
Kishona	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Theedle	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
Zigweid	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
57*:					
Lakoa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Crownest	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
58--- Lohmiller	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
59*, 60*:					
Lohmiller	Severe: percs slowly.	Moderate: slope.	Moderate: flooding.	Moderate: flooding.	Poor: hard to pack.
Haverdad	Moderate: flooding, percs slowly.	Moderate: seepage, slope.	Moderate: flooding.	Moderate: flooding.	Good.
61--- Lohsman	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
62--- Nilrap	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
63--- Norkool	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
64--- Nunnston	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
65*:					
Nunnston	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Tanna Variant	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
66*:					
Nunnston	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Tanna Variant	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
67---------- Onita Variant	Severe: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Good.
68*: Orella----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
Cadoma----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
69*: Orella----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, slope.
Samday---------- Rock outcrop.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, slope.
70*: Parmleed----------	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Bidman----------	Severe: percs slowly.	Moderate: slope.	Slight----------	Slight----------	Good.
71*: Parmleed----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Bowbac----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
72*: Parmleed----------	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Forkwood----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
73*: Parmleed----------	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Renohill----------	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
74*: Pesowyo----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
74*: Paunsaugunt	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
75*: Pesowyo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Paunsaugunt	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
76--- Petrie	Severe: percs slowly.	Slight	Slight	Slight	Poor: hard to pack.
77*: Petrie	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
Ustic Torriorthents.					
78*. Pits, bentonite					
79*. Pits, gravel					
80--- Recluse	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
81--- Reicess	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
82*: Reicess	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Wages Variant	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
83*: Reicess	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Wages Variant	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
84*: Regnaps	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Crownest	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
85*:					
Regnaps	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Norkool	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Crownest	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
86*:					
Rekop Variant	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Gypnevee Variant	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: area reclaim, thin layer.
Rock outcrop.					
87*:					
Rekop Variant	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Gypnevee Variant	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
88, 89*:					
Renohill	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
90*:					
Renohill	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
Savageton	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
91*.					
Rock outcrop					
92*:					
Rock outcrop.					
Vanocker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
93*:					
Rock outcrop.					

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
93*:					
Wibaux	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
94*:					
Rothican	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
Colhill	Moderate: large stones.	Severe: seepage.	Moderate: large stones.	Slight	Poor: small stones.
95*:					
Samday	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, slope.
Grummit	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
96*:					
Samday	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, slope.
Savageton	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
97*:					
Samday	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
Shingle	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Worf	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
98*:					
Samoist	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Colsavage	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
99*:					
Savageton	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
99*:					
Bahl	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
100*:					
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Samday	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, slope.
Rock outcrop.					
101*:					
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Theedle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
102*:					
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Theedle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Cambria	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
103*:					
Shingle Variant	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Theedle Variant	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
104 Stetter	Severe: percs slowly, flooding.	Severe: flooding.	Severe: too clayey, flooding.	Severe: flooding.	Poor: too clayey, hard to pack.
105*:					
Stovho Variant	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
Stovho	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: large stones, slope.
106 Sugakool	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, small stones.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
107*:					
Sugakool	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, small stones.
Colhill	Moderate: large stones.	Severe: seepage.	Moderate: large stones.	Slight	Poor: small stones.
108*:					
Sugakool	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, small stones, slope.
Colhill	Moderate: slope, large stones.	Severe: seepage, slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
109*:					
Tassel	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
110*:					
Tassel	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Terro	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Rock outcrop.					
111*:					
Tassel	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Turnercrest	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
112*:					
Tassel Variant	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Shingle Variant	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
113*:					
Terro	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
Turnercrest	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
114*:					
Theedle	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Kishona	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
115*:					
Thermopolis Variant	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
116*:					
Topeman	Severe: percs slowly.	Severe: flooding.	Severe: depth to rock.	Moderate: flooding, depth to rock.	Poor: hard to pack.
Demar	Severe: percs slowly.	Moderate: depth to rock.	Severe: depth to rock, too acid.	Slight	Poor: hard to pack, too acid.
117 Twotop	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
118, 119 Ulm	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
120*:					
Ulm	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
Renohill	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
121. Ustic Torrifluvents					
122*: Ustic Torriorthents.					
Typic Eutroboralfs.					
Rock outcrop.					
123*:					
Vanocker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
123*: Citadel	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
124 Vassett	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
125 Vassett	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
126*: Vonalee	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Fair: too sandy.
Terro	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
127*: Winler	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack.
Savageton	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
128*: Worf	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Tassel	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1*:				
Absted	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Bone	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
2	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Alice Variant				
3	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Bidman				
4*:				
Bidman	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Bone	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
5*:				
Bidman	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Ulm	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
6	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Bone				
7*:				
Bowbac	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
Tassel	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Rock outcrop.				
8	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Cadoma				
9	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Cambria				
10	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Chinook				
11*:				
Chinook	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11*:				
Tassel Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
12*:				
Chinook	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Tassel Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
13*:				
Chinook	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Theedle Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
14*:				
Chinook	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Theedle Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
15*:				
Citadel	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
Lakoa	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, area reclaim.
16*:				
Citadel	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
Lakoa	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
17*, 18*:				
Citadel	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
McCaffery	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
19*:				
Colhill	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rothican	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
20---------- Colnevee	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
21---------- Colnevee	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
22---------- Colnevee	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
23---------- Colnevee	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
24---------- Colnevee Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
25, 26---------- Colombo Variant	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
27*: Colsavage----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
Bahl Variant---------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
28---------- Cordeston	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
29*: Corpening----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Rock outcrop.				
30*: Crownest----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Regnaps----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
31*: Crownest----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Regnaps----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
32---------- Cushman	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
33*:				
Cushman	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
Cambria	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
34*:				
Cushman	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
Renohill	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
35*:				
Cushman	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
Shingle	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
36*:				
Cushman	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
Terro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
37--- Dwyer	Good	Probable	Improbable: too sandy.	Poor: too sandy.
38--- Forkwood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
39*:				
Forkwood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Cambria	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Cushman	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
40*:				
Forkwood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Cushman	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
40*:				
Terro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
41*:				
Forkwood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ulm	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
42*:				
Grummit	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Maggin	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
43*:				
Grummit	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
Snomo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
44*:				
Grummit	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Snomo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
45*:				
Gullied land.				
Torriorthents.				
46*:				
Haverdad	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Clarkelen	Good	Probable	Improbable: too sandy.	Fair: small stones, thin layer.
47*:				
Haverdad	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Clarkelen Variant	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
48 Higgins Variant	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
49*:				
Hiland	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Bowbac	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
50*:				
Hiland	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Vonalee	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
51--- Hilight	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
52*:				
Keeline	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Turnercrest	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
53--- Kishona	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
54--- Kishona	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
55*:				
Kishona	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Shingle	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Theedle	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
56*:				
Kishona	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Theedle	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey.
Zigweid	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
57*:				
Lakoa	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Crownest	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
58---------- Lohmiller	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
59*, 60*: Lohmiller----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Haverdad----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
61---------- Lohsman	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
62---------- Nilrap	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
63---------- Norkool	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
64---------- Nunnston	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
65*: Nunnston----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Tanna Variant--------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
66*: Nunnston----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Tanna Variant--------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
67---------- Onita Variant	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
68*: Orella----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Cadoma----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
69*: Orella----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
69*:				
Samday	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Rock outcrop.				
70*:				
Parmleed	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Bidman	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
71*:				
Parmleed	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Bowbac	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
72*:				
Parmleed	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Forkwood	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
73*:				
Parmleed	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Renohill	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
74*:				
Pesowyo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Paunsaugunt	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
75*:				
Pesowyo	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Paunsaugunt	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
76--- Petrie	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
77*:				
Petrie	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
77*: Ustic Torriorthents.				
78*. Pits, bentonite				
79*. Pits, gravel				
80---------- Recluse	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
81---------- Reicess	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
82*: Reicess----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Wages Variant--------	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
83*: Reicess----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Wages Variant--------	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
84*: Regnaps----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
Crownest----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
85*: Regnaps----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
Norkool----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
Crownest----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
86*: Rekop Variant--------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Gypnevee Variant-----	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Good.
Rock outcrop.				

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
87*:				
Rekop Variant	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Gypnevee Variant	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop.				
88, 89--- Renohill	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
90*:				
Renohill	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Savageton	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
91*. Rock outcrop.				
92*: Rock outcrop.				
Vanocker	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
93*: Rock outcrop.				
Wibaux	Poor: slope.	Improbable: small stones.	Probable	Poor: small stones, slope.
94*:				
Rothican	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Colhill	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
95*:				
Samday	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Grummit	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
96*:				
Samday	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
96*:				
Savageton	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
97*:				
Samday	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
Shingle	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Worf	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
98*:				
Samoist	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Colsavage	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
99*:				
Savageton	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
Bahl	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
100*:				
Shingle	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Samday	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Rock outcrop.				
101*:				
Shingle	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Theedle	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
102*:				
Shingle	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
102*:				
Theedle	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cambria	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
103*:				
Shingle Variant	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Theedle Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
104 Stetter	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
105*:				
Stovho Variant	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Stovho	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
106 Sugakool	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
107*, 108*:				
Sugakool	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Colhill	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
109*:				
Tassel	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Shingle	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
110*:				
Tassel	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Terro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop.				
111*:				
Tassel	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
111*:				
Turnercrest	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
112*:				
Tassel Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Shingle Variant	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
113*:				
Terro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Turnercrest	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
114*:				
Theedle	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
Kishona	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
115*:				
Thermopolis Variant	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
116*:				
Topeman	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Demar	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, excess salt.
117 Twotop	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
118, 119 Ulm	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
120*:				
Ulm	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Renohill	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
121. Ustic Torrifluvents				

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
122*: Ustic Torriorthents. Typic Eutroboralfs. Rock outcrop.				
123*: Vanocker	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Citadel	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
124 Vassett	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
125 Vassett	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
126*: Vonalee	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Terro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
127*: Winler	Poor: shrink-swell, low strength, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Savageton	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
128*: Worf	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Shingle	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Tassel	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1*: Absted	Moderate: slope.	Severe: excess sodium.	Deep to water	Slope, soil blowing, percs slowly.	Erodes easily, soil blowing.	Too arid, excess sodium.
Bone	Moderate: slope.	Moderate: hard to pack, excess salt.	Deep to water	Droughty, percs slowly.	Erodes easily	Erodes easily, droughty.
2--- Alice Variant	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
3--- Bidman	Moderate: slope.	Slight---	Deep to water	Slope, percs slowly.	Erodes easily	Too arid, erodes easily.
4*: Bidman	Slight---	Slight---	Deep to water	Percs slowly---	Erodes easily	Too arid, erodes easily.
Bone	Slight---	Moderate: hard to pack, excess salt.	Deep to water	Droughty, percs slowly.	Erodes easily	Erodes easily, droughty.
5*: Bidman	Moderate: slope.	Slight---	Deep to water	Slope, percs slowly.	Erodes easily	Too arid, erodes easily.
Ulm	Moderate: seepage, slope.	Slight---	Deep to water	Percs slowly, slope.	Erodes easily	Erodes easily, percs slowly.
6--- Bone	Slight---	Moderate: hard to pack, excess salt.	Deep to water	Droughty, percs slowly.	Erodes easily	Erodes easily, droughty.
7*: Bowbac	Severe: slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Tassel	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.						
8--- Cadoma	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
9--- Cambria	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope---	Erodes easily	Erodes easily.
10--- Chinook	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing---	Favorable.
11*: Chinook	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing---	Favorable.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
11*:						
Tassel Variant---	Severe: depth to rock.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, soil blowing.	Depth to rock.
12*:						
Chinook----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
Tassel Variant---	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
13*:						
Chinook----------	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Soil blowing---	Favorable.
Theedle Variant--	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
14*:						
Chinook----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
Theedle Variant--	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
15*:						
Citadel----------	Moderate: seepage, slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Slope, percs slowly, rooting depth.	Large stones, erodes easily.	Large stones, erodes easily.
Lakoa------------	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Favorable------	Favorable.
16*:						
Citadel----------	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Slope, percs slowly, rooting depth.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
Lakoa------------	Severe: slope.	Moderate: piping.	Deep to water	Slope----------	Slope----------	Slope.
17*, 18*:						
Citadel----------	Moderate: seepage, slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Slope, percs slowly, rooting depth.	Large stones, erodes easily.	Large stones, erodes easily.
McCaffery--------	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
19*:						
Colhill----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
19*:						
Rothican	Severe: slope.	Slight	Deep to water	Slope	Slope	Slope.
20--- Colnevee	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
21--- Colnevee	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
22--- Colnevee	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
23--- Colnevee	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
24--- Colnevee Variant	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
25--- Colombo Variant	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
26--- Colombo Variant	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Erodes easily	Erodes easily.
27*:						
Colsavage	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock.	Depth to rock, percs slowly.	Depth to rock, percs slowly.
Bahl Variant	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
28--- Cordeston	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
29*:						
Corpening	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
30*:						
Crownest	Severe: depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock, slope.	Depth to rock.
Regnaps	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
31*:						
Crownest	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock, slope.	Slope, depth to rock.
Regnaps	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
32---------- Cushman	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
33*: Cushman----------	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Cambria----------	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
34*: Cushman----------	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Renohill---------	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
35*: Cushman----------	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Shingle----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
36*: Cushman----------	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Terro----------	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Depth to rock, soil blowing.	Depth to rock.
37---------- Dwyer	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
38---------- Forkwood	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Soil blowing, slope.	Soil blowing---	Favorable.
39*: Forkwood---------	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Soil blowing, slope.	Soil blowing---	Favorable.
Cambria----------	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
Cushman----------	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
40*:						
Forkwood	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Soil blowing, slope.	Soil blowing	Favorable.
Cushman	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Terro	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Depth to rock, soil blowing.	Depth to rock.
41*:						
Forkwood	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Soil blowing, slope.	Soil blowing	Favorable.
Ulm	Moderate: seepage, slope.	Slight	Deep to water	Percs slowly, slope.	Erodes easily	Erodes easily, percs slowly.
42*:						
Grummit	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope, droughty.	Slope, depth to rock.	Too arid, slope, droughty.
Maggin	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
43*:						
Grummit	Severe: depth to rock.	Severe: hard to pack.	Deep to water	Slope, droughty.	Depth to rock	Too arid, droughty.
Snomo	Moderate: seepage, depth to rock, slope.	Severe: hard to pack.	Deep to water	Droughty, slow intake, slope.	Favorable	Droughty.
44*:						
Grummit	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope, droughty.	Slope, depth to rock.	Too arid, slope, droughty.
Snomo	Severe: slope.	Severe: hard to pack.	Deep to water	Droughty, slow intake, slope.	Slope	Slope, droughty.
45*:						
Gullied land.						
Torriorthents.						
46*:						
Haverdad	Moderate: seepage.	Severe: piping.	Deep to water	Excess salt	Erodes easily	Too arid, excess salt, erodes easily.
Clarkelen	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Too sandy, soil blowing.	Favorable.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
47*:						
Haverdad	Moderate: seepage.	Severe: piping.	Deep to water	Excess salt	Erodes easily	Too arid, excess salt, erodes easily.
Clarkelen Variant	Severe: seepage.	Severe: piping, excess salt.	Deep to water	Soil blowing, excess salt.	Too sandy, soil blowing.	Excess salt.
48 Higgins Variant	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
49*:						
Hiland	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope	Too sandy, soil blowing.	Favorable.
Bowbac	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
50*:						
Hiland	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope	Too sandy, soil blowing.	Favorable.
Vonalee	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Too sandy, soil blowing.	Favorable.
51 Hilight	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
52*:						
Keeline	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing.	Soil blowing	Droughty.
Turnercrest	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
53 Kishona	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, excess salt.	Favorable	Excess salt.
54 Kishona	Moderate: seepage.	Severe: piping.	Deep to water	Excess salt	Favorable	Excess salt.
55*:						
Kishona	Severe: slope.	Severe: piping.	Deep to water	Slope, excess salt.	Slope	Slope, excess salt.
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Theedle	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
56*:						
Kishona	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, excess salt.	Favorable	Excess salt.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
56*:						
Theedle	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Depth to rock, erodes easily.	Too arid, erodes easily.
Zigweid	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily.	Erodes easily.
57*:						
Lakoa	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope	Slope.
Crownest	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Droughty, depth to rock	Slope, depth to rock.	Slope, depth to rock.
58--- Lohmiller	Slight	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, flooding.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
59*, 60*:						
Lohmiller	Slight	Moderate: hard to pack, piping.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
Haverdad	Moderate: seepage.	Severe: piping.	Deep to water	Excess salt	Erodes easily	Too arid, excess salt, erodes easily.
61--- Lohsman	Moderate: depth to rock, slope.	Severe: excess sodium.	Deep to water	Droughty, percs slowly.	Depth to rock, erodes easily.	Excess sodium, erodes easily.
62--- Nilrap	Moderate: slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
63--- Norkool	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
64--- Nunnston	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.	Erodes easily	Erodes easily, percs slowly.
65*:						
Nunnston	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.	Erodes easily	Erodes easily, percs slowly.
Tanna Variant	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
66*:						
Nunnston	Severe: slope.	Slight	Deep to water	Percs slowly, slope.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
Tanna Variant	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
67--- Onita Variant	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
68*:						
Orella	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Cadoma	Severe: slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
69*:						
Orella	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Samday	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
70*:						
Parmleed	Moderate: depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Bidman	Moderate: slope.	Slight	Deep to water	Slope, percs slowly.	Erodes easily	Too arid, erodes easily.
71*:						
Parmleed	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Bowbac	Severe: slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
72*:						
Parmleed	Moderate: depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Forkwood	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Soil blowing, slope.	Soil blowing---	Favorable.
73*:						
Parmleed	Moderate: depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Renohill	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
74*:						
Pesowyo	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Paunsaugunt	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
75*: Pesowyo	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Paunsaugunt	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
76--- Petrie	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly.
77*: Petrie	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Ustic Torriorthents.						
78*. Pits, bentonite						
79*. Pits, gravel						
80--- Recluse	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope	Erodes easily	Too arid, erodes easily.
81--- Reicess	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
82*: Reicess	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Wages Variant	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
83*: Reicess	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
Wages Variant	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
84*: Regnaps	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
Crownest	Severe: depth to rock.	Severe: piping.	Deep to water	Droughty, depth to rock.	Slope, depth to rock.	Depth to rock.
85*: Regnaps	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
85*:						
Norkool	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Crownest	Severe: depth to rock.	Severe: piping.	Deep to water	Droughty, depth to rock.	Slope, depth to rock.	Depth to rock.
86*:						
Rekop Variant	Severe: depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Gypnevee Variant	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Rock outcrop.						
87*:						
Rekop Variant	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Gypnevee Variant	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Rock outcrop.						
88, 89--- Renohill	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
90*:						
Renohill	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Savageton	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
91*.						
Rock outcrop.						
92*:						
Rock outcrop.						
Vanocker	Severe: slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, large stones.	Large stones, slope, droughty.
93*:						
Rock outcrop.						
Wibaux	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Slope	Too arid, slope.
94*:						
Rothican	Moderate: seepage, slope.	Slight	Deep to water	Slope	Favorable	Favorable.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
94*:						
Colhill----------	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Large stones---	Large stones, droughty.
95*:						
Samday----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Grummit----------	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Too arid, slope, droughty.
96*:						
Samday----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Savageton--------	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
97*:						
Samday----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Shingle----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Worf----------	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
98*:						
Samoist----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Colsavage--------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
99*:						
Savageton--------	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Bahl----------	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
100*:						
Shingle----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Samday----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
101*:						
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Theedle	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
102*:						
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Theedle	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Cambria	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
103*:						
Shingle Variant	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Theedle Variant	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
104 Stetter	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, flooding.	Percs slowly, erodes easily.	Percs slowly, erodes easily, droughty.
105*:						
Stovho Variant	Severe: slope.	Slight	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Stovho	Severe: slope.	Severe: piping.	Deep to water	Slope, percs slowly, erodes easily.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
106 Sugakool	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
107*:						
Sugakool	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
Colhill	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Large stones	Large stones, droughty.
108*:						
Sugakool	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope	Slope.
Colhill	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
109*:						
Tassel	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock, rooting depth.
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
110*:						
Tassel	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock, rooting depth.
Terro	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Rock outcrop.						
111*:						
Tassel	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock, rooting depth.
Turnercrest	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
112*:						
Tassel Variant	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Shingle Variant	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
113*:						
Terro	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Depth to rock, soil blowing.	Depth to rock.
Turnercrest	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
114*:						
Theedle	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Kishona	Severe: slope.	Severe: piping.	Deep to water	Slope, excess salt.	Slope	Slope, excess salt.
115*:						
Thermopolis Variant	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
116*: Topeman	Moderate: depth to rock.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake	Erodes easily, percs slowly.	Erodes easily, droughty, percs slowly.
Demar	Moderate: depth to rock.	Moderate: thin layer, hard to pack, excess salt.	Deep to water	Droughty, percs slowly.	Erodes easily, percs slowly.	Too arid, erodes easily, droughty.
117--- Twotop	Moderate: slope.	Severe: hard to pack.	Deep to water	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, droughty.
118, 119--- Ulm	Moderate: seepage, slope.	Slight	Deep to water	Percs slowly, slope.	Erodes easily	Erodes easily, percs slowly.
120*: Ulm	Moderate: seepage, slope.	Slight	Deep to water	Percs slowly, slope.	Erodes easily	Erodes easily, percs slowly.
Renohill	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
121. Ustic Torrifluvents						
122*: Ustic Torriorthents.						
Typic Eutroboralfs.						
Rock outcrop.						
123*: Vanocker	Severe: slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, large stones.	Large stones, slope, droughty.
Citadel	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Slope, percs slowly, rooting depth.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
124--- Vassett	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
125--- Vassett	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
126*: Vonalee	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Too sandy, soil blowing.	Favorable.
Terro	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Depth to rock, soil blowing.	Depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for---		Features affecting---			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
127*:						
Winler	Severe: slope.	Severe: hard to pack.	Deep to water	Slow intake, droughty, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
Savageton	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
128*:						
Worf	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Tassel	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock, rooting depth.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1*:											
Absted	0-6	Fine sandy loam	SM	A-4	0-5	85-100	85-100	65-80	35-50	15-20	NP-5
	6-60	Clay, clay loam.	CH, CL	A-7	0	85-100	85-100	80-100	70-95	40-60	20-30
Bone	0-1	Loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-15
	1-4	Clay	CL, CH	A-7	0	90-100	90-100	80-90	70-80	40-55	20-35
	4-60	Clay loam	CL, CH	A-7	0	90-100	90-100	80-90	70-80	40-55	20-35
2	0-8	Fine sandy loam	SM	A-2,A-4	0	90-100	90-100	60-85	30-50	15-25	NP-5
Alice Variant	8-20	Fine sandy loam	SM	A-4	0	90-100	90-100	85-95	35-45	15-25	NP-5
	20-60	Loamy very fine sand.	SM	A-2, A-4	0	90-100	90-100	80-90	30-40	---	NP
3	0-4	Loam	CL	A-6	0	80-100	80-100	70-85	60-70	30-40	10-15
Bidman	4-12	Clay	CH	A-7	0	80-100	80-100	80-100	70-90	50-60	30-40
	12-60	Clay loam	CL	A-6, A-7	0	80-100	80-100	75-100	65-80	35-45	20-30
4*:											
Bidman	0-4	Loam	CL	A-6	0	80-100	80-100	70-85	60-70	30-40	10-15
	4-12	Clay	CH	A-7	0	80-100	80-100	80-100	70-90	50-60	30-40
	12-60	Clay loam	CL	A-6, A-7	0	80-100	80-100	75-100	65-80	35-45	20-30
Bone	0-1	Loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-15
	1-4	Clay	CL, CH	A-7	0	90-100	90-100	80-90	70-80	40-55	20-35
	4-60	Clay loam	CL, CH	A-7	0	90-100	90-100	80-90	70-80	40-55	20-35
5*:											
Bidman	0-4	Loam	CL	A-6	0	80-100	80-100	70-85	60-70	30-40	10-15
	4-12	Clay	CH	A-7	0	80-100	80-100	80-100	70-90	50-60	30-40
	12-60	Clay loam	CL	A-6, A-7	0	80-100	80-100	75-100	65-80	35-45	20-30
Ulm	0-6	Clay loam	CL	A-6	0-5	95-100	95-100	80-100	70-80	30-40	10-20
	6-16	Clay loam	CL	A-6, A-7	0-5	75-100	75-100	75-100	60-80	35-45	20-30
	16-60	Clay loam	CL	A-6	0-5	75-100	75-100	75-100	60-80	30-40	15-20
6	0-1	Loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-15
Bone	1-4	Clay	CL, CH	A-7	0	90-100	90-100	80-90	70-80	40-55	20-35
	4-60	Clay loam	CL, CH	A-7	0	90-100	90-100	80-90	70-80	40-55	20-35
7*:											
Bowbac	0-7	Sandy loam	SM	A-2	0	90-100	90-100	65-80	35-50	15-25	NP-5
	7-18	Sandy clay loam	CL	A-6	0	90-100	90-100	70-85	50-60	25-40	10-20
	18-33	Sandy loam	SM, ML	A-4, A-6	0	90-100	90-100	60-80	45-55	25-35	5-15
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tassel	0-3	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	75-100	40-65	<35	NP-7
	3-15	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	65-95	40-65	<35	NP-7
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
8	0-3	Silty clay loam	CL, CH	A-7	0	100	100	85-95	80-90	40-65	20-35
Cadoma	3-11	Silty clay loam	CL, CH	A-7	0	100	100	85-95	80-90	40-65	20-35
	11-28	Clay	CL, CH	A-7	0	100	100	80-90	75-85	40-55	25-35
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
9----------	0-4	Loam----------	CL, ML	A-4	0	95-100	95-100	75-85	60-70	20-30	NP-10
Cambria	4-60	Loam----------	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-95	70-80	25-40	5-15
10----------	0-10	Fine sandy loam	SM	A-4, A-2	0	80-100	75-100	65-85	30-50	15-25	NP-5
Chinook	10-20	Fine sandy loam	SM	A-4, A-2	0	80-100	75-100	55-85	30-50	15-25	NP-5
	20-60	Sandy loam-------	SM	A-4, A-2	0	80-100	75-100	60-80	25-45	15-25	NP-5
11*, 12*:											
Chinook---------	0-10	Fine sandy loam	SM	A-4, A-2	0	80-100	75-100	65-85	30-50	15-25	NP-5
	10-20	Fine sandy loam	SM	A-4, A-2	0	80-100	75-100	55-85	30-50	15-25	NP-5
	20-60	Sandy loam-------	SM	A-4, A-2	0	80-100	75-100	60-80	25-45	15-25	NP-5
Tassel Variant--	0-16	Fine sandy loam	SM	A-2	0	100	95-100	60-80	25-35	20-25	NP-5
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13*, 14*:											
Chinook---------	0-10	Fine sandy loam	SM	A-4, A-2	0	80-100	75-100	65-85	30-50	15-25	NP-5
	10-20	Fine sandy loam	SM	A-4, A-2	0	80-100	75-100	55-85	30-50	15-25	NP-5
	20-60	Sandy loam	SM	A-4, A-2	0	80-100	75-100	60-80	25-45	15-25	NP-5
Theedle Variant-	0-3	Loam----------	CL-ML, ML	A-4	0	95-100	95-100	70-85	60-70	20-30	NP-10
	3-30	Loam----------	CL	A-6	0	95-100	95-100	70-85	60-70	25-40	10-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15*, 16*:											
Citadel---------	0-10	Loam----------	CL, ML	A-6, A-4	0	100	100	85-100	55-80	25-40	3-15
	10-60	Clay----------	CL, CH	A-6, A-7	0-10	95-100	90-100	85-100	70-95	35-55	15-30
Lakoa-----------	0-11	Loam----------	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-35	3-15
	11-32	Clay loam---------	CL	A-6, A-7	0-5	95-100	90-100	85-100	50-80	35-45	12-20
	32-60	Loam----------	CL, SC	A-6, A-4	0-15	90-100	85-100	75-95	45-90	30-40	8-15
17*, 18*:											
Citadel---------	0-10	Loam----------	CL, ML	A-6, A-4	0	100	100	85-100	55-80	25-40	3-15
	10-60	Clay----------	CL, CH	A-6, A-7	0-10	95-100	90-100	85-100	70-95	35-55	15-30
McCaffery-------	0-30	Loamy sand-------	SM	A-2	0	85-100	85-100	50-65	20-30	---	NP
	30-60	Loamy sand-------	SM	A-2	0	85-100	85-100	70-80	15-30	---	NP
19*:											
Colhill---------	0-6	Gravelly loam----	GM-GC, GM SM-SC, SM	A-4	0-5	55-80	50-75	40-65	40-50	20-30	NP-10
	6-60	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-5	30-60	25-50	15-25	15-25	20-30	NP-10
Rothican--------	0-8	Loam----------	CL	A-6	0	85-100	85-100	75-90	60-75	25-35	10-15
	8-60	Gravelly loam----	GC, SC	A-6	0	50-75	50-75	45-70	35-50	25-35	10-15
20, 21----------	0-5	Silt loam---------	ML	A-4	0	100	100	95-100	70-100	20-30	NP-5
Colnevee	5-60	Silt loam---------	CL-ML, ML	A-4	0	100	100	95-100	75-95	20-30	NP-10
22, 23----------	0-3	Silt loam---------	ML	A-4	0	100	100	95-100	70-100	20-30	NP-5
Colnevee	3-60	Silt loam---------	CL-ML, ML	A-4	0	100	100	95-100	75-95	20-30	NP-10
24----------	0-5	Silt loam---------	ML, CL-ML	A-4	0	100	100	95-100	75-100	20-30	NP-10
Colnevee Variant	5-31	Silt loam---------	CL-ML, ML	A-4	0	100	100	95-100	75-100	20-30	NP-10
	31	Weathered bedrock	---	---	---	---	---	---	---	---	---
25, 26----------	0-8	Loam----------	CL-ML	A-4	0	95-100	80-100	55-75	50-60	25-30	5-10
Colombo Variant	8-60	Stratified sandy loam to clay loam.	CL, CL-ML	A-4, A-6	0	90-100	80-100	55-75	50-60	25-35	5-10

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27*:											
Colsavage-------	0-5	Clay loam--------	CL	A-7, A-6	0	95-100	95-100	95-100	70-90	30-45	15-30
	5-30	Clay-------------	CL, CH	A-7	0	95-100	95-100	95-100	85-95	40-60	20-35
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bahl Variant----	0-8	Clay loam--------	CL	A-6, A-7	0	100	95-100	85-100	60-80	35-50	15-25
	8-60	Clay-------------	CL, CH	A-7	0	100	100	90-100	85-95	40-60	20-35
28---------------	0-10	Loam-------------	ML	A-4	0	85-100	85-100	80-90	60-70	20-25	NP-5
Cordeston	10-40	Loam-------------	CL-ML, CL	A-4, A-6	0	85-100	80-100	80-90	60-70	25-35	5-15
	40-60	Loam-------------	CL, CL-ML, ML	A-6, A-4	0	85-100	85-100	85-95	60-80	20-35	NP-15
29*:											
Corpening-------	0-6	Channery loam----	GM-GC	A-4	0-5	50-75	50-75	45-65	35-50	15-25	5-10
	6-16	Channery loam----	GM-GC	A-4	0-5	50-75	50-75	45-65	35-50	15-25	5-10
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
30*, 31*:											
Crownest--------	0-4	Channery sandy loam.	SM	A-2	0	75-100	60-85	35-50	20-30	---	NP
	4-12	Channery sandy loam.	SM	A-2	0-5	80-100	60-85	35-50	25-35	---	NP
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Regnaps---------	0-4	Loam-------------	ML	A-4	0	95-100	95-100	60-80	50-60	20-25	NP-5
	4-16	Clay loam--------	CL	A-6	0	95-100	95-100	75-90	65-75	25-40	10-20
	16-21	Loam-------------	ML, CL-ML	A-4	0	85-100	75-100	60-80	50-60	20-30	NP-10
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
32---------------	0-2	Loam-------------	CL-ML, ML	A-4	0	90-100	95-100	70-85	60-70	20-30	NP-10
Cushman	2-12	Clay loam--------	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	12-34	Loam-------------	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
33*:											
Cushman---------	0-2	Loam-------------	CL-ML, ML	A-4	0	90-100	90-100	70--85	60-70	20-30	NP-10
	2-12	Clay loam--------	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	12-34	Loam-------------	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cambria---------	0-4	Loam-------------	CL-ML, ML	A-4	0	95-100	95-100	75-85	60-70	20-30	NP-10
	4-12	Clay loam--------	CL-ML, CL	A-4, A-6	0	95-100	95-100	75-85	55-75	25-40	5-15
	12-60	Loam-------------	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-95	70-80	25-40	5-15
34*:											
Cushman---------	0-2	Loam-------------	CL-ML, ML	A-4	0	90-100	90-100	70-85	60-70	20-30	NP-10
	2-12	Clay loam--------	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	12-34	Loam-------------	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Renohill--------	0-4	Loam-------------	CL-ML	A-4	0	85-100	80-100	80-95	50-75	25-30	5-10
	4-12	Clay loam--------	CL, CH	A-7, A-6	0	95-100	90-100	90-100	75-95	35-65	20-35
	12-34	Clay loam--------	CL	A-6	0	85-100	80-100	80-95	70-80	30-40	15-25
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
35*:											
Cushman	0-2	Loam	CL-ML, ML	A-4	0	90-100	90-100	70-85	60-70	20-30	NP-10
	2-12	Clay loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	12-34	Loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Shingle	0-6	Loam	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	6-17	Loam	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
36*:											
Cushman	0-2	Loam	CL-ML, ML	A-4	0	90-100	90-100	70-85	60-70	20-30	NP-10
	2-12	Clay loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	12-34	Loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Terro	0-8	Sandy loam	SM	A-2, A-4	0-15	100	100	60-90	30-45	---	NP
	8-36	Sandy loam	SM	A-2, A-4	0-15	100	100	60-90	30-45	20-25	NP-5
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
37	0-5	Fine sand	SP-SM, SM	A-3, A-2	0	100	100	60-80	5-20	---	NP
Dwyer	5-60	Fine sand	SP-SM, SM	A-3, A-2	0	85-100	75-100	50-80	5-35	---	NP
38	0-4	Loam	ML, CL-ML	A-4	0	75-100	75-100	70-90	50-70	20-30	NP-10
Forkwood	4-21	Clay loam	CL	A-6	0	75-100	75-100	70-90	55-75	25-35	10-20
	21-60	Loam	CL	A-6	0	75-100	75-100	70-90	55-75	25-40	10-25
39*:											
Forkwood	0-4	Loam	ML, CL-ML	A-4	0	75-100	75-100	70-90	50-70	20-30	NP-10
	4-21	Clay loam	CL	A-6	0	75-100	75-100	70-90	55-75	25-35	10-20
	21-60	Loam	CL	A-6	0	75-100	75-100	70-90	55-75	25-40	10-25
Cambria	0-4	Loam	CL-ML, ML	A-4	0	95-100	95-100	75-85	60-70	20-30	NP-10
	4-12	Clay loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	75-85	55-75	25-40	5-15
	12-60	Loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-95	70-80	25-40	5-15
Cushman	0-2	Loam	CL-ML, ML	A-4	0	90-100	90-100	70-85	60-70	20-30	NP-10
	2-12	Clay loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	12-34	Loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
40*:											
Forkwood	0-4	Loam	ML, CL-ML	A-4	0	75-100	75-100	70-90	50-70	20-30	NP-10
	4-21	Clay loam	CL	A-6	0	75-100	75-100	70-90	55-75	25-35	10-20
	21-60	Loam	CL	A-6	0	75-100	75-100	70-90	55-75	25-40	10-25
Cushman	0-2	Loam	CL-ML, ML	A-4	0	90-100	90-100	70-85	60-70	20-30	NP-10
	2-12	Clay loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	12-34	Loam	CL	A-6	0	90-100	90-100	80-90	70-80	30-40	10-20
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Terro	0-8	Sandy loam	SM	A-2, A-4	0-15	100	100	60-90	30-45	---	NP
	8-36	Sandy loam	SM	A-2, A-4	0-15	100	100	60-90	30-45	20-25	NP-5
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
41*:											
Forkwood	0-4	Loam	ML, CL-ML	A-4	0	75-100	75-100	70-90	50-70	20-30	NP-10
	4-21	Clay loam	CL	A-6	0	75-100	75-100	70-90	55-75	25-35	10-20
	21-60	Loam	CL	A-6	0	75-100	75-100	70-90	55-75	25-40	10-25

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
41*:											
Ulm----------	0-6	Clay loam--------	CL	A-6	0-5	95-100	95-100	80-100	70-80	30-40	10-20
	6-16	Clay loam--------	CL	A-6, A-7	0-5	75-100	75-100	75-100	60-80	35-45	20-30
	16-60	Clay loam--------	CL	A-6	0-5	75-100	75-100	75-100	60-80	30-40	15-20
42*:											
Grummit---------	0-4	Clay loam--------	CH, MH	A-7	0	95-100	95-100	90-100	80-100	40-60	20-35
	4-15	Clay-------------	CH, MH, ML, CL	A-7	0	95-100	85-100	75-100	65-100	40-60	10-30
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Maggin----------	0-7	Clay loam--------	CL	A-6, A-7	0	95-100	95-100	85-95	80-90	35-45	15-25
	7-29	Clay-------------	CH	A-7	0	100	100	95-100	85-95	65-75	35-45
	29	Unweathered bedrock.	CL-CH	A-7	0	100	60-75	55-65	50-60	45-55	20-30
43*, 44*:											
Grummit---------	0-4	Clay loam--------	CH, MH	A-7	0	95-100	95-100	90-100	85-100	40-60	20-35
	4-15	Clay-------------	CH, MH, ML, CL	A-7	0	95-100	85-100	75-100	65-100	40-60	10-30
	15	Unweathered bedrock.	CH, MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	40-60	10-30
Snomo-----------	0-4	Silty clay loam	CL, CH	A-7	0	100	95-100	85-100	80-100	40-65	20-35
	4-44	Silty clay loam	MH, CH	A-7	0	95-100	95-100	95-100	90-100	50-70	20-35
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
45*:											
Gullied land.											
Torriorthents.											
46*:											
Haverdad--------	0-9	Loam-------------	CL-ML, ML	A-4	0	75-100	75-100	70-90	50-70	20-30	NP-10
	9-60	Stratified fine sandy loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	75-100	75-100	70-90	50-60	25-35	5-15
Clarkelen-------	0-5	Sandy loam-------	SM	A-2, A-4	0	100	95-100	55-75	25-40	20-25	NP-5
	5-60	Stratified loamy sand to fine sandy loam.	SM	A-2	0-5	95-100	90-100	55-70	25-35	---	NP
47*:											
Haverdad--------	0-9	Loam-------------	CL-ML, ML	A-4	0	75-100	75-100	70-90	50-70	20-30	NP-10
	9-60	Stratified fine sandy loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	75-100	75-100	70-90	50-60	25-35	5-15
Clarkelen Variant--------	0-5	Sandy loam-------	SM, SM-SC	A-4	0	100	95-100	55-75	35-45	20-30	NP-10
	5-60	Stratified loamy sand to silt loam.	SM, SM-SC	A-2, A-4	0	95-100	90-100	55-70	30-40	20-30	NP-10
48----------	0-3	Silt loam--------	CL-ML	A-4	0	100	100	95-100	90-100	20-30	5-10
Higgins Variant	3-60	Silt loam--------	CL-ML	A-4	0	100	100	95-100	90-100	20-30	5-10
49*:											
Hiland----------	0-5	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	65-75	30-40	20-25	NP-5
	5-20	Sandy clay loam	SM-SC, SC	A-2, A-4, A-6	0	95-100	90-100	50-75	30-50	20-30	5-15
	20-60	Sandy loam-------	SM	A-2	0	85-100	75-100	45-75	15-30	20-25	NP-5

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
49*:											
Bowbac----------	0-7	Sandy loam-------	SM	A-2	0	90-100	90-100	65-80	35-50	15-25	NP-5
	7-18	Sandy clay loam	CL	A-6	0	90-100	90-100	70-85	50-60	25-40	10-20
	18-33	Sandy loam-------	SM, ML, SM-SC, CL-ML	A-4, A-6	0	90-100	90-100	60-80	45-55	25-35	5-15
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
50*:											
Hiland----------	0-5	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	65-75	30-40	20-25	NP-5
	5-20	Sandy clay loam	SM-SC, SC	A-2, A-4, A-6	0	95-100	90-100	50-75	30-50	20-30	5-15
	20-60	Sandy loam-------	SM	A-2	0	85-100	75-100	45-75	15-30	20-25	NP-5
Vonalee---------	0-6	Fine sandy loam	SM-SC, SM	A-2, A-4	0	100	95-100	55-75	30-40	20-30	NP-10
	6-60	Sandy loam-------	SM-SC, SM	A-2, A-4	0	100	90-100	55-75	30-40	20-30	NP-10
51----------	0-4	Clay loam--------	CL	A-6, A-7	0	100	100	80-90	70-80	35-45	15-20
Hilight	4-16	Clay-------------	CH, CL	A-7	0	100	100	90-100	85-95	45-60	20-35
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
52*:											
Keeline---------	0-4	Sandy loam-------	SM	A-2, A-4	0	100	95-100	55-75	25-40	20-25	NP-5
	4-60	Sandy loam-------	SM, SM-SC	A-2, A-4	0	100	95-100	60-85	25-50	20-30	NP-10
Turnercrest-----	0-6	Sandy loam-------	SM	A-2	0	100	100	60-80	25-35	---	NP
	6-25	Fine sandy loam	SM	A-2, A-4	0	100	100	60-80	25-40	20-25	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
53----------	0-7	Loam-------------	ML	A-4	0	85-100	75-100	65-85	55-75	25-30	NP-5
Kishona	7-60	Loam-------------	CL-ML, CL	A-4, A-6	0	85-100	75-100	70-90	65-85	20-30	5-15
54----------	0-5	Clay loam--------	CL	A-6	0	85-100	75-100	70-90	70-80	30-40	10-20
Kishona	5-60	Loam-------------	CL-ML, CL	A-4, A-6	0	85-100	75-100	70-90	65-85	20-30	5-15
55*:											
Kishona---------	0-7	Loam-------------	ML	A-4	0	85-100	75-100	65-85	55-75	25-30	NP-5
	7-60	Loam-------------	CL-ML, CL	A-4, A-6	0	85-100	75-100	70-90	65-85	20-30	5-15
Shingle---------	0-6	Loam-------------	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	6-17	Loam-------------	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Theedle---------	0-8	Loam-------------	CL-ML	A-4	0	95-100	95-100	70-85	60-70	20-30	5-10
	8-28	Loam-------------	CL-ML, CL	A-4, A-6	0	95-100	95-100	70-85	60-70	25-40	5-20
	28	Weathered bedrock.	---	---	---	---	---	---	---	---	---
56*:											
Kishona---------	0-7	Loam-------------	ML	A-4	0	85-100	75-100	65-85	55-75	25-30	NP-5
	7-60	Loam-------------	CL-ML, CL	A-4, A-6	0	85-100	75-100	70-90	65-85	20-30	5-15
Theedle---------	0-8	Loam-------------	CL-ML	A-4	0	95-100	95-100	70-85	60-70	20-30	5-10
	8-28	Loam-------------	CL-ML, CL	A-4, A-6	0	95-100	95-100	70-850	60-70	25-40	5-20
	28	Weathered bedrock	---	---	---	---	---	---	---	---	---
Zigweid---------	0-5	Loam-------------	CL	A-6	0	75-100	75-100	70-85	60-70	25-40	10-20
	5-60	Loam-------------	CL	A-6	0	75-100	75-100	70-850	60-70	25-40	10-20
57*:											
Lakoa----------	0-11	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-35	5-15
	11-32	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	85-100	50-80	35-45	12-20
	32-60	Loam-------------	CL, SC	A-6, A-4	0-15	90-100	85-100	75-95	45-90	30-40	8-15

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
57*:											
Crownest--------	0-4	Channery sandy loam.	SM	A-2	0	75-100	60-85	35-50	20-30	---	NP
	4-12	Channery sandy loam.	SM	A-2	0-5	80-100	60-85	35-50	25-35	---	NP
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
58----------	0-6	Clay loam--------	CL	A-6, A-7	0	100	95-100	90-100	75-85	35-50	15-25
Lohmiller	6-60	Stratified loam to clay.	CL, ML, CL-ML	A-4, A-6	0	95-100	95-100	90-100	65-75	25-40	5-15
59*, 60*:											
Lohmiller-------	0-6	Clay loam--------	CL	A-6, A-7	0	100	95-100	90-100	70-85	35-50	12-25
	6-60	Stratified loam to clay.	CL, CH	A-6, A-7	0	95-100	95-100	90-100	65-95	35-60	12-30
Haverdad--------	0-9	Loam-------------	CL-ML, ML	A-4	0	75-100	75-100	70-90	50-70	20-30	NP-10
	9-60	Stratified fine sandy loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	75-100	75-100	70-90	50-60	25-35	5-15
61----------	0-3	Loam-------------	ML, CL-ML	A-4	0	75-100	75-100	60-85	50-65	20-30	NP-10
Lohsman	3-38	Clay-------------	CH, CL	A-7	0	75-100	75-100	70-90	65-75	40-55	20-35
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---
62----------	0-15	Loam-------------	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	60-85	25-35	5-15
Nilrap	15-37	Clay loam--------	CL, CH	A-7	0	100	95-100	85-95	80-90	40-55	10-35
	37-60	Very gravelly loam.	GM-GC, GC	A-4, A-6	0	60-70	35-50	30-45	20-35	20-30	5-15
63----------	0-4	Loam-------------	CL-ML, CL	A-4	0	100	95-100	85-95	60-85	20-30	NP-10
Norkool	4-14	Silty clay loam	CL	A-6	0	100	95-100	95-100	85-95	30-40	10-20
	14-60	Silt loam--------	CL-ML, CL	A-4	0	100	95-100	95-100	75-90	20-30	NP-10
64----------	0-8	Clay loam--------	CL	A-6, A-7	0	100	95-100	85-100	60-80	35-45	15-25
Nunnston	8-16	Clay-------------	CL, CH	A-7	0	100	95-100	85-100	85-95	45-55	25-35
	16-60	Clay-------------	CL	A-7	0	100	95-100	85-95	65-85	40-50	20-30
65*, 66*:											
Nunnston--------	0-8	Clay loam--------	CL	A-6, A-7	0	100	90-100	85-100	60-80	35-45	15-25
	8-16	Clay-------------	CL, CH	A-7	0	100	90-100	85-100	85-95	45-55	25-35
	16-60	Clay-------------	CL	A-7	0	100	95-100	85-95	65-85	40-50	20-30
Tanna Variant---	0-8	Clay loam--------	CL	A-6	0	100	95-100	85-100	60-80	25-40	10-20
	8-23	Clay-------------	CL, CH	A-7	0	100	95-100	85-100	85-95	40-60	20-35
	23-36	Clay loam--------	CL	A-6, A-7	0	100	95-100	85-95	65-85	35-50	15-25
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
67----------	0-22	Loam-------------	CL	A-4	0	100	95-100	95-100	70-85	30-35	5-10
Onita Variant	22-38	Silty clay loam	CL	A-7	0	100	95-100	90-100	80-90	40-50	15-25
	38-60	Silt loam--------	CL	A-6	0	100	95-100	95-100	85-95	30-35	10-15
68*:											
Orella----------	0-2	Silty clay loam	CH, CL	A-6, A-7	0	100	100	95-100	70-95	38-65	20-40
	2-12	Silty clay loam	CH	A-7	0	100	100	90-100	75-95	50-70	30-50
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cadoma----------	0-3	Silty clay loam	CL, CH	A-7	0	100	100	85-95	80-90	40-65	20-35
	3-28	Clay, silty clay loam.	CL, CH	A-7	0	100	100	85-95	80-90	40-65	20-35
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
69*:											
Orella----------	0-2	Silty clay loam	CH, CL	A-6, A-7	0	100	100	95-100	70-95	38-65	20-40
	2-12	Silty clay loam	CH	A-7	0	100	100	90-100	75-95	50-70	30-50
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Samday----------	0-4	Clay----------	CL	A-6, A-7	0	100	90-100	85-95	75-90	35-50	15-30
	4-16	Clay----------	CL, CH	A-6	0	100	95-100	85-100	75-95	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
70*:											
Parmleed--------	0-5	Loam----------	CL-ML, ML	A-4	0	75-100	75-100	70-90	50-60	20-30	NP-10
	5-14	Clay----------	CL, CH	A-7	0	95-100	85-100	85-95	85-95	40-55	20-35
	14-28	Clay----------	CL	A-6	0	95-100	85-100	70-85	60-70	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bidman----------	0-4	Loam----------	CL	A-6	0	80-100	80-100	70-85	60-70	30-40	10-15
	4-12	Clay----------	CH	A-7	0	80-100	80-100	80-100	70-90	50-60	30-40
	12-60	Clay loam--------	CL	A-6, A-7	0	80-100	80-100	75-100	65-80	35-45	20-30
71*:											
Parmleed--------	0-5	Loam----------	CL-ML, ML	A-4	0	75-100	75-100	70-90	50-60	20-30	NP-10
	5-14	Clay----------	CL, CH	A-7	0	95-100	85-100	85-95	85-95	40-55	20-35
	14-28	Clay loam--------	CL	A-6	0	95-100	85-100	70-85	60-70	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bowbac----------	0-7	Sandy loam-------	SM	A-2	0	90-100	90-100	65-80	35-50	15-25	NP-5
	7-18	Sandy clay loam	CL	A-6	0	90-100	90-100	70-85	50-60	25-40	10-20
	18-33	Sandy loam-------	SM, ML, SM-SC, CL-ML	A-4, A-6	0	90-100	90-100	60-80	45-55	25-35	5-15
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
72*:											
Parmleed--------	0-5	Loam----------	CL-ML	A-4	0	75-100	75-100	70-90	50-60	20-30	NP-10
	5-14	Clay----------	CL, CH	A-7	0	95-100	85-100	85-95	85-95	40-55	20-35
	14-28	Clay loam--------	CL	A-6	0	95-100	85-100	70-85	60-70	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Forkwood--------	0-4	Loam----------	ML, CL-ML	A-4	0	75-100	75-100	70-90	50-70	20-30	NP-10
	4-21	Clay loam--------	CL	A-6	0	75-100	75-100	70-90	55-75	25-35	10-20
	21-60	Loam----------	CL	A-6	0	75-100	75-100	70-90	55-75	25-40	10-25
73*:											
Parmleed--------	0-5	Loam----------	CL-ML, ML	A-4	0	75-100	75-100	70-90	50-60	20-30	NP-10
	5-14	Clay----------	CL, CH	A-7	0	95-100	85-100	85-95	85-95	40-55	20-35
	14-28	Clay loam--------	CL	A-6	0	95-100	85-100	70-85	60-70	30-40	10-15
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Renohill--------	0-4	Clay loam--------	CL	A-6	0	85-100	80-100	80-95	70-90	30-40	10-20
	4-12	Clay loam--------	CL, CH	A-7, A-6	0	95-100	90-100	90-100	75-95	35-65	20-35
	12-34	Clay loam--------	CL	A-6	0	85-100	80-100	80-95	70-80	30-40	15-25
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
74*, 75*:											
Pesowyo	0-5	Channery clay loam.	CL, GC, SC	A-6	0	65-80	60-75	50-65	45-55	35-40	15-20
	5-24	Very channery clay loam.	GC	A-2	0	40-60	25-50	20-40	20-35	35-45	15-20
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Paunsaugunt	0-6	Loam	CL-ML	A-4	0	75-85	75-85	65-75	50-60	20-30	5-10
	6-16	Very channery loam.	GM-GC	A-2	0	40-50	40-50	33-45	25-35	20-30	5-10
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
76	0-4	Clay loam	CL	A-6	0	80-100	75-100	75-100	60-80	35-40	15-20
Petrie	4-60	Clay loam	CL, CH	A-7	0	80-100	75-100	75-100	60-95	40-55	20-35
77*:											
Petrie	0-4	Clay loam	CL	A-6	0	80-100	75-100	75-100	60-80	35-40	15-20
	4-60	Clay loam	CL, CH	A-7	0	80-100	75-100	75-100	60-95	40-55	20-35
Ustic Torriorthents.											
78*. Pits, bentonite											
79*. Pits, gravel											
80	0-8	Loam	CL-ML	A-4	0	100	85-100	80-90	60-75	25-30	5-10
Recluse	8-20	Clay loam	CL	A-6	0	100	85-100	80-90	60-80	35-40	15-20
	20-40	Clay loam	CL	A-6	0	95-100	85-100	75-90	50-70	25-40	10-20
	40-60	Sandy loam	SM	A-2	0	95-100	85-100	50-70	25-35	20-25	NP-5
81	0-10	Loam	CL-ML, CL	A-4, A-6	0	100	85-100	80-90	60-75	25-35	5-15
Reicess	10-30	Clay loam	CL	A-6	0	95-100	85-100	75-90	60-75	35-40	15-20
	30-60	Loam	CL-ML, CL	A-4, A-6	0	95-100	85-100	65-85	60-70	25-35	5-15
82*, 83*:											
Reicess	0-10	Loam	CL-ML, CL	A-4, A-6	0	100	85-100	80-90	60-75	25-35	5-15
	10-31	Clay loam	CL	A-6	0	95-100	85-100	75-90	60-75	35-40	15-20
	31-60	Loam	CL-ML, CL	A-4, A-6	0	95-100	85-100	65-85	60-70	25-35	5-15
Wages Variant	0-5	Loam	CL-ML, CL	A-4, A-6	0	90-100	75-100	65-90	60-75	25-35	5-15
	5-12	Clay loam	CL-ML, CL	A-4, A-6	0	90-100	90-100	75-85	55-65	25-40	5-15
	12-60	Loam	CL-ML, CL	A-4, A-6	0	90-100	90-100	85-95	70-80	25-40	5-15
84*:											
Regnaps	0-4	Loam	ML	A-4	0	95-100	95-100	60-80	50-60	20-25	NP-5
	4-16	Clay loam	CL	A-6	0	95-100	95-100	75-90	65-75	25-40	10-20
	16-21	Loam	ML, CL-ML	A-4	0	85-100	75-100	60-80	50-60	20-30	NP-10
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
Crownest	0-4	Channery sandy loam.	SM	A-2	0	75-100	60-85	35-50	20-30	---	NP
	4-12	Channery sandy loam.	SM	A-2	0-5	80-100	60-85	35-50	25-35	---	NP
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
85*:											
Regnaps	0-4	Loam	ML	A-4	0	95-100	95-100	60-80	50-60	25-25	NP-5
	4-16	Clay loam	CL	A-6	0	95-100	95-100	75-90	65-75	25-40	10-20
	16-21	Loam	ML, CL-ML	A-4	0	85-100	75-100	60-80	50-60	20-30	NP-10
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
85*:											
Norkool	0-4	Loam	CL-ML, CL	A-4	0	100	95-100	85-95	60-85	20-30	NP-10
	4-21	Silty clay loam	CL	A-6	0	100	95-100	95-100	85-95	30-40	10-20
	21-60	Silt loam	CL-ML, CL	A-4	0	100	95-100	95-100	75-90	20-30	NP-10
Crownest	0-4	Channery sandy loam.	SM	A-2	0	75-100	60-85	35-50	20-30	---	NP
	4-12	Channery sandy loam.	SM	A-2	0-5	80-100	60-85	35-50	25-35	---	---
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
86*, 87*:											
Rekop Variant	0-5	Loam	ML	A-4	0-5	95-100	95-100	85-95	60-75	30-35	5-10
	5-14	Loam	ML	A-4	0-10	75-100	75-100	60-80	50-60	30-35	5-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gypnevee Variant	0-6	Silt loam	CL-ML, CL	A-4	0	100	100	95-100	75-85	20-25	5-10
	6-45	Silt loam	CL-ML, CL	A-4	0	100	100	95-100	75-85	20-25	5-10
	45	Unweathered bedrock.	--	---	---	---	---	---	---	---	---
Rock outcrop.											
88	0-4	Loam	CL-ML	A-4	0	85-100	80-100	80-95	50-75	25-30	5-10
Renohill	4-12	Clay loam	CL, CH	A-7, A-6	0	95-100	90-100	90-100	75-95	35-65	20-35
	12-34	Clay loam	CL	A-6	0	85-100	80-100	80-95	70-80	30-40	15-25
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
89	0-4	Clay loam	CL	A-6	0	85-100	80-100	80-95	70-90	30-40	10-20
Renohill	4-12	Clay loam	CL, CH	A-7, A-6	0	95-100	90-100	90-100	75-95	35-65	20-35
	12-34	Clay loam	CL	A-6	0	85-100	80-100	80-95	70-80	30-40	15-25
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
90*:											
Renohill	0-4	Clay loam	CL	A-6	0	85-100	80-100	80-95	70-90	30-40	10-20
	4-12	Clay loam	CL, CH	A-7, A-6	0	95-100	90-100	90-100	75-95	35-65	20-35
	12-34	Clay loam	CL	A-6	0	85-100	80-100	80-95	70-80	30-40	15-25
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Savageton	0-5	Clay loam	CL, CH	A-7	0	100	100	90-100	85-95	40-55	20-35
	5-29	Clay loam	CL, CH	A-7	0	100	100	90-100	85-95	40-55	20-35
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
91*. Rock outcrop											
92*: Rock outcrop.											
Vanocker	0-2	Gravelly loam	SM, CL, SM	A-4, A-6	0-10	60-80	55-75	50-70	45-70	30-45	5-20
	2-60	Very channery clay loam.	CL, SC, GC	A-6, A-7	5-15	60-80	50-70	45-65	40-60	30-45	10-20
93*: Rock outcrop.											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
93*:											
Wibaux	0-4	Channery loam	GM-GC, SM-SC	A-4	0-5	55-75	50-75	40-60	35-45	25-35	5-10
	4-16	Very channery loam.	GM-GC	A-2	0-25	30-55	25-50	20-35	20-30	25-35	5-10
	16-60	Fragmental material.	GP	A-1	0-25	0-10	0-5	0-5	0-5	---	NP
94*:											
Rothican	0-8	Loam	CL	A-6	0	85-100	85-100	75-90	60-75	25-35	10-15
	8-60	Gravelly loam	GC, SC	A-6	0	50-75	50-75	45-70	35-50	25-35	10-15
Colhill	0-6	Gravelly loam	GN-GC, GM, SM-SC, SM	A-4	0-5	55-80	50-75	40-65	40-50	20-30	NP-10
	6-60	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-5	30-60	25-50	15-25	15-25	20-30	NP-10
95*:											
Samday	0-4	Clay	CL	A-6, A-7	0	100	90-100	85-95	75-90	35-50	15-30
	4-16	Clay	CL, CH	A-6	0	100	95-100	85-100	75-95	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Grummit	0-4	Clay loam	CH, MH, CL	A-7	0	95-100	85-100	75-100	65-100	40-60	10-30
	4-15	Clay	CH, MH, ML, CL	A-7	0	95-100	85-100	75-100	65-100	40-60	10-30
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
96*:											
Samday	0-4	Clay	CL	A-6, A-7	0	100	90-100	85-95	75-90	35-50	15-30
	4-16	Clay	CL, CH	A-6	0	100	95-100	85-100	75-95	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Savageton	0-5	Clay loam	CL, CH	A-7	0	100	100	90-100	85-95	40-55	20-35
	5-29	Clay loam	CL, CH	A-7	0	100	100	90-100	85-95	40-55	20-35
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
97*:											
Samday	0-4	Clay	CL	A-6, A-7	0	100	90-100	85-95	75-90	35-50	15-30
	4-16	Clay	CL, CH	A-6	0	100	95-100	85-100	75-95	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Shingle	0-6	Loam	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	6-17	Loam	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Worf	0-3	Loam	CL-ML	A-4	0	100	95-100	65-95	50-65	25-35	5-10
	3-16	Loam	CL	A-6	0	100	95-100	65-85	60-75	25-40	10-20
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
98*:											
Samoist	0-2	Clay loam	CL	A-7	0	100	100	90-100	85-95	40-50	20-30
	2-12	Clay	CL	A-7	0	100	100	90-100	85-95	40-50	20-30
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Colsavage	0-5	Clay loam	CL	A-7, A-6	0	95-100	95-100	95-100	70-90	30-40	15-30
	5-30	Clay	CL, CH	A-7	0	95-100	95-100	95-100	85-95	40-60	20-35
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
99*:											
Savageton-------	0-5	Clay loam--------	CL, CH	A-7	0	100	100	90-100	85-95	40-55	20-35
	5-29	Clay loam--------	CL, CH	A-7	0	100	100	90-100	85-95	40-55	20-35
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bahl------------	0-6	Clay loam--------	CL	A-6, A-7	0	100	95-100	85-100	60-80	35-45	15-25
	6-60	Clay-------------	CL, CH	A-7	0	100	100	90-100	85-95	40-60	20-35
100*:											
Shingle----------	0-6	Loam-------------	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	6-17	Loam-------------	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Samday-----------	0-4	Clay-------------	CL	A-6, A-7	0	100	90-100	85-95	75-90	35-50	15-30
	4-16	Clay-------------	CL, CH	A-6	0	100	95-100	85-100	75-95	40-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
101*:											
Shingle----------	0-6	Loam-------------	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	6-17	Loam-------------	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Theedle----------	0-8	Loam-------------	CL-ML	A-4	0	95-100	95-100	70-85	60-70	20-30	5-10
	8-28	Loam-------------	CL-ML, CL	A-4, A-6	0	95-100	95-100	70-85	60-70	20-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
102*:											
Shingle----------	0-6	Loam-------------	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	6-17	Loam-------------	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Theedle----------	0-8	Loam-------------	CL-ML	A-4	0	95-100	95-100	70-85	60-70	20-30	5-10
	8-28	Loam-------------	CL-ML, CL	A-4, A-6	0	95-100	95-100	70-85	60-70	25-40	5-20
	28	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cambria----------	0-4	Loam-------------	CL-ML, ML	A-4	0	95-100	95-100	75-85	60-70	20-30	NP-10
	4-12	Loam-------------	CL-ML, ML	A-4, A-6	0	95-100	95-100	75-85	55-75	25-40	5-15
	12-60	Loam-------------	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-95	70-80	25-40	5-15
103*:											
Shingle Variant-	0-5	Loam-------------	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	5-16	Loam-------------	CL	A-6	0	75-100	75-100	65-100	50-80	35-40	15-20
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Theedle Variant-	0-3	Loam-------------	CL-ML, ML	A-4	0	95-100	95-100	70-85	60-70	20-30	NP-10
	3-30	Clay loam--------	CL	A-6	0	95-100	95-100	70-85	60-70	25-40	10-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
104--------------	0-4	Clay-------------	CH	A-7	0	100	100	90-100	75-100	50-90	25-65
Stetter	4-60	Clay-------------	CH	A-7	0	100	100	90-100	75-100	50-90	25-65
105*:											
Stovho Variant--	0-9	Loam-------------	ML	A-4	0	100	95-100	95-100	70-85	30-35	5-10
	9-20	Clay-------------	CL	A-7	0	100	95-100	95-100	80-100	45-55	15-25
	20-60	Clay-------------	CL	A-6, A-7	0	100	95-100	95-100	80-100	35-50	15-25

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
105*:											
Stovho----------	0-8	Silt loam--------	ML, CL	A-4, A-6	0	100	95-100	95-100	85-100	25-40	3-15
	8-24	Silty clay loam--	CL, CH	A-7	0	100	95-100	90-100	80-100	40-60	15-30
	24-60	Clay loam--------	CL	A-6, A-7	0	100	95-100	90-100	70-100	35-50	11-25
106----------	0-7	Loam-------------	CL-ML	A-4	0	95-100	95-100	85-90	60-75	25-30	5-10
Sugakool	7-16	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	90-100	75-90	35-45	15-25
	16-60	Very gravelly loam.	GC	A-2	0	35-55	35-50	30-45	25-35	25-35	10-15
107*, 108*:											
Sugakool--------	0-7	Loam-------------	CL-ML	A-4	0	95-100	95-100	85-90	60-75	25-30	5-10
	7-16	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	90-100	75-90	35-45	15-25
	16-60	Very gravelly loam.	GC	A-2	0	35-55	35-50	30-45	25-35	25-35	10-15
Colhill---------	0-6	Gravelly loam----	GM-GC, GM, SM-SC, SM	A-4	0-5	55-80	50-75	40-65	40-50	20-30	NP-10
	6-60	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-5	30-60	25-50	15-25	15-25	20-30	NP-10
109*:											
Tassel----------	0-3	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	75-100	40-65	<35	NP-7
	3-15	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	65-95	40-65	<35	NP-7
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Shingle---------	0-6	Loam-------------	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	6-17	Loam-------------	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
110*:											
Tassel----------	0-3	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	75-100	40-65	<35	NP-7
	3-15	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	65-100	40-65	<35	NP-7
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Terro-----------	0-8	Sandy loam-------	SM	A-2, A-4	0-15	100	100	60-90	30-45	---	NP
	8-36	Sandy loam-------	SM	A-2, A-4	0-15	100	100	60-90	30-45	20-25	NP-5
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
111*:											
Tassel----------	0-3	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	75-100	40-65	<35	NP-7
	3-15	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	65-100	40-65	<35	NP-7
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Turnercrest-----	0-2	Fine sandy loam	SM	A-2	0	100	100	60-80	25-35	20-25	NP
	2-6	Fine sandy loam	SM	A-2, A-4	0	100	100	60-80	25-35	20-25	NP-5
	6-25	Fine sandy loam	SM	A-2	0	100	100	60-80	25-35	20-25	NP-5
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
112*:											
Tassel Variant--	0-16	Fine sandy loam	SM	A-2	0	100	95-100	60-80	25-35	20-25	NP-5
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
112*:											
Shingle Variant-	0-5	Loam	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	5-16	Loam	CL	A-6	0	75-100	75-100	65-100	50-80	35-40	15-20
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
113*:											
Terro	0-8	Sandy loam	SM	A-2, A-4	0-15	100	100	60-90	30-45	---	NP
	8-24	Sandy loam	SM	A-2, A-4	0-15	100	100	60-90	30-45	20-25	NP-5
	24-36	Sandy loam, fine sandy loam.	SM	A-2, A-4	0-15	100	100	60-90	30-40	20-25	NP-5
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Turnercrest	0-2	Sandy loam	SM	A-2	0	100	100	60-80	25-35	---	NP
	2-25	Fine sandy loam	SM	A-2	0	100	100	60-80	25-35	20-25	NP-5
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
114*:											
Theedle	0-8	Loam	CL-ML	A-4	0	95-100	95-100	70-85	60-70	20-30	5-10
	8-28	Loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	70-85	60-70	25-40	5-20
	28	Weathered bedrock	---	---	---	---	---	---	---	---	---
Kishona	0-7	Loam	ML	A-4	0	85-100	75-100	65-85	55-75	25-30	NP-5
	7-60	Loam	CL-ML, CL	A-4, A-6	0	85-100	75-100	70-90	65-85	20-30	5-15
115*:											
Thermopolis Variant	0-3	Silt loam	CL-ML	A-4	0	100	100	95-100	75-85	20-25	5-10
	3-13	Silt loam	CL-ML	A-4	0	100	100	95-100	75-85	20-25	5-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
116*:											
Topeman	0-4	Clay	CH	A-7	0	100	100	95-100	85-95	50-60	30-35
	4-40	Clay	CH	A-7	0	100	100	95-100	85-95	50-60	30-35
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Demar	0-6	Loam	CL, CL-ML	A-4, A-6, A-7	0	100	100	95-100	65-80	25-45	5-20
	6-20	Silty clay	CL, CH	A-7	0	100	100	100	95-100	40-60	20-35
	20-50	Clay	CL, CH	A-7	0	100	100	100	95-100	40-60	20-35
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
117	0-5	Clay	CH, MH	A-7	0	100	95-100	85-100	75-100	60-85	30-45
Twotop	5-60	Clay	CH, MH	A-7	0	100	95-100	95-100	85-100	60-85	30-45
118	0-6	Loam	CL-ML	A-4	0-5	95-100	95-100	80-100	70-80	20-30	5-10
Ulm	6-16	Clay loam	CL	A-6, A-7	0-5	75-100	75-100	75-100	60-80	35-45	20-30
	16-60	Clay loam	CL	A-6	0-5	75-100	75-100	75-100	60-80	30-45	15-20
119	0-6	Clay loam	CL	A-6	0-5	95-100	95-100	80-100	70-80	30-40	10-20
Ulm	6-16	Clay loam	CL	A-6, A-7	0-5	75-100	75-100	75-100	60-80	35-45	20-30
	16-60	Clay loam	CL	A-6	0-5	75-100	75-100	75-100	60-80	30-40	15-20
120*:											
Ulm	0-6	Clay loam	CL	A-6	0-5	95-100	95-100	80-100	70-80	30-40	10-20
	6-16	Clay loam	CL	A-6, A-7	0-5	75-100	75-100	75-100	60-80	35-45	20-30
	16-60	Clay loam	CL	A-6	0-5	75-100	75-100	75-100	60-80	30-40	15-20

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
120*:											
Renohill--------	0-4	Clay loam--------	CL	A-6	0	85-100	80-100	80-95	70-90	30-40	10-20
	4-12	Clay loam--------	CL, CH	A-7, A-6	0	95-100	90-100	90-100	75-95	35-65	20-35
	12-34	Clay loam--------	CL	A-6	0	85-100	80-100	85-95	70-80	30-40	15-25
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
121. Ustic Torrifluvents											
122*: Ustic Torriorthents.											
Typic Eutroboralfs.											
Rock outcrop.											
123*:											
Vanocker--------	0-2	Gravelly loam----	ML, CL, SM, SC	A-4, A-6, A-7	0-10	60-80	55-75	50-70	45-70	30-45	7-20
	2-60	Very channery clay loam.	GC	A-2	5-15	30-60	25-50	20-40	20-35	30-45	10-20
Citadel---------	0-10	Loam-------------	CL, ML	A-6, A-4	0	100	100	85-100	55-80	25-40	3-15
	10-60	Clay-------------	CL, CH	A-6, A-7	0-10	95-100	90-100	85-100	70-95	35-55	15-30
124, 125--------- Vassett	0-9	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	95-100	85-95	60-85	25-35	5-15
	9-24	Silty clay loam	CL	A-6	0	100	95-100	95-100	80-90	35-40	15-20
	24-60	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	95-100	90-95	60-85	25-35	5-15
126*:											
Vonalee---------	0-6	Fine sandy loam	SM-SC, SM	A-2, A-4	0	100	95-100	55-75	30-40	20-30	NP-10
	6-60	Sandy loam, coarse sandy loam.	SM-SC, SM	A-2, A-4	0	100	95-100	55-75	30-40	20-30	NP-10
Terro-----------	0-6	Sandy loam-------	SM	A-2, A-4	0-15	100	100	60-90	30-45	---	NP
	6-24	Sandy loam-------	SM	A-2, A-4	0-15	100	100	60-90	30-45	20-25	NP-5
	24-34	Sandy loam-------	SM	A-2, A-4	0-15	100	100	60-90	30-45	20-25	NP-5
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
127*:											
Winler----------	0-6	Clay-------------	CH, MH	A-7	0	100	100	90-100	80-100	65-95	30-55
	6-16	Clay-------------	CH, MH	A-7	0	100	100	90-100	80-100	65-90	30-55
	16-32	Clay-------------	CH, MH	A-7	0	95-100	70-100	60-100	50-100	65-90	30-55
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Savageton-------	0-5	Clay loam--------	CL, CH	A-7	0	100	100	90-100	85-95	40-55	20-35
	5-29	Clay loam--------	CL, CH	A-7	0	100	100	90-100	85-95	40-55	20-35
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
128*:											
Worf------------	0-3	Loam-------------	CL-ML	A-4	0	100	95-100	65-95	50-65	25-35	5-10
	3-16	Loam-------------	CL	A-6	0	100	95-100	65-85	60-75	25-40	10-20
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
128*:											
Shingle---------	0-6	Loam----------	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	6-17	Loam----------	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tassel----------	0-3	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	75-100	40-65	<35	NP-7
	3-15	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	65-95	40-65	<35	NP-7
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
1*:											
Absted----------	0-6	8-18	2.0-6.0	0.11-0.13	6.6-7.8	<2	Low-------	0.32	5	3	1-2
	6-60	35-50	0.06-0.2	0.11-0.15	6.6-7.8	<16	High------	0.43			
Bone----------	0-1	20-38	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.32	5	5	<.5
	1-4	40-50	<0.06	0.12-0.15	>7.8	2-8	High------	0.37			
	4-60	35-40	<0.06	0.08-0.10	>7.8	4-16	High------	0.43			
2----------	0-8	5-15	0.6-2.0	0.12-0.14	6.6-8.4	<2	Low-------	0.32	5	3	1-2
Alice Variant	8-20	5-15	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low-------	0.37			
	20-60	2-10	2.0-6.0	0.08-0.11	7.4-8.4	<2	Low-------	0.37			
3----------	0-4	20-27	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.32	5	6	1-2
Bidman	4-12	40-50	0.06-0.2	0.14-0.16	6.6-7.8	<2	High------	0.32			
	12-60	28-35	0.2-0.6	0.19-0.21	7.9-9.0	<2	High------	0.43			
4*:											
Bidman----------	0-4	20-27	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.32	5	6	1-2
	4-12	40-50	0.06-0.2	0.14-0.16	6.6-7.8	<2	High------	0.32			
	12-60	28-35	0.2-0.6	0.19-0.21	7.9-9.0	<2	High------	0.43			
Bone----------	0-1	20-27	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.32	5	5	<.5
	1-4	40-50	<0.06	0.12-0.15	>7.8	2-8	High------	0.37			
	4-60	35-40	<0.06	0.08-0.10	>7.8	4-16	High------	0.43			
5*:											
Bidman----------	0-4	20-27	0.2-0.6	0.19-0.21	6.1-7.3	<2	Moderate	0.32	5	6	1-2
	4-12	40-50	0.06-0.2	0.14-0.16	6.6-7.8	<2	High------	0.32			
	12-60	28-35	0.2-0.6	0.19-0.21	7.9-9.0	<2	High------	0.43			
Ulm----------	0-6	28-35	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.32	5	6	1-3
	6-16	35-40	0.06-2.0	0.19-0.21	6.6-8.4	<2	High------	0.37			
	16-60	30-40	0.6-2.0	0.19-0.21	7.9-9.0	<2	Moderate	0.37			
6----------	0-1	20-27	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.32	5	5	<.5
Bone	1-4	35-40	<0.06	0.12-0.15	>7.8	2-8	High------	0.37			
	4-60	35-40	<0.06	0.08-0.10	>7.8	4-16	High------	0.43			
7*:											
Bowbac----------	0-7	5-15	0.6-2.0	0.12-0.14	6.6-8.4	<2	Low-------	0.32	2	3	1-2
	7-18	20-35	0.6-2.0	0.14-0.16	6.6-8.4	<2	Moderate	0.37			
	18-33	15-25	0.6-2.0	0.12-0.17	7.9-9.0	<2	Low-------	0.37			
	33	---	---	---	---	---	----------	----			
Tassel----------	0-4	10-20	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low-------	0.32	1	5	1-2
	4-16	5-15	2.0-6.0	0.10-0.12	6.6-7.8	<2	Low-------	0.20			
	16	---	---	---	---	---	----------	----			
Rock outcrop.											
8----------	0-3	35-40	0.06-0.2	0.13-0.15	>6.6	<4	High------	0.37	3	4	1-3
Cadoma	3-11	35-40	0.06-0.2	0.16-0.19	>8.4	4-8	High------	0.43			
	11-28	40-50	0.06-0.2	0.16-0.19	>8.4	4-16	High------	0.43			
	28	---	---	---	---	---	----------	----			
9----------	0-4	10-25	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low-------	0.32	5	6	1-2
Cambria	4-60	18-27	0.6-2.0	0.17-0.18	7.9-9.0	<2	Moderate--	0.37			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
10----------	0-10	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low--------	0.20	5	3	1-2
Chinook	10-20	5-18	2.0-6.0	0.12-0.15	7.4-8.4	<2	Low--------	0.20			
	20-60	5-15	2.0-6.0	0.11-0.12	7.4-9.0	<2	Low--------	0.20			
11*, 12*:											
Chinook----------	0-10	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low--------	0.20	5	3	1-2
	10-20	5-18	2.0-6.0	0.12-0.15	7.4-8.4	<2	Low--------	0.20			
	20-60	5-15	2.0-6.0	0.11-0.12	7.4-9.0	<2	Low--------	0.20			
Tassel Variant--	0-16	5-15	2.0-6.0	0.12-0.14	6.6-8.4	<2	Low--------	0.24	2	3	<.5
	16	---	---	---	---	---	----------	----			
13*, 14*:											
Chinook----------	0-10	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low--------	0.20	5	3	1-2
	10-20	5-18	2.0-6.0	0.12-0.15	7.4-8.4	<2	Low--------	0.20			
	20-60	5-15	2.0-6.0	0.11-0.12	7.4-9.0	<2	Low--------	0.20			
Theedle Variant-	0-3	18-27	0.6-2.0	0.17-0.20	6.6-8.4	<2	Low--------	0.32	5	6	1-2
	3-30	18-27	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low--------	0.37			
	30	---	---	---	---	---	----------	----			
15*, 16*:											
Citadel----------	0-10	10-20	0.6-2.0	0.16-0.18	5.1-7.3	<2	Low--------	0.37	5	8	2-4
	10-60	40-45	0.06-0.6	0.11-0.17	5.1-7.3	<2	High-------	0.37			
Lakoa------------	0-11	10-20	0.6-2.0	0.17-0.20	5.1-7.3	<2	Low--------	0.32	5	5	1-3
	11-32	27-35	0.6-2.0	0.17-0.20	5.6-7.3	<2	Moderate	0.32			
	32-60	18-27	0.6-2.0	0.16-0.20	5.6-8.4	<2	Moderate	0.32			
17*, 18*:											
Citadel----------	0-10	10-20	0.6-2.0	0.16-0.18	5.1-7.3	<2	Low--------	0.37	5	8	2-4
	10-60	40-45	0.06-0.6	0.11-0.17	5.1-7.8	<2	High-------	0.37			
McCaffery--------	0-30	3-5	6.0-20	0.06-0.07	5.6-6.5	<2	Low--------	0.17	5	2	1-2
	30-60	5-8	6.0-20	0.05-0.06	6.1-7.3	<2	Low--------	0.17			
19*:											
Colhill----------	0-6	15-25	0.6-2.0	0.12-0.16	6.6-7.8	<2	Low--------	0.15	2	8	1-2
	6-60	15-25	2.0-6.0	0.07-0.09	7.4-8.4	<4	Low--------	0.10			
Rothican---------	0-8	18-27	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.28	5	6	<1
	8-60	18-27	0.6-2.0	0.10-0.15	7.9-9.0	<2	Low--------	0.24			
20, 21-----------	0-5	10-18	0.6-2.0	0.17-0.20	6.6-8.4	<2	Low--------	0.32	4	5	1-2
Colnevee	5-60	10-18	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Low--------	0.43			
22, 23-----------	0-3	10-18	0.6-2.0	0.17-0.20	6.6-8.4	<2	Low--------	0.32	4	5	1-2
Colnevee	3-60	10-18	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Low--------	0.43			
24----------	0-5	10-18	0.6-2.0	0.17-0.20	6.6-7.8	<2	Low--------	0.32	5	4	1-2
Colnevee Variant	5-31	10-18	0.6-2.0	0.17-0.20	7.4-9.0	2-4	Low--------	0.43			
	31	---	---	---	---	---	----------	----			
25, 26-----------	0-8	15-27	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low--------	0.32	5	5	1-3
Colombo Variant	8-60	15-30	0.6-2.0	0.14-0.16	7.4-8.4	<2	Moderate	0.37			
27*:											
Colsavage--------	0-5	30-40	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.24	2	5	1-2
	5-30	40-55	0.06-0.2	0.14-0.18	7.9-9.0	2-4	High-------	0.32			
	30	---	---	---	---	---	----------	----			
Bahl Variant-----	0-8	30-40	0.06-0.2	0.17-0.20	6.6-8.4	<2	Moderate	0.32	5	6	1-2
	8-60	40-55	0.06-0.2	0.15-0.20	7.9-9.0	2-4	High-------	0.37			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
28----------	0-8	18-27	0.6-2.0	0.17-0.19	6.6-7.8	<2	Low--------	0.32	5	5	2-3
Cordeston	8-38	18-27	0.6-2.0	0.13-0.17	6.6-7.8	<2	Moderate	0.32			
	38-60	10-27	0.6-2.0	0.13-0.17	6.6-7.8	<2	Low--------	0.32			
29*:											
Corpening-------	0-6	10-20	0.6-2.0	0.09-0.11	7.4-8.4	<2	Low--------	0.15	1	8	2-3
	6-16	10-20	0.6-2.0	0.09-0.11	7.9-9.0	<2	Low--------	0.17			
	16	---	---	---	---	---	----------	----			
Rock outcrop.											
30*, 31*:											
Crownest--------	0-4	2-10	2.0-6.0	0.07-0.12	6.6-7.8	<2	Low--------	0.24	1	3	1-2
	4-12	5-15	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low--------	0.28			
	12	---	---	---	---	---	----------	----			
Regnaps---------	0-4	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.32	2	5	1-2
	4-16	27-35	0.6-2.0	0.15-0.20	6.6-7.8	<2	Moderate	----			
	16-21	10-25	0.6-2.0	0.13-0.17	6.6-7.8	<2	Low--------	----			
	21	---	---	---	---	---	----------	----			
32----------	0-2	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.32	2	5	1-2
Cushman	2-12	18-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	12-34	20-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
33*:											
Cushman---------	0-2	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.32	2	5	1-2
	2-12	28-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	12-34	20-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
Cambria---------	0-4	10-25	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low--------	0.32	5	6	1-2
	4-12	28-35	0.6-2.0	0.15-0.28	7.4-8.4	<2	Moderate	0.37			
	12-60	18-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
34*:											
Cushman---------	0-2	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.32	2	5	1-2
	2-12	28-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	12-34	20-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
Renohill--------	0-4	18-27	0.6-2.0	0.17-0.19	6.6-7.8	<2	Low--------	0.37	3	5	1-3
	4-12	35-40	0.06-0.2	0.14-0.16	6.6-8.4	<2	High-------	0.32			
	12-34	30-40	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
35*:											
Cushman---------	0-2	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.32	2	5	1-2
	2-12	28-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	12-34	20-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
Shingle---------	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low--------	0.32	2	5	1-3
	6-17	20-27	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	----------	----			
36*:											
Cushman---------	0-2	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.32	2	5	1-2
	2-12	28-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	12-34	20-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
	34	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
36*:											
Terro	0-6	8-12	2.0-6.0	0.09-0.14	6.6-7.8	<2	Low	0.28	2	3	1-2
	6-34	10-18	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low	0.28			
	34	---	---	---	---	---	---	---			
37	0-5	1-5	6.0-20	0.04-0.11	6.1-9.0	<2	Low	0.28	5	1	1-2
Dwyer	5-60	1-8	6.0-20	0.04-0.11	7.9-9.0	<2	Low	0.32			
38	0-4	12-25	0.6-2.0	0.15-0.17	6.6-8.4	2-4	Low	0.28	5	3	2-3
Forkwood	4-21	28-30	0.6-2.0	0.19-0.21	6.6-8.4	2-4	Moderate	0.32			
	21-60	20-27	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
39*:											
Forkwood	0-4	12-25	0.6-2.0	0.15-0.17	6.6-8.4	2-4	Low	0.28	5	4	2-3
	4-21	28-30	0.6-2.0	0.19-0.21	6.6-8.4	2-4	Moderate	0.32			
	21-60	20-27	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
Cambria	0-4	10-25	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low	0.32	5	6	1-2
	4-12	28-35	0.6-2.0	0.15-0.20	7.4-8.4	<2	Moderate	0.37			
	12-60	18-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
Cushman	0-2	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.32	2	5	1-2
	2-12	28-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	12-34	20-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
	34	---	---	---	---	---	---	---			
40*:											
Forkwood	0-4	12-25	0.6-2.0	0.15-0.17	6.6-8.4	2-4	Low	0.28	5	3	2-3
	4-21	28-30	0.6-2.0	0.19-0.21	6.6-8.4	2-4	Moderate	0.32			
	21-60	20-27	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
Cushman	0-2	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.32	2	5	1-2
	2-12	28-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	12-34	20-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
	34	---	---	---	---	---	---	---			
Terro	0-6	8-12	2.0-6.0	0.09-0.14	6.6-7.8	<2	Low	0.28	2	3	1-2
	6-34	10-18	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low	0.28			
	34	---	---	---	---	---	---	---			
41*:											
Forkwood	0-4	12-25	0.6-2.0	0.15-0.17	6.6-8.4	2-4	Low	0.28	5	3	2-3
	4-21	28-30	0.6-2.0	0.19-0.21	6.6-8.4	2-4	Moderate	0.32			
	21-60	20-27	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
Ulm	0-6	28-35	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.32	5	6	1-3
	6-16	35-40	0.06-2.0	0.19-0.21	6.6-8.4	<2	High	0.37			
	16-60	30-40	0.6-2.0	0.19-0.21	7.9-9.0	<2	Moderate	0.37			
42*:											
Grummit	0-4	35-40	0.6-2.0	0.08-0.17	3.6-6.6	<2	High	0.28	2	4	1-2
	4-15	50-65	0.6-2.0	0.08-0.17	3.6-6.0	<2	High	0.28			
	15	---	---	---	---	---	---	---			
Maggin	0-7	30-40	2.0-6.0	0.12-0.20	4.5-6.0	<2	High	0.10	2	8	3-4
	7-29	60-70	2.0-6.0	0.04-0.06	4.5-6.0	<2	High	0.05			
	29	---	---	---	---	---	---	---			
43*, 44*:											
Grummit	0-4	35-40	0.6-2.0	0.08-0.17	3.6-6.6	<2	High	0.28	2	4	1-2
	4-15	40-65	0.6-2.0	0.08-0.17	3.6-6.6	<2	High	0.28			
	15	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
43*, 44*:											
Snomo	0-4	30-40	0.6-2.0	0.10-0.14	3.6-6.5	<2	High	0.28	4	4	2-4
	4-44	60-70	0.6-2.0	0.08-0.12	3.6-5.5	<2	High	0.28			
	44	---	---	---	---	---	---	---			
45*:											
Gullied land.											
Torriorthents.											
46*:											
Haverdad	0-6	13-27	0.6-2.0	0.16-0.18	7.4-9.0	<8	Low	0.37	5	5	1-2
	6-60	20-35	0.6-2.0	0.16-0.18	7.9-9.0	<8	Low	0.37			
Clarkelen	0-5	5-15	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low	0.24	5	3	1-2
	5-60	5-18	2.0-6.0	0.12-0.15	7.4-9.0	<4	Low	0.28			
47*:											
Haverdad	0-4	13-27	0.6-2.0	0.16-0.18	7.4-9.0	<8	Low	0.37	5	5	1-2
	4-60	20-35	0.6-2.0	0.16-0.18	7.9-9.0	<8	Low	0.37			
Clarkelen Variant	0-5	5-15	2.0-6.0	0.12-0.14	7.4-8.4	>4	Low	0.28	5	3	1-2
	5-60	10-20	2.0-6.0	0.12-0.15	7.4-9.0	4-8	Low	0.32			
48	0-3	10-20	0.6-2.0	0.17-0.20	6.6-8.4	<2	Low	0.43	5	8	2-4
Higgins Variant	3-60	10-18	0.6-2.0	0.17-0.20	6.6-8.4	2-4	Low	0.49			
49*:											
Hiland	0-5	8-18	6.0-20	0.07-0.12	6.6-8.4	<2	Low	0.20	5	3	1-2
	5-20	20-25	0.6-2.0	0.12-0.15	7.4-9.0	<4	Low	0.28			
	20-60	8-16	2.0-6.0	0.07-0.14	7.9-9.0	<4	Low	0.20			
Bowbac	0-7	5-15	0.6-2.0	0.12-0.14	6.6-8.4	<2	Low	0.32	2	3	1-2
	7-18	20-35	0.6-2.0	0.14-0.16	6.6-8.4	<2	Moderate	0.37			
	18-33	15-20	0.6-2.0	0.12-0.17	7.9-9.0	<2	Low	0.37			
	33	---	---	---	---	---	---	---			
50*:											
Hiland	0-5	8-18	6.0-20	0.07-0.12	6.6-8.4	<2	Low	0.20	5	3	1-2
	5-20	20-25	0.6-2.0	0.14-0.16	7.4-8.4	<4	Low	0.28			
	20-60	8-16	2.0-6.0	0.07-0.14	7.9-9.0	<4	Low	0.20			
Vonalee	0-6	5-15	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low	0.28	5	3	1-2
	6-60	5-15	2.0-6.0	0.12-0.14	6.6-9.0	<2	Low	0.32			
51	0-4	30-40	0.06-0.2	0.19-0.21	6.1-8.4	<2	Moderate	0.32	1	6	1-2
Hilight	4-16	40-55	<0.06	0.14-0.17	6.1-8.4	<2	High	0.43			
	16	---	---	---	---	---	---	---			
52*:											
Keeline	0-4	5-15	2.0-6.0	0.12-0.14	6.6-8.4	<4	Low	0.24	5	3	1-2
	4-60	5-18	2.0-6.0	0.09-0.14	7.9-9.0	<4	Low	0.28			
Turnercrest	0-6	5-12	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low	0.32	2	3	1-2
	6-25	7-18	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low	0.32			
	25	---	---	---	---	---	---	---			
53	0-7	10-27	0.6-2.0	0.16-0.18	7.4-8.4	<4	Low	0.28	5	4L	.5-1
Kishona	7-60	20-27	0.6-2.0	0.10-0.17	7.9-9.0	2-8	Moderate	0.32			
54	0-5	27-35	0.6-2.0	0.19-0.21	7.4-8.4	4-8	Moderate	0.32	5	6	.5-1
Kishona	5-60	20-35	0.6-2.0	0.10-0.17	7.9-9.0	2-8	Moderate	0.32			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
55*:											
Kishona	0-7	10-27	0.6-2.0	0.16-0.18	7.4-8.4	<4	Low	0.28	5	4L	.5-1
	7-60	20-27	0.6-2.0	0.10-0.17	7.9-9.0	2-8	Moderate	0.32			
Shingle	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low	0.32	2	5	1-3
	6-17	20-27	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
Theedle	0-8	10-20	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low	0.32	2	5	1-2
	8-28	18-27	0.6-2.0	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
	28	---	---	---	---	---	---	---			
56*:											
Kishona	0-7	10-27	0.6-2.0	0.16-0.18	7.4-8.4	<4	Low	0.28	5	4L	.5-1
	7-60	20-27	0.6-2.0	0.10-0.17	7.9-9.0	2-8	Moderate	0.32			
Theedle	0-8	10-20	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low	0.32	2	5	1-2
	8-28	18-27	0.6-2.0	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
	28	---	---	---	---	---	---	---			
Zigweid	0-5	18-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.32	5	6	1-2
	5-60	18-27	0.6-2.0	0.16-0.21	7.9-9.0	<2	Moderate	0.43			
57*:											
Lakoa	0-11	10-20	0.6-2.0	0.17-0.20	5.1-7.3	<2	Low	0.32	5	5	1-3
	11-32	27-35	0.6-2.0	0.17-0.20	5.6-7.8	<2	Moderate	0.32			
	32-60	18-27	0.6-2.0	0.16-0.20	5.6-8.4	<2	Moderate	0.32			
Crownest	0-4	2-10	2.0-6.0	0.07-0.12	6.6-7.8	<2	Low	0.24	1	3	1-2
	4-12	5-15	2.0-6.0	0.11-0.13	6.6-7.8	<2	Low	0.28			
	12	---	---	---	---	---	---	---			
58	0-6	30-40	0.06-0.6	0.14-0.17	6.6-8.4	<4	Moderate	0.28	5	4L	1-2
Lohmiller	6-60	25-45	0.06-0.6	0.14-0.16	7.4-8.4	<4	Moderate	0.28			
59*, 60*:											
Lohmiller	0-6	30-40	0.06-0.6	0.14-0.17	6.6-8.4	<4	Moderate	0.32	5	4L	1-3
	6-60	35-50	0.06-0.6	0.14-0.16	7.4-8.4	<8	High	0.32			
Haverdad	0-9	13-27	0.6-2.0	0.16-0.18	7.4-9.0	<8	Low	0.37	5	5	1-2
	9-60	18-35	0.6-2.0	0.16-0.18	7.9-9.0	<8	Low	0.37			
61	0-3	10-20	0.6-2.0	0.15-0.17	6.6-7.8	<2	Low	0.32	2	5	1-2
Lohsman	3-38	40-50	0.06-0.2	0.07-0.09	>7.8	<4	High	0.37			
	38	---	---	---	---	---	---	---			
62	0-15	20-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low	0.28	5	6	1-2
Nilrap	15-37	35-40	0.2-0.6	0.16-0.18	6.6-7.8	<2	Moderate	0.37			
	37-60	15-25	0.2-0.6	0.10-0.12	7.4-8.4	<2	Low	0.15			
63	0-4	5-15	0.6-2.0	0.17-0.20	6.6-7.8	<2	Low	0.37	5	6	1-2
Norkool	4-14	28-35	0.6-2.0	0.17-0.20	6.6-7.8	<2	Moderate	0.43			
	14-60	5-15	0.6-2.0	0.17-0.20	7.9-9.0	<2	Low	0.49			
64	0-8	27-35	0.2-0.6	0.17-0.20	6.6-7.8	<2	Moderate	0.32	5	6	1-2
Nunnston	8-16	40-55	0.06-0.2	0.17-0.20	7.4-8.4	<2	High	0.37			
	16-60	30-40	0.2-0.6	0.15-0.20	7.9-9.0	<2	High	0.37			
65*, 66*:											
Nunnston	0-8	27-35	0.2-0.6	0.17-0.20	6.6-7.8	<2	Moderate	0.32	5	6	1-2
	8-16	40-55	0.06-0.2	0.17-0.20	7.4-8.4	<2	High	0.37			
	16-60	40-45	0.2-0.6	0.15-0.20	7.9-9.0	<2	High	0.37			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
65*, 66*:											
Tanna Variant---	0-8	27-35	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.32	5	6	1-2
	8-23	40-55	0.06-0.2	0.15-0.17	7.4-8.4	<2	High------	0.37			
	23-36	30-40	0.2-0.6	0.15-0.17	7.4-9.0	<2	High------	0.37			
	36	---	---	---	---	---	----------	----			
67---------------	0-22	20-25	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low-------	0.28	5	5	2-4
Onita Variant	22-33	35-40	0.2-0.6	0.18-0.20	7.4-8.4	<2	Moderate	0.37			
	33-60	20-25	0.6-2.0	0.18-0.20	7.4-8.4	<2	Moderate	0.43			
68*:											
Orella----------	0-6	27-40	0.2-0.6	0.12-0.14	7.4-9.0	<4	High------	0.32	2	4L	.5-1
	6-12	40-65	<0.06	0.09-0.11	7.4-9.0+	4-16	High------	0.32			
	12	---	---	---	---	---	----------	----			
Cadoma----------	0-3	35-40	0.06-0.2	0.13-0.15	>6.5	<4	High------	0.37	3	4	1-3
	3-28	35-60	0.06-0.2	0.16-0.19	>8.4	4-8	High------	0.43			
	28	---	---	---	---	---	----------	----			
69*:											
Orella----------	0-6	27-40	0.2-0.6	0.12-0.14	7.4-9.0	<4	High------	0.32	2	4L	.5-1
	6-12	40-65	<0.06	0.09-0.11	7.4-9.0+	4-16	High------	0.32			
	12	---	---	---	---	---	----------	----			
Samday----------	0-4	40-45	0.2-0.6	0.15-0.20	6.6-8.4	<2	High------	0.37	1	6	1-2
	4-16	40-50	0.06-0.2	0.14-0.18	7.4-9.0	<4	High------	0.32			
	16	---	---	---	---	---	----------				
Rock outcrop.											
70*:											
Parmleed--------	0-5	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.37	2	5	1-2
	5-14	40-50	<0.06	0.15-0.17	6.6-7.8	<2	High------	0.43			
	14-28	28-35	0.06-0.2	0.19-0.21	7.4-9.0	<2	Moderate	0.43			
	28	---	---	---	---	---	----------	----			
Bidman----------	0-4	20-30	0.2-0.6	0.19-0.21	6.1-7.3	<2	Moderate	0.32	5	6	1-2
	4-12	35-50	0.06-0.2	0.14-0.16	6.6-7.8	<2	High------	0.32			
	12-60	25-35	0.2-0.6	0.19-0.21	7.9-9.0	<2	High------	0.43			
71*:											
Parmleed--------	0-5	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.37	2	5	1-2
	5-14	40-50	<0.06	0.15-0.17	6.6-7.8	<2	High------	0.43			
	14-28	27-35	0.06-0.2	0.19-0.21	7.4-9.0	<2	Moderate	0.43			
	28	---	---	---	---	---	----------	----			
Bowbac----------	0-7	5-15	0.6-2.0	0.12-0.14	6.6-8.4	<2	Low-------	0.32	2	3	1-2
	7-18	20-35	0.6-2.0	0.14-0.16	6.6-8.4	<2	Moderate	0.37			
	18-33	15-20	0.6-2.0	0.12-0.17	7.9-9.0	<2	Low-------	0.37			
	33	---	---	---	---	---	----------	----			
72*:											
Parmleed--------	0-5	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.37	2	5	1-2
	5-14	40-50	<0.06	0.15-0.17	6.6-7.8	<2	High------	0.43			
	14-28	27-35	0.06-0.2	0.19-0.21	7.4-9.0	<2	Moderate	0.43			
	28	---	---	---	---	---	----------	----			
Forkwood--------	0-4	12-25	0.6-2.0	0.15-0.17	6.6-8.4	2-4	Low-------	0.28	5	4	2-3
	4-21	28-30	0.6-2.0	0.19-0.21	6.6-8.4	2-4	Moderate	0.32			
	21-60	20-27	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low-------	0.28			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
73*:											
Parmleed--------	0-5	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.37	2	5	1-2
	5-14	40-50	<0.06	0.15-0.17	6.6-7.8	<2	High------	0.43			
	14-28	20-27	0.06-0.2	0.19-0.21	7.4-9.0	<2	Moderate	0.43			
	28	---	---	---	---	---	----------	----			
Renohill--------	0-4	27-35	0.2-0.6	0.17-0.21	6.6-7.8	<2	Moderate	0.37	3	6	1-3
	4-12	35-50	0.06-0.2	0.14-0.16	6.6-8.4	<2	High------	0.32			
	12-34	30-40	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
74*, 75*:											
Pesowyo---------	0-5	28-35	0.2-0.6	0.12-0.15	6.6-8.4	<2	Moderate	0.17	2	8	<1
	5-14	28-35	0.2-0.6	0.05-0.10	7.4-8.4	<2	Moderate	0.10			
	14-24	28-35	0.2-0.6	0.05-0.10	7.9-9.0	<2	Moderate	0.10			
	24	---	---	---	---	---	----------	----			
Paunsaugunt------	0-6	18-27	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low-------	0.37	1	6	1-2
	6-16	15-25	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low-------	0.05			
	16	---	---	---	---	---	----------	----			
76----------------	0-4	30-40	0.06-0.2	0.19-0.21	>8.4	2-4	Moderate	0.49	5	4	.5-1
Petrie	4-60	35-40	<0.06	0.14-0.20	>8.4	4-8	High------	0.49			
77*:											
Petrie----------	0-4	30-40	0.06-0.2	0.19-0.21	>8.4	2-4	Moderate	0.49	5	4	.5-1
	4-60	35-40	<0.06	0.14-0.20	>8.4	4-8	High------	0.49			
Ustic Torriorthents.											
78*:											
Pits, bentonite											
79*:											
Pits, gravel											
80----------------	0-8	15-25	0.6-2.0	0.15-0.17	6.6-7.8	<2	Low-------	0.32	5	5	1-2
Recluse	8-20	27-35	0.6-2.0	0.17-0.20	6.6-7.8	<2	Moderate	0.37			
	20-40	28-35	0.6-2.0	0.15-0.20	7.4-8.4	<2	Moderate	0.37			
	40-60	10-20	0.6-2.0	0.11-0.13	7.4-8.4	<2	Low-------	0.28			
81----------------	0-10	18-25	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low-------	0.32	5	5	1-2
Reicess	10-31	28-35	0.6-2.0	0.17-0.20	6.6-8.4	<2	Moderate	0.37			
	31-60	18-25	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low-------	0.37			
82*, 83*:											
Reicess----------	0-10	18-25	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low-------	0.32	5	5	1-2
	10-31	28-35	0.6-2.0	0.17-0.20	6.6-8.4	<2	Moderate	0.37			
	31-60	18-25	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low-------	0.37			
Wages Variant---	0-5	15-25	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate	0.32	5	6	1-2
	5-12	28-35	0.6-2.0	0.17-0.20	6.6-8.4	<2	Moderate	0.37			
	12-60	18-27	0.6-2.0	0.17-0.20	7.4-9.0	<2	Moderate	0.37			
84*:											
Regnaps----------	0-4	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.32	2	5	1-2
	4-16	27-35	0.6-2.0	0.15-0.20	6.6-7.8	<2	Moderate	0.37			
	16-21	10-25	0.6-2.0	0.13-0.17	6.6-7.8	<2	Low-------	0.37			
	21	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
84*:											
Crownest--------	0-4	2-10	2.0-6.0	0.07-0.12	6.6-7.8	<2	Low-------	0.24	1	3	1-2
	4-12	5-15	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low-------	0.28			
	12	---	---	---	---	---	----------	----			
85*:											
Regnaps---------	0-4	10-20	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.32	2	5	1-2
	4-12	27-35	0.6-2.0	0.15-0.20	6.6-7.8	<2	Moderate	----			
	16-21	10-25	0.6-2.0	0.13-0.17	6.6-7.8	<2	Low-------	----			
	21	---	---	---	---	---	----------	----			
Norkool---------	0-4	5-15	0.6-2.0	0.17-0.20	6.6-7.8	<2	Low-------	0.37	5	6	1-2
	4-14	28-35	0.6-2.0	0.17-0.20	6.6-7.8	<2	Moderate	0.43			
	14-60	5-15	0.6-2.0	0.17-0.20	7.9-9.0	<2	Low-------	0.49			
Crownest--------	0-3	2-10	2.0-6.0	0.07-0.12	6.6-7.8	<2	Low-------	0.24	1	3	1-2
	3-12	5-15	2.0-6.0	0.11-0.13	6.6-7.8	<2	Low-------	0.28			
	12	---	---	---	---	---	----------	----			
86*, 87*:											
Rekop Variant---	0-5	15-25	0.6-2.0	0.16-0.18	7.4-9.0	2-4	Low-------	0.37	1	5	1-3
	5-14	15-25	0.6-2.0	0.12-0.18	7.4-9.0	2-4	Low-------	0.43			
	14	---	---	---	---	---	----------	----			
Gypnevee Variant	0-6	8-15	0.6-2.0	0.19-0.21	6.6-8.4	<2	Low-------	0.49	5	5	1-2
	6-45	8-15	0.6-2.0	0.19-0.21	7.4-8.4	<2	Low-------	0.49			
	45	---	---	---	---	---	----------	----			
Rock outcrop.											
88----------	0-4	18-27	0.6-2.0	0.17-0.19	6.6-7.8	<2	Low-------	0.37	3	5	1-3
Renohill	4-12	35-40	0.06-0.2	0.14-0.16	6.6-8.4	<2	High------	0.32			
	12-34	30-40	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
89----------	0-4	27-35	0.2-0.6	0.17-0.21	6.6-7.8	<2	Moderate	0.37	3	6	1-3
Renohill	4-12	35-40	0.06-0.2	0.14-0.16	6.6-8.4	<2	High------	0.32			
	12-34	30-40	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
90*:											
Renohill--------	0-4	27-35	0.2-0.6	0.17-0.21	6.6-7.8	<2	Moderate	0.37	3	6	1-3
	4-12	35-40	0.06-0.2	0.14-0.16	6.6-8.4	<2	High------	0.32			
	12-34	30-40	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	0.37			
	34	---	---	---	---	---	----------	----			
Savageton-------	0-5	35-40	<0.06	0.15-0.20	6.6-8.4	<2	High------	0.32	2	6	1-2
	5-29	35-40	<0.06	0.15-0.20	7.9-9.0	<2	High------	0.37			
	29	---	---	---	---	---	----------	----			
91*.											
Rock outcrop											
92*:											
Rock outcrop.											
Vanocker--------	0-2	20-27	0.6-2.0	0.10-0.12	5.6-7.3	<2	Low-------	0.17	3	8	5-10
	2-60	28-34	0.6-2.0	0.09-0.11	5.6-7.8	<2	Moderate	0.24			
93*:											
Rock outcrop.											
Wibaux----------	0-4	15-25	0.6-2.0	0.09-0.11	6.6-7.8	<2	Low-------	0.15	1	8	1-3
	4-16	15-25	0.6-2.0	0.04-0.06	6.6-7.8	<2	Low-------	0.15			
	16-60	0	>20	0.00-0.01	6.6-7.8	<2	Low-------	----			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
94*:											
Rothican	0-8	18-27	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.28	5	6	<1
	8-60	18-27	0.6-2.0	0.10-0.15	7.9-9.0	<2	Low	0.24			
Colhill	0-6	15-25	0.6-2.0	0.12-0.16	7.4-7.8	<2	Low	0.15	2	8	1-2
	6-60	15-25	2.0-6.0	0.07-0.09	7.4-8.4	<4	Low	0.10			
95*:											
Samday	0-4	40-45	0.2-0.6	0.15-0.20	6.6-8.4	<2	High	0.37	1	6	1-2
	4-16	40-50	0.06-0.2	0.14-0.18	7.4-9.0	<4	High	0.32			
	16	---	---	---	---	---	---	---			
Grummit	0-4	30-40	0.2-0.6	0.08-0.17	3.6-6.6	<2	High	0.28	2	4	1-2
	4-15	40-65	0.6-2.0	0.08-0.17	3.6-6.6	<2	High	0.28			
	15	---	---	---	3.6-5.5	---	---	---			
96*:											
Samday	0-4	40-45	0.2-0.6	0.15-0.20	6.6-8.4	<2	High	0.37	1	6	1-2
	4-16	40-50	0.06-0.2	0.14-0.18	7.4-9.0	<4	High	0.32			
	16	---	---	---	---	---	---	---			
Savageton	0-5	35-40	<0.06	0.15-0.20	6.6-8.4	<2	High	0.32	2	6	1-2
	5-29	35-40	<0.06	0.15-0.20	7.9-9.0	<2	High	0.37			
	29	---	---	---	---	---	---	---			
97*:											
Samday	0-4	40-45	0.2-0.6	0.15-0.20	6.6-8.4	<2	High	0.37	1	6	1-2
	4-16	40-50	0.06-0.2	0.14-0.18	7.4-9.0	<4	High	0.32			
	16	---	---	---	---	---	---	---			
Shingle	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low	0.32	2	5	1-3
	6-17	20-27	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
Worf	0-3	15-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.28	1	5	1-3
	3-16	18-27	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.37			
	16	---	---	---	---	---	---	---			
98*:											
Samoist	0-2	35-40	<0.06	0.15-0.17	7.4-9.0	<2	High	0.37	1	6	1-2
	2-12	40-45	<0.06	0.15-0.17	7.4-9.0	<2	High	0.43			
	12	---	---	---	---	---	---	---			
Colsavage	0-5	30-40	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.24	2	5	1-2
	5-30	40-55	0.06-0.2	0.14-0.18	7.9-9.0	2-4	High	0.32			
	30	---	---	---	---	---	---	---			
99*:											
Savageton	0-5	35-40	<0.06	0.15-0.20	6.6-8.4	<2	High	0.32	2	6	1-2
	5-29	40-50	<0.06	0.15-0.20	7.9-9.0	<2	High	0.37			
	29	---	---	---	---	---	---	---			
Bahl	0-6	30-40	0.06-0.2	0.17-0.20	6.6-8.4	<2	Moderate	0.32	5	6	1-2
	6-60	40-55	0.06-0.2	0.15-0.20	7.4-9.0	2-4	High	0.37			
100*:											
Shingle	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low	0.32	2	5	1-3
	6-17	20-27	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
Samday	0-4	40-45	0.2-0.6	0.15-0.20	6.6-8.4	<2	High	0.37	1	6	1-2
	4-16	40-50	0.06-0.2	0.14-0.18	7.4-9.0	<4	High	0.32			
	16	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
100*: Rock outcrop.											
101*: Shingle---------	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low-------	0.32	2	5	1-3
	6-17	20-27	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	----------	----			
Theedle---------	0-4	10-20	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low-------	0.32	2	5	1-2
	4-28	18-27	0.6-2.0	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
	28	---	---	---	---	---	----------	----			
102*: Shingle---------	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low-------	0.32	2	5	1-3
	6-17	20-27	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	----------	----			
Theedle---------	0-4	10-20	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low-------	0.32	2	5	1-2
	4-28	18-27	0.6-2.0	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
	28	---	---	---	---	---	----------	----			
Cambria---------	0-4	10-25	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low-------	0.32	5	6	1-2
	4-12	18-27	0.6-2.0	0.15-0.20	7.4-8.4	<2	Moderate	0.37			
	12-60	18-27	0.6-2.0	0.17-0.20	7.9-9.0	<2	Moderate	0.37			
103*: Shingle Variant-	0-5	15-25	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low-------	0.32	2	4	1-2
	5-16	22-27	0.6-2.0	0.16-0.20	7.9-9.0	<2	Moderate	0.37			
	16	---	---	---	---	---	----------	----			
Theedle Variant-	0-3	10-27	0.6-2.0	0.17-0.20	6.6-8.4	<2	Low-------	0.32	5	6	1-2
	3-30	28-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low-------	0.37			
	30	---	---	---	---	---	----------	----			
104---------------	0-4	40-60	<0.2	0.09-0.16	6.6-8.4	<2	High------	0.37	5	4	1-3
Stetter	4-60	45-60	<0.2	0.09-0.16	6.6-8.4	<4	High------	0.37			
105*: Stovho Variant--	0-9	20-26	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.37	5	6	2-4
	9-20	40-45	0.2-0.6	0.14-0.16	7.4-8.4	<2	High------	0.43			
	20-60	30-45	0.2-0.6	0.15-0.20	7.4-8.4	<2	Moderate	0.43			
Stovho----------	0-8	20-26	0.6-2.0	0.17-0.20	5.6-7.3	<2	Low-------	0.37	5	6	3-6
	8-24	35-40	0.06-0.6	0.14-0.17	5.6-7.3	<2	High------	0.37			
	24-60	30-40	0.2-2.0	0.14-0.17	6.6-8.4	<2	Moderate	0.37			
106---------------	0-7	15-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.28	4	6	2-3
Sugakool	7-16	27-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.32			
	16-60	20-30	2.0-6.0	0.06-0.07	7.9-9.0	<2	Low-------	0.20			
107*, 108*: Sugakool--------	0-7	15-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.28	4	6	2-3
	7-16	27-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.32			
	16-60	20-30	2.0-6.0	0.06-0.07	7.9-9.0	<2	Low-------	0.20			
Colhill---------	0-6	15-25	0.6-2.0	0.12-0.16	7.4-7.8	<2	Low-------	0.15	2	8	1-2
	6-60	15-25	2.0-6.0	0.07-0.09	7.4-8.4	<4	Low-------	0.10			
109*: Tassel----------	0-3	5-12	2.0-6.0	0.16-0.18	7.4-8.4	<2	Low-------	0.24	2	3	.5-1
	3-15	5-12	2.0-6.0	0.15-0.17	7.4-8.4	<2	Low-------	0.24			
	15	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
109*:											
Shingle---------	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low--------	0.32	2	5	1-3
	6-17	20-27	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	----------	----			
110*:											
Tassel----------	0-3	5-12	2.0-6.0	0.16-0.18	7.4-8.4	<2	Low--------	0.24	2	3	.5-1
	3-15	5-12	2.0-6.0	0.15-0.17	7.4-8.4	<2	Low--------	0.24			
	15	---	---	---	---	---	----------	----			
Terro-----------	0-8	8-12	2.0-6.0	0.09-0.14	6.6-7.8	<2	Low--------	0.28	2	3	1-2
	8-16	10-18	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low--------	0.28			
	16-36	10-18	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low--------	0.32			
	36	---	---	---	---	---	----------	----			
Rock outcrop.											
111*:											
Tassel----------	0-3	5-12	2.0-6.0	0.16-0.18	7.4-8.4	<2	Low--------	0.24	2	3	.5-1
	3-15	5-12	2.0-6.0	0.15-0.17	7.4-8.4	<2	Low--------	0.24			
	15	---	---	---	---	---	----------	----			
Turnercrest-----	0-2	5-12	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low--------	0.32	2	3	1-2
	2-4	7-18	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low--------	0.32			
	4-25	7-18	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low--------	0.37			
	25	---	---	---	---	---	----------	----			
112*:											
Tassel Variant--	0-16	5-15	2.0-6.0	0.12-0.14	6.6-8.4	<2	Low--------	0.24	2	3	<.5
	16	---	---	---	---	---	----------	----			
Shingle Variant-	0-5	15-25	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low--------	0.32	2	4	1-2
	5-16	22-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	16	---	---	---	---	---	----------	----			
113*:											
Terro-----------	0-8	8-12	2.0-6.0	0.09-0.14	6.6-7.8	<2	Low--------	0.28	2	3	1-2
	8-24	10-18	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low--------	0.28			
	24-36	10-18	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low--------	0.32			
	36	---	---	---	---	---	----------	----			
Turnercrest-----	0-2	5-12	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low--------	0.32	2	3	1-2
	2-25	7-18	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low--------	0.32			
	25	---	---	---	---	---	----------	----			
114*:											
Theedle---------	0-4	10-20	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low--------	0.32	2	5	1-2
	4-28	18-27	0.6-2.0	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
	28	---	---	---	---	---	----------	----			
Kishona---------	0-7	10-27	0.6-2.0	0.16-0.18	7.4-8.4	<4	Low--------	0.28	5	4L	.5-1
	7-60	20-35	0.6-2.0	0.10-0.17	7.9-9.0	2-8	Moderate	0.32			
	60-70	20-27	0.6-2.0	0.15-0.20	7.9-9.0	2-8	Low--------	0.43			
115*:											
Thermopolis Variant--------	0-3	10-15	0.6-2.0	0.19-0.21	6.6-7.8	<2	Low--------	0.49	5	5	2-3
	3-13	10-15	0.6-2.0	0.19-0.21	7.4-8.4	<2	Low--------	0.49			
	13	---	---	---	---	---	----------	----			
Rock outcrop.											

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
116*:											
Topeman	0-4	40-55	<0.06	0.15-0.17	5.6-6.5	<2	High	0.37	4	6	2-4
	4-40	45-60	<0.06	0.15-0.17	5.6-6.5	<2	High	0.43			
	40	45-60	<0.06	0.09-0.12	5.1-6.5	<2	High	0.20			
	48	---	---	---	---	---	---	---			
Demar	0-6	15-27	0.6-2.0	0.16-0.20	5.1-7.8	<2	Moderate	0.37	3	6	.5-3
	6-20	40-60	<0.06	0.08-0.17	5.1-7.3	<2	High	0.37			
	20-50	40-60	<0.06	0.08-0.17	<5.1	8-16	High	0.37			
	50	---	---	---	---	---	---	---			
117	0-5	60-70	<0.06	0.08-0.12	6.6-7.8	<2	Very high	0.37	5	4	1-3
Twotop	5-60	60-70	<0.06	0.08-0.12	6.6-8.4	<4	Very high	0.37			
118	0-6	20-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.32	5	6	1-3
Ulm	6-16	35-40	0.06-2.0	0.19-0.21	6.6-8.4	<2	High	0.37			
	16-60	30-40	0.6-2.0	0.19-0.21	7.9-9.0	<2	Moderate	0.37			
119	0-6	28-35	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.32	5	6	1-3
Ulm	6-16	35-50	0.06-2.0	0.19-0.21	6.6-8.4	<2	High	0.37			
	16-60	30-42	0.6-2.0	0.19-0.21	7.9-9.0	<2	Moderate	0.37			
120*:											
Ulm	0-6	28-35	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.32	5	6	1-3
	6-16	35-40	0.06-2.0	0.19-0.21	6.6-8.4	<2	High	0.37			
	16-60	30-40	0.6-2.0	0.19-0.21	7.9-9.0	<2	Moderate	0.37			
	60-70	25-35	0.6-2.0	0.12-0.15	7.9-9.0	<2	Moderate	0.37			
Renohill	0-4	27-35	0.2-0.6	0.17-0.21	6.6-7.8	<2	Moderate	0.37	3	6	1-3
	4-12	35-40	0.06-0.2	0.14-0.16	6.6-8.4	<2	High	0.32			
	12-34	30-40	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	0.37			
	34	---	---	---	---	---	---	---			
121. Ustic Torrifluvents.											
122*: Ustic Torriorthents.											
Typic Eutroboralfs.											
Rock outcrop.											
123*:											
Vanocker	0-2	20-27	0.6-2.0	0.10-0.12	5.6-7.3	<2	Moderate	0.17	3	8	5-10
	2-60	27-34	0.6-2.0	0.09-0.11	5.6-7.8	<2	Moderate	0.24			
Citadel	0-10	10-20	0.6-2.0	0.16-0.18	5.1-7.3	<2	Low	0.37	5	8	2-4
	10-60	40-45	0.06-0.6	0.11-0.17	5.1-7.3	<2	High	0.37			
124, 125	0-9	15-27	0.6-2.0	0.17-0.20	6.6-7.8	<2	Low	0.28	5	6	2-4
Vassett	9-24	28-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37			
	24-60	15-30	0.6-2.0	0.16-0.18	7.9-9.0	<2	Low	0.43			
126*:											
Vonalee	0-6	5-15	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low	0.28	5	3	1-2
	6-60	5-15	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low	0.32			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
126*:											
Terro	0-6	8-12	2.0-6.0	0.09-0.14	6.6-7.8	<2	Low	0.28	2	3	1-2
	6-20	10-18	2.0-6.0	0.12-0.14	6.6-7.8	<2	Low	0.28			
	20-34	10-18	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low	0.32			
	34	---	---	---	---	---	---	---			
127*:											
Winler	0-6	50-70	<0.06	0.08-0.14	6.1-7.8	<2	Very high	0.37	4	4	1-3
	6-16	60-75	<0.06	0.08-0.12	6.1-7.8	2-4	Very high	0.37			
	16-32	55-65	<0.06	0.04-0.10	5.6-8.4	2-4	Very high	0.37			
	32	---	---	---	4.5-7.8	---	---	---			
Savageton	0-5	35-40	<0.06	0.15-0.20	6.6-8.4	<2	High	0.32	2	6	1-2
	5-29	35-40	<0.06	0.15-0.20	7.9-9.0	<2	High	0.37			
	29	---	---	---	---	---	---	---			
128*:											
Worf	0-6	15-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	0.28	1	5	1-3
	3-16	18-27	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.37			
	16	---	---	---	---	---	---	---			
Shingle	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low	0.32	2	5	1-3
	6-17	20-27	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
Tassel	0-3	5-12	2.0-6.0	0.16-0.18	7.4-8.4	<2	Low	0.24	2	3	.5-1
	3-15	5-12	2.0-6.0	0.15-0.17	7.4-8.4	<2	Low	0.24			
	15	---	---	---	---	---	---	---			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data was not estimated]

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Uncoated steel	Concrete
					In			
1*:								
Absted	C	None	---	---	>60	---	High	High.
Bone	D	None	---	---	>60	---	High	High.
2---- Alice Variant	B	None	---	---	>60	---	High	Low.
3---- Bidman	C	None	---	---	>60	---	High	Low.
4*:								
Bidman	C	None	---	---	>60	---	High	Low.
Bone	D	None	---	---	>60	---	High	High.
5*:								
Bidman	C	None	---	---	>60	---	High	Low.
Ulm	C	None	---	---	>60	---	High	Low.
6---- Bone	D	None	---	---	>60	---	High	High.
7*:								
Bowbac	C	None	---	---	20-40	Soft	High	Low.
Tassel	D	None	---	---	10-20	Soft	High	Low.
Rock outcrop.								
8---- Cadoma	D	None	---	---	20-40	Soft	High	High.
9---- Cambria	B	None	---	---	>60	---	High	Low.
10---- Chinook	B	None	---	---	>60	---	High	Low.
11*, 12*:								
Chinook	B	None	---	---	>60	---	High	Low.
Tassel Variant	D	None	---	---	10-20	Soft	High	Low.
13*, 14*:								
Chinook	B	None	---	---	>60	---	High	Low.
Theedle Variant	B	None	---	---	20-40	Soft	High	Low.
15*, 16*:								
Citadel	C	None	---	---	>60	---	High	Moderate.
Lakoa	B	None	---	---	>60	---	High	Moderate.
17*, 18*:								
Citadel	C	None	---	---	>60	---	High	Moderate.
McCaffery	A	None	---	---	>60	---	Moderate	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Uncoated steel	Concrete
					In			
19*:								
Colhill	B	None	---	---	>60	---	High	Low.
Rothican	B	None	---	---	>60	---	High	Low.
20, 21, 22, 23---- Colnevee	B	None	---	---	>60	---	High	Moderate.
24---------- Colnevee Variant	C	None	---	---	20-40	Soft	High	Moderate.
25---------- Colombo Variant	B	Rare	---	---	>60	---	High	Low.
26---------- Colombo Variant	B	Occasional	Very brief	Apr-Jun	>60	---	High	Low.
27*:								
Colsavage	C	None	---	---	20-40	Soft	High	Low.
Bahl Variant	C	None	---	---	>60	---	High	Moderate.
28---------- Cordeston	B	Rare	---	---	>60	---	Moderate	Low.
29*:								
Corpening	D	None	---	---	10-20	Hard	High	Low.
Rock outcrop.								
30*, 31*:								
Crownest	D	None	---	---	10-20	Hard	High	Low.
Regnaps	C	None	---	---	20-40	Soft	Moderate	Low.
32---------- Cushman	C	None	---	---	20-40	Soft	High	Low.
33*:								
Cushman	C	None	---	---	20-40	Soft	High	Low.
Cambria	B	None	---	---	>60	---	High	Low.
34*:								
Cushman	C	None	---	---	20-40	Soft	High	Low.
Renohill	C	None	---	---	20-40	Soft	High	Low.
35*:								
Cushman	C	None	---	---	20-40	Soft	High	Low.
Shingle	D	None	---	---	10-20	Soft	High	Low.
36*:								
Cushman	C	None	---	---	20-40	Soft	High	Low.
Terro	C	None	---	---	20-40	Soft	High	Low.
37---------- Dwyer	A	None	---	---	>60	---	High	Low.
38---------- Forkwood	B	None	---	---	>60	---	High	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Uncoated steel	Concrete
					In			
39*:								
Forkwood	B	None	---	---	>60	---	High	High.
Cambria	B	None	---	---	>60	---	High	Low.
Cushman	C	None	---	---	20-40	Soft	High	Low.
40*:								
Forkwood	B	None	---	---	>60	---	High	High.
Cushman	C	None	---	---	20-40	Soft	High	Low.
Terro	C	None	---	---	20-40	Soft	High	Low.
41*:								
Forkwood	B	None	---	---	>60	---	High	High.
Ulm	C	None	---	---	>60	---	High	Low.
42*:								
Grummit	D	None	---	---	10-20	Soft	High	High.
Maggin	C	None	---	---	20-40	Soft	High	High.
43*, 44*:								
Grummit	D	None	---	---	10-20	Soft	High	High.
Snomo	C	None	---	---	40-60	Soft	Moderate	High.
45*:								
Gullied land.								
Torriorthents.								
46*:								
Haverdad	B	Rare	---	---	>60	---	High	Moderate.
Clarkelen	B	Rare	---	---	>60	---	High	Low.
47*:								
Haverdad	B	Rare	---	---	>60	---	High	Moderate.
Clarkelen Variant	B	Rare	---	---	>60	---	High	High.
48--- Higgins Variant	B	Rare	---	---	>60	---	High	Low.
49*:								
Hiland	B	None	---	---	>60	---	High	Low.
Bowbac	C	None	---	---	20-40	Soft	High	Low.
50*:								
Hiland	B	None	---	---	>60	---	High	Low.
Vonalee	B	None	---	---	>60	---	High	Low.
51--- Hilight	D	None	---	---	10-20	Soft	High	Low.
52*:								
Keeline	B	None	---	---	>60	---	High	Low.
Turnercrest	C	None	---	---	20-40	Soft	High	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Uncoated steel	Concrete
					In			
53, 54---------- Kishona	B	None--------	---	---	>60	---	High-----	High.
55*: Kishona----------	B	None--------	---	---	>60	---	High-----	High.
Shingle----------	D	None--------	---	---	10-20	Soft	High-----	Low.
Theedle----------	C	None--------	---	---	20-40	Soft	High-----	Low.
56*: Kishona----------	B	None--------	---	---	>60	---	High-----	High.
Theedle----------	C	None--------	---	---	20-40	Soft	High-----	Low.
Zigweid----------	B	None--------	---	---	>60	---	High-----	Low.
57*: Lakoa----------	B	None--------	---	---	>60	---	High-----	Moderate.
Crownest---------	D	None--------	---	---	10-20	Hard	High-----	Low.
58---------- Lohmiller	C	Occasional	Brief-----	Apr-Jun	>60	---	High-----	Moderate.
59*, 60*: Lohmiller--------	C	Rare--------	---	---	>60	---	High-----	Moderate.
Haverdad---------	B	Rare--------	---	---	>60	---	High-----	Moderate.
61---------- Lohsman	D	Rare--------	---	---	20-40	Soft	High-----	Moderate.
62---------- Nilrap	B	None--------	---	---	>60	---	High-----	Low.
63---------- Norkool	B	None--------	---	---	>60	---	High-----	Low.
64---------- Nunnston	C	None--------	---	---	>60	---	High-----	Low.
65*, 66*: Nunnston---------	C	None--------	---	---	>60	---	High-----	Low.
Tanna Variant----	C	None--------	---	---	20-40	Soft	High-----	Low.
67---------- Onita Variant	B	None--------	---	---	>60	---	High-----	Low.
68*: Orella----------	D	None--------	---	---	10-20	Soft	High-----	Low.
Cadoma----------	D	None--------	---	---	20-40	Soft	High-----	High.
69*: Orella----------	D	None--------	---	---	10-20	Soft	High-----	Low.
Samday----------	D	None--------	---	---	10-20	Soft	High-----	Low.
Rock outcrop.								
70*: Parmleed---------	C	None--------	---	---	20-40	Soft	High-----	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Uncoated steel	Concrete
					In			
70*: Bidman	C	None	---	---	>60	---	High	Low.
71*: Parmleed	C	None	---	---	20-40	Soft	High	Low.
Bowbac	C	None	---	---	20-40	Soft	High	Low.
72*: Parmleed	C	None	---	---	20-40	Soft	High	Low.
Forkwood	B	None	---	---	>60	---	High	High.
73*: Parmleed	C	None	---	---	20-40	Soft	High	Low.
Renohill	C	None	---	---	20-40	Soft	High	Low.
74*, 75*: Pesowyo	C	None	---	---	20-40	Hard	High	Low.
Paunsaugunt	D	None	---	---	10-20	Hard	Moderate	Low.
76-- Petrie	D	None	---	---	>60	---	High	High.
77*: Petrie	D	None	---	---	>60	---	High	High.
Ustic Torriorthents.								
78*. Pits, bentonite								
79*. Pits, gravel								
80-- Recluse	B	None	---	---	>60	---	High	Low.
81-- Reicess	B	None	---	---	>60	---	High	Low.
82*, 83*: Reicess	B	None	---	---	>60	---	High	Low.
Wages Variant	B	None	---	---	>60	---	High	Low.
84*: Regnaps	C	None	---	---	20-40	Soft	Moderate	Low.
Crownest	D	None	---	---	10-20	Hard	High	Low.
85*: Regnaps	C	None	---	---	20-40	Soft	Moderate	Low.
Norkool	B	None	---	---	>60	---	High	Low.
Crownest	D	None	---	---	10-20	Hard	High	Low.
86*, 87*: Rekop Variant	D	None	---	---	10-20	Soft	High	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Uncoated steel	Concrete
					In			
86*, 87*: Gypnevee Variant-	B	None	---	---	40-60	Soft	High	High.
Rock outcrop.								
88, 89--- Renohill	C	None	---	---	20-40	Soft	High	Low.
90*: Renohill---	C	None	---	---	20-40	Soft	High	Low.
Savageton---	D	None	---	---	20-40	Soft	High	Low.
91*. Rock outcrop								
92*: Rock outcrop.								
Vanocker---	B	None	---	---	>60	---	High	Moderate.
93*: Rock outcrop.								
Wibaux---	B	None	---	---	>60	---	Moderate	Low.
94*: Rothican---	B	None	---	---	>60	---	High	Low.
Colhill---	B	None	---	---	>60	---	High	Low.
95*: Samday---	D	None	---	---	6-20	Soft	High	Low.
Grummit---	D	None	---	---	10-20	Soft	High	High.
96*: Samday---	D	None	---	---	10-20	Soft	High	Low.
Savageton---	D	None	---	---	20-40	Soft	High	Low.
97*: Samday---	D	None	---	---	10-20	Soft	High	Low.
Shingle---	D	None	---	---	10-20	Soft	High	Low.
Worf---	D	None	---	---	10-20	Soft	Moderate	Low.
98*: Samoist---	D	None	---	---	10-20	Soft	High	Moderate.
Colsavage---	C	None	---	---	20-40	Soft	High	Low.
99*: Savageton---	D	None	---	---	20-40	Soft	High	Low.
Bahl---	C	None	---	---	>60	---	High	Low.
100*: Shingle---	D	None	---	---	4-20	Soft	High	Low.
Samday---	D	None	---	---	6-20	Soft	High	Low.
Rock outcrop.								

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Uncoated steel	Concrete
					In			
101*:								
Shingle	D	None	---	---	4-20	Soft	High	Low.
Theedle	C	None	---	---	20-40	Soft	High	Low.
102*:								
Shingle	D	None	---	---	4-20	Soft	High	Low.
Theedle	C	None	---	---	20-40	Soft	High	Low.
Cambria	B	None	---	---	>60	---	High	Low.
103*:								
Shingle Variant	D	None	---	---	10-20	Soft	High	Low.
Theedle Variant	B	None	---	---	20-40	Soft	High	Low.
104--- Stetter	D	Frequent	Brief	Mar-Jun	>60	---	High	Low.
105*:								
Stovho Variant	B	None	---	---	>60	---	High	Low.
Stovho	C	None	---	---	>60	---	High	Moderate.
106--- Sugakool	B	None	---	---	>60	---	High	Low.
107*, 108*:								
Sugakool	B	None	---	---	>60	---	High	Low.
Colhill	B	None	---	---	>60	---	High	Low.
109*:								
Tassel	D	None	---	---	6-20	Soft	High	Low.
Shingle	D	None	---	---	4-20	Soft	High	Low.
110*:								
Tassel	D	None	---	---	6-20	Soft	High	Low.
Terro	C	None	---	---	20-40	Soft	High	Low.
Rock outcrop.								
111*:								
Tassel	D	None	---	---	6-20	Soft	High	Low.
Turnercrest	C	None	---	---	20-40	Soft	High	Low.
112*:								
Tassel Variant	D	None	---	---	10-20	Soft	High	Low.
Shingle Variant	D	None	---	---	10-20	Soft	High	Low.
113*:								
Terro	C	None	---	---	20-40	Soft	High	Low.
Turnercrest	C	None	---	---	20-40	Soft	High	Low.
114*:								
Theedle	C	None	---	---	20-40	Soft	High	Low.
Kishona	B	None	---	---	>60	---	High	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Uncoated steel	Concrete
					In			
115*: Thermopolis Variant	B	None	---	---	10-20	Soft	High	High.
Rock outcrop.								
116*: Topeman	D	None	---	---	40-60	Soft	Moderate	Moderate.
Demar	D	None	---	---	40-60	Soft	High	High.
117--- Twotop	D	None	---	---	>60	---	High	Moderate.
118, 119--- Ulm	C	None	---	---	>60	---	High	Low.
120*: Ulm	C	None	---	---	>60	---	High	Low.
Renohill	C	None	---	---	20-40	Soft	High	Low.
121. Ustic Torrifluvents								
122*: Ustic Torriorthents.								
Typic Eutroboralfs.								
Rock outcrop.								
123*: Vanocker	B	None	---	---	>60	---	High	Moderate.
Citadel	C	None	---	---	>60	---	High	Moderate.
124, 125--- Vassett	B	None	---	---	>60	---	High	Low.
126*: Vonalee	B	None	---	---	>60	---	High	Low.
Terro	C	None	---	---	20-40	Soft	High	Low.
127*: Winler	D	None	---	---	20-40	Soft	High	Moderate.
Savageton	D	None	---	---	20-40	Soft	High	Low.
128*: Wort	D	None	---	---	10-20	Soft	Moderate	Low.
Shingle	D	None	---	---	10-20	Soft	High	Low.
Tassel	D	None	---	---	10-20	Soft	High	Low.

*See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Absted	Fine, montmorillonitic, mesic Haplustollic Natrargids
Alice Variant	Coarse-loamy, mixed, mesic Aridic Haplustolls
Bahl	Fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents
Bahl Variant	Fine, montmorillonitic (calcareous), frigid Ustertic Torriorthents
Bidman	Fine, montmorillonitic, mesic Ustollic Paleargids
Bone	Fine, montmorillonitic (calcareous), mesic Ustic Torriorthents
Bowbac	Fine-loamy, mixed, mesic Ustollic Haplargids
Cadoma	Fine, montmorillonitic, mesic Ustollic Camborthids
Cambria	Fine-loamy, mixed, mesic Ustollic Haplargids
Chinook	Coarse-loamy, mixed Aridic Haploboralls
Citadel	Fine, montmorillonitic Typic Eutroboralfs
Clarkelen	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Clarkelen Variant	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Colhill	Loamy-skeletal, mixed (calcareous), frigid Ustic Torriorthents
Colnevee	Coarse-silty, mixed (calcareous), frigid Ustic Torriorthents
Colnevee Variant	Coarse-silty, mixed (calcareous), frigid Ustic Torriorthents
Colombo Variant	Fine-loamy, mixed, mesic Torrifluventic Haplustolls
Colsavage	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Cordeston	Fine-loamy, mixed Cumulic Haploborolls
Corpening	Loamy, mixed Lithic Haploborolls
Crownest	Loamy, mixed, nonacid, frigid Lithic Ustic Torriorthents
Cushman	Fine-loamy, mixed, mesic Ustollic Haplargids
Demar	Fine, montmorillonitic, mesic Ustollic Paleargids
Dwyer	Mixed, mesic Ustic Torripsamments
Forkwood	Fine-loamy, mixed, mesic Ustollic Haplargids
Grummit	Clayey, montmorillonitic, acid, mesic, shallow Ustic Torriorthents
Gypnevee Variant	Coarse-silty, gypsic, frigid Ustic Torriorthents
Haverdad	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Higgins Variant	Coarse-silty, gypsic, mesic Typic Haplaquepts
Hiland	Fine-loamy, mixed, mesic Ustollic Haplargids
Hilight	Clayey, montmorillonitic, nonacid, mesic, shallow Ustic Torriorthents
Keeline	Coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents
Kishona	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents
Lakoa	Fine-loamy, mixed Typic Eutroboralfs
Lohmiller	Fine, montmorillonitic (calcareous), mesic Ustic Torrifluvents
Lohsman	Fine, montmorillonitic, mesic Haplustollic Natrargids
Maggin	Fine, montmorillonitic, mesic Aridic Haplustolls
McCaffery	Mixed, frigid Alfic Ustipsamments
Nilrap	Fine, montmorillonitic Aridic Argiborolls
Norkool	Fine-silty, mixed Aridic Argiborolls
Nunnston	Fine, montmorillonitic Aridic Argiborolls
Onita Variant	Fine, montmorillonitic Pachic Argiborolls
Orella	Clayey, mixed (calcareous), mesic, shallow Ustic Torriorthents
Parmleed	Fine, montmorillonitic, mesic Ustollic Paleargids
Paunsaugunt	Loamy-skeletal, mixed Lithic Haploborolls
Pesowyo	Loamy-skeletal, mixed Typic Haploborolls
Petrie	Fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents
Recluse	Fine-loamy, mixed, mesic Aridic Argiustolls
Regnaps	Fine-loamy, mixed Borollic Haplargids
Reicess	Fine-loamy, mixed Aridic Argiborolls
Rekop Variant	Loamy, gypsic, shallow Borollic Camborthids
Renohill	Fine, montmorillonitic, mesic Ustollic Haplargids
Rothican	Fine-loamy, mixed Aridic Calciborolls
Samday	Clayey, montmorillonitic (calcareous), mesic, shallow Ustic Torriorthents
Samoist	Clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents
Savageton	Fine, montmorillonitic, mesic Ustollic Camborthids
Shingle	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Shingle Variant	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Snomo	Very fine, montmorillonitic, mesic Ustollic Camborthids
Stetter	Fine, montmorillonitic, nonacid, mesic Ustertic Torrifluvents
Stovho	Fine, montmorillonitic Mollic Cryoboralfs
Stovho Variant	Fine, montmorillonitic Mollic Cryoboralfs
Sugakool	Fine-loamy, mixed Aridic Argiborolls
Tanna Variant	Fine, montmorillonitic Aridic Argiborolls
Tassel	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents

TABLE 16.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Tassel Variant	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Terro	Coarse-loamy, mixed, mesic Ustollic Haplargids
Theedle	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents
Theedle Variant	Fine-loamy, mixed (calcareous), frigid Ustic Torriorthents
Thermopolis Variant	Loamy, mixed, shallow Borollic Camborthids
Topeman	Fine, montmorillonitic, nonacid, mesic Ustic Torriorthents
Turnercrest	Coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents
Twotop	Very fine, montmorillonitic, mesic Ustertic Camborthids
Ulm	Fine, montmorillonitic, mesic Ustollic Haplargids
Vanocker	Loamy-skeletal, mixed, frigid Typic Eutrochrepts
Vassett	Fine-silty, mixed Aridic Argiborolls
Vonalee	Coarse-loamy, mixed, mesic Ustollic Haplargids
Wages Variant	Fine-loamy, mixed Typic Eutroboralfs
Wibaux	Loamy-skeletal over fragmental, mixed, nonacid, mesic Ustic Torriorthents
Winler	Very fine, montmorillonitic, mesic Ustertic Camborthids
Worf	Loamy, mixed, mesic, shallow Ustollic Haplargids
Zigweid	Fine-loamy, mixed, mesic Ustollic Camborthids

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