



United States
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Natural
Resources
Conservation
Service

In cooperation with
United States Department
of the Interior, Bureau of
Land Management, and
Montana Agricultural
Experiment Station

Soil Survey of Prairie County, Montana Part I



How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, which is the color map preceding the detailed soil maps, the survey area is 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 general 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** in Part I of this survey for a general description of the soils in your area.

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.

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** in Part I of this survey, which lists the map units by symbol and name and shows the page where each map unit is described.

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.

A **State Soil Geographic Data Base (STATSGO)** is available for this survey area. This data base consists of a soils map at a scale of 1 to 250,000 and descriptions of groups of associated soils. It replaces the general soil map published in older soil surveys. The map and the data base can be used for multicounty planning, and map output can be tailored for a specific use. More information about the State Soil Geographic Data Base for this survey area, or for any portion of Montana, is available at the local office of the Natural Resources Conservation Service.

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

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1986. This survey was made cooperatively by the Natural Resources Conservation Service; the United States Department of the Interior, Bureau of Land Management; and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Prairie County Conservation District.

Financial assistance was provided by the Old West Regional Commission in cooperation with the Montana Department of State Lands; the Montana Association of Conservation Districts; the United States Department of the Interior, Bureau of Land Management; and the Board of Commissioners for Prairie County.

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.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Irrigated crops are in an area of Kremlin loam, 0 to 2 percent slopes, in the foreground. An area of Badland is in the background. If irrigated, the Kremlin soil is suitable for any type of crop rotation adapted to the climate.

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Foreword

This soil survey contains information that can be used in land-planning programs in Prairie County, Montana. 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 practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

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

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

Richard J. Gooby
State Conservationist
Natural Resources Conservation Service

Soil Survey of Prairie County, Montana

Fieldwork by Arnold N. Benson, Michael F. Browne, Jerome M. Setera, and James H. Smith, Natural Resources Conservation Service
Additional contributors include Mark H. Clark, William L. Fouts, Wesley M. Larson, Robert E. Leinard, Michael A. Nichols, and William P. Volk

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the United States Department of the Interior, Bureau of Land Management, and the Montana Agricultural Experiment Station

How This Survey Was Made

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

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

Individual soils on the landscape commonly merge into 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 a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and

tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

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

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

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

General Nature of the Survey Area

This soil survey updates the survey, "Soil Survey of the Lower Yellowstone Valley Area, Montana," published in 1939. It provides additional information and has larger maps, which show the soils in greater detail.

Prairie County is in the east-central part of Montana (fig. 1). The total area is 1,114,300 acres, or about 1,727 square miles. Terry, the county seat, is in the central part of the county. About 53 percent of the county is privately owned land, 41 percent is Federal land, and 6 percent is State land. The average annual precipitation ranges from 10 to 14 inches. The frost-free period ranges from 105 to 125 days. Elevation ranges from about 2,140 feet on the flood plain along the

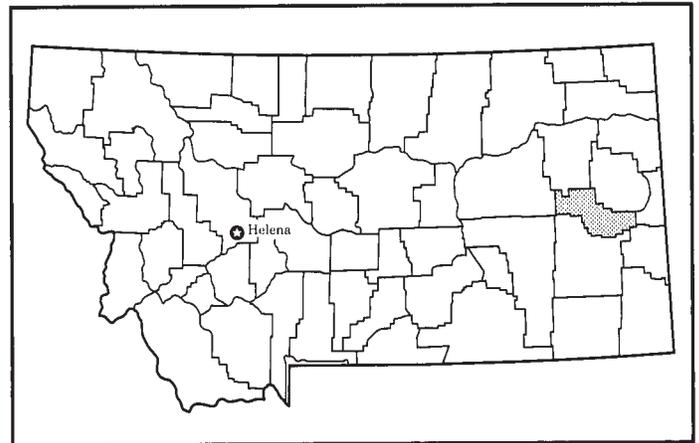


Figure 1.—Location of Prairie County in Montana.

Yellowstone River to about 3,600 feet in the northern part of the county. Most of the survey area is drained by the Yellowstone River, which divides the county across the center, from the southwest to the northeast. The Powder River drains portions of the southern part of the county. It converges with the Yellowstone River about 7 miles west of Terry. The county is mostly characterized by undulating to hilly uplands. It also has nearly level benches adjacent to the Yellowstone River. Rough breaks and areas of badland border the benches along the major rivers and their tributaries.

History

The first permanent settlements in Prairie County were cavalry posts established by the United States Army. Settlements later expanded with the growth of railroads in the late 1800's. Prior to this period, the area was used primarily by the Crow, Cheyenne, and Sioux Indians for hunting.

In 1806, William Clark passed through the area while traveling to meet with Meriwether Lewis at the confluence of the Yellowstone and Missouri Rivers. Clark's expedition camped just below the mouth of the Powder River, on the north bank of the Yellowstone. Following the Lewis and Clark expedition, the area was used mainly by French and American trappers and by the Crow, Cheyenne, and Sioux Nations until the mid to late 1800's, when the United States Army established cavalry posts at Ft. Keogh and Ft. Custer.

During the 1870's, the Northern Pacific Railroad began surveying and constructing a route to the West. With the growth of the railroad, permanent settlements began to be established. In the 1880's, large herds of cattle and sheep began to arrive by trail and railroad. Ranching became the major industry in the survey area until the Homestead Act, when the Chicago, Milwaukee,

St. Paul, and Pacific Railroads brought new settlers to the area. Farming then became the principal industry in the area. Droughts during the 1930's forced many settlers to abandon their land, which reverted to Federal ownership.

Prairie County was established in 1915 from parts of Dawson and Custer Counties. Terry, the county seat, is located along Interstate 94, which is a major east-west transportation route in Montana. Prairie County presently has a mixed industry of livestock, agriculture, and petroleum production. The Buffalo Rapids Irrigation Project, completed in 1944, provides irrigation water for the production of sugar beets, alfalfa, and corn.

Ground-Water Resources

Most water for domestic and livestock use in Prairie County is obtained from wells ranging from shallow, dug wells along the creek valleys to deep, drilled wells in the upland areas. The wells are 15 to 2,500 feet deep. The deep wells are highly mineralized. The Yellowstone River offers an abundant supply of water for irrigation.

Ground water in the county is in a variety of aquifers that have been classified as alluvial deposits or terrace deposits of sand and gravel, or it is in bedrock formations of sandstone, coal, fissile sandy shale, or baked clinker beds. The Pierre and Lebo Formations consist mainly of highly mineralized shale that does not yield water or yields highly mineralized water that is not usable.

The most significant ground-water sources in Prairie County are the alluvial deposits and terrace deposits along river valleys and in the inner valleys of most streams. The coarse deposits are the most permeable zones in the area. Yields from the aquifers range from 10 to 1,000 gallons of water per minute.

Water quality tends to vary greatly because of differences in chemical characteristics of the soils and the amount of precipitation in an area. The permeability and recharge characteristics of the aquifer influence water quality. In areas where the material has slow or very slow permeability, the aquifer recharge is low and water that moves through the material receives high concentrations of dissolved solids. Water from a shallow depth, or a depth of less than 125 feet, contains large amounts of calcium and magnesium and is therefore hard. Water from a greater depth contains only small amounts of calcium and magnesium and is therefore soft. The soft water, which is a mixture of sodium bicarbonate and water, is generally satisfactory for domestic purposes but may be unfit for irrigation.

The most important bedrock aquifers in Prairie County include the Fox Hills Sandstone, Hell Creek Sandstone, the Tongue River Member, and clinker and

coal beds. Flowing artesian wells in the flood plains along the Yellowstone and Powder Rivers derive their water from the Fort Union and Hell Creek aquifers. Water from all of the flowing artesian wells is soft. The Fox Hills Sandstone is an excellent ground-water aquifer; the water is soft, and wells yield as much as 90 gallons per minute. Sandstone and coal beds in the Hell Creek aquifer can yield water in an adequate quality and volume for domestic and livestock use. The sandstone of the Tongue River can yield 6 to 15 gallons of water per minute.

Rock and Mineral Resources

Rock and mineral resources can be divided into the following three groups: metals, fuels consisting of coal, oil, and gas, and nonmetallic or industrial minerals. Prairie County does not have metal resources but has potential for the production of natural gas and oil and has a large quantity of valuable coal deposits. Nonmetallic or industrial minerals, with the exception of sand and gravel, have not been mined extensively in the county. Montana agate can be found in and along the Yellowstone River.

With the exception of the Cedar Creek anticline area, many of the geologic conditions that favor the accumulation of oil and gas are not present in Prairie County.

Mineable coal resources in Prairie County are plentiful. Coal in the Hell Creek Formation is in localized areas and does not have extensive potential for economic exploration. Several lenses of coal are in the Lebo Shale Member of the Fort Union Formation, but they cannot be traced to any distance. The only deposit that extends over a large distance is the Big Dirty Bed, which reaches a thickness of 15 feet. Deposits of coal as much as 5 feet thick have been reported in localized areas of the Big Dirty Bed.

The producing coal beds in Prairie County are in the Tongue River Member of the Fort Union Formation. This member contains many coal beds that are uniformly of good quality, have relatively thin overburden, and are thick enough to be mined economically. The Terry Lignite Field and the Little Sheep Mountain coal field (4) are both in parts of Prairie County.

The nonmetallic or industrial minerals are important resources in Prairie County. Sand and gravel deposits of fluvial or residual origin are mined extensively. These materials are used in concrete and asphalt, in highway and other road construction, and as ballast on railroads. Clinker deposits in the area of the Tongue River Member are mined locally and are utilized on county and private roads.

Physiography, Drainage, and Geology

Prairie County is in the Missouri Plateau section of the Northern Great Plains province. The surface does not resemble a plain, however, as some parts are rough and dissected and the area contains very pronounced features of relief. The Big Sheep Mountain Divide, which extends into the northwestern part of the county, is the most pronounced topographic feature. It rises 300 to 400 feet above the adjoining plains and consists of relatively flat beds of the Fort Union Formation. It is often capped by gravel deposits.

Elevation in the central and southern parts of Prairie County ranges from about 2,140 to 2,900 feet above sea level. The lowest elevations are on flood plains along the Yellowstone River at the northeast margin of the county. The highest elevations, with relief of about 760 feet, are in the upper tributary drainageways of the Powder River.

The highest elevation in the northern portion of the county is 3,625 feet at Big Sheep Mountain in T. 15 N., R. 47 E. The highest relief in Prairie County north of the Yellowstone River is approximately 1,200 feet.

The geologic structure of Prairie County is comparatively simple. Strata are well exposed, and structural features are easily determined. Structures consist of gentle folds and a few faults of slight displacement. True faults are uncommon in Prairie County. When they occur, the maximum displacement is approximately 3 to 10 feet. These faults are mostly covered and are not easily identifiable from a long distance.

The majority of the county lies within the westernmost extension of the Williston Basin. To the northeast, the county is flanked by a northwest-trending pair of structures—the Sheep Mountain syncline and the Cedar Creek anticline. The southeastern extent of the Williston Basin is defined by a small uplift southwest of Miles City, known as the Miles City arch. The surface topography does not reflect the geologic structure because portions near the center of the basin are at higher elevations than areas near the margin.

Most of the county is drained by the Yellowstone River and its tributaries. The Yellowstone River flows through the center of Prairie County in a northeasterly direction. The principal drainageways that flow from the north into the Yellowstone River include Crooked Creek, Cherry Creek, Cedar Creek, Brackett Creek, and Cottonwood Creek. South of the Yellowstone River, the Powder River, Ash Creek, O'Fallon Creek, and Cabin Creek are the largest drainageways. The northwestern part of Prairie County is drained by the Redwater River and its tributaries, which include Timber Creek, West

and East Duck Creek, Ash Creek, Pasture Creek, and Tusler Creek. The Redwater River flows to the north and enters the Missouri River near Poplar.

Generally, the streams are bordered by belts of wide alluvial benches that are separated by low bedrock bluffs. The bluffs are gently sloping to steep and are several hundred feet high. The various topographic forms indicate the differences in the types of rock structure and their resistance to erosion.

The survey area may be described as an upland plain trenched by numerous drainageways. It is rolling, and creek valleys are deeply incised. Outcrops of resistant rock form isolated buttes and mesas. Soils of the uplands are shallow to very deep. In areas where streams have not cut deeply into the surface, dryland farming is practiced. The more rugged areas are used for grazing.

Bare, steep slopes of rugged badland occur in Prairie County. The areas of badland formed in soft, erosive shale of the Lebo Shale Member. An area of badland approximately 6 miles wide occurs north of the Yellowstone River and extends west to the county line. A broad band also extends south of the Yellowstone River, along both sides of the Powder River, to the southern border of the county. These areas are nearly impassable in places. The larger streams have cut broad and fairly flat valleys through the badland. These valleys are bordered by low, moundlike hills.

Other areas in Prairie County have very different characteristics. These areas consist of gently rolling uplands dissected by a system of deep, narrow drainageways. Steep, bare buttes are rare. Where present, they are formed by resistant cap rock protecting the underlying strata from erosion. The cap is generally composed of clinker formed by coal beds burned along the outcrop. Small hills and knobs of unburned rock are coherent enough to form vertical cliffs but are eroded rapidly by wind and water. Little Sheep Mountain is the most prominent landform of this type.

In Prairie County, the dissected remnants of at least four river terraces can be recognized. The highest terrace lies on the southeast flank of Little Sheep Mountain at an elevation of about 3,200 feet. A second terrace is on the north divide of Cherry Creek at an elevation of about 2,800 feet. The third terrace is best preserved south of the Yellowstone River near Terry. It has an elevation of approximately 2,600 feet. Younger terraces occur at the lower elevations. Prairie County has not been subjected to the physiographic changes characteristic of other portions of Montana. It has not been glaciated and has not been subjected to the major uplifts that have occurred in regions to the west and north. With the exception of the Powder River, major

drainageways flow along the same courses that they have always followed.

Powder River, which joins the Yellowstone River at a point about 8 miles upstream from Terry, is bordered by a terrace several miles in width. In the past, the Powder River flowed through this broad valley plain and evidently went north and joined the Yellowstone River near or downstream from Terry. The Powder River is now entrenched in a much narrower area cut along the west side of the older valley. It joins the Yellowstone River about 8 to 10 miles further upstream than it once did.

The major river valleys are about 1 to 2 miles wide and are nearly level. Most of the irrigated farming in Prairie County is practiced along these stream valleys. The soils are coarse to fine alluvium and are very productive. The flat valley lands are separated from the uplands by steep, irregular slopes.

Although these valleys have been repeatedly deepened, the area has not been subjected to the drastic drainage modification that occurred in northern Montana, where ice sheets blocked and reversed the flow of several rivers.

The present land surface in the area reflects long periods of sedimentation and erosion. Alternating layers of sand, silt, clay, and lime were deposited as the level of the seas, which covered much of Montana in the geologic past, fluctuated. These deposits were compacted, cemented, and hardened and eventually became shale and sandstone.

The sediments were nearly horizontal when they were deposited. During the late Eocene epoch, about 30 million years ago, they became tilted, folded, and faulted. The deformation occurred after the deposition of the highest beds of the Tongue River Member.

After deformation, four gravel-covered erosional surfaces developed in eastern Montana and adjacent parts of Canada. The highest surface, and therefore the oldest, is the Cypress Plain. At the top of Big Sheep Mountain in T. 15 N., R. 47 E., in Prairie County, well developed terrace deposits are at an elevation of about 3,600 feet. The terrace forms the divide between the Missouri and Yellowstone Rivers. It is capped with 20 to 30 feet of coarse, well rounded pebbles and some embedded sand. In places, the pebbles are cemented by calcium carbonate to a conglomerate. The pebbles consist of porphyry and other crystalline rocks, a few granite fragments, numerous pink and reddish quartzite fragments, quartz, chert, and silicified wood. The terrace is about 1,200 feet above the level of the Yellowstone River at Terry.

Terraces that have been assigned to the Flaxville Plain are below the Cypress Plain (3). They include terraces along the Yellowstone River and terraces east

and southeast of Cherry Creek Divide, at a surface elevation of approximately 2,800 feet. The terraces consist of 20 to 30 feet of coarse, well rounded pebbles.

Along the Yellowstone Valley, well developed terraces that are younger than those of the Flaxville Plain are 100 to 400 feet above the Yellowstone River. The best preserved of these terraces forms a high bench on the south side of the river in T. 12 N., R. 50 and 51 E., and in Fallon Flats in the northern part of T. 12 and 13 N., R. 52 and 53 E.

The fourth stage of erosion resulted in the development of the lowest terraces along the Yellowstone River. The river has since incised into the valley 50 feet or more. The valley flats formed during and after the retreat of glacial ice from northern Montana. The streams are presently in a new cycle of downcutting.

Exposed rock is sedimentary in origin and ranges in age from Upper Cretaceous to recent. The oldest beds occur in the northeast corner of the county in the Cedar Creek anticline.

Compressional faulting, folding, and uplift during the Laramide orogeny of the Late Cretaceous and early Tertiary periods produced the structures in this region. Before the second phase of mountain building, during the middle Tertiary period, the mountains were subjected to erosional forces that continued until the surface was once again a flat, truncated plain. Erosional materials were spread for hundreds of miles over eastern Montana. The terrestrial Fort Union Formation of the early Tertiary period resulted from this erosional deposition.

The Fort Union section is the youngest Tertiary bedrock formation exposed in Prairie County. It ranges to 2,000 feet in thickness and consists of layers of dark shale and alternating thick beds of white sandy clay siltstone and sandstone. Surface deposits, ranging from Oligocene to recent in age, form a thin mantle over the eroded surface of the bedrock. These deposits include terrace gravel and alluvial fill along present streams.

The following paragraphs describe the various geologic systems and the formations that resulted from the action of these systems.

Upper Cretaceous System (60 Million Years)

Pierre Shale.—The Late Cretaceous Pierre Shale is exposed along the top of the Cedar Creek anticline in T. 12 N., R. 56 E. Outcrops consist predominantly of gray to black fissile shale and bentonitic shale that has thin bands of sandy shale containing concretions as large as 1 foot in diameter and abundant crystals of gypsum. The vegetation is sparse. The shale is erosive. It is plastic and sticky when wet.

Soils that developed from the Pierre Shale are fine

textured. Examples of soils that formed in the Pierre Shale include Neldore and Marvan soils.

Fox Hills Formation.—The Late Cretaceous Fox Hills Formation is exposed in the Cedar Creek anticline. Outcrops are visible in T. 12 N., R. 56 E., and T. 13 N., R. 55 E. The Fox Hills Formation is composed of two members. The Basal Member, which is of marine origin, is composed of thin beds of grayish yellow sandy shale. The Upper Member consists of massive arkosic sandstone beds that generally are cross bedded. Irregular concretions of harder sandstone, as large as 5 feet in diameter, are common in the Upper Sandstone Member. The nonmarine origin of the Upper Member is indicated by the presence of remains from dinosaurs and other nonmarine vertebrates. Examples of soils that formed in material derived from the Fox Hills Formation include Blackhall, Busby, Cabbart, Delpoint, and Twilight soils.

Hell Creek Formation.—The Late Cretaceous Hell Creek Formation consists of amber-colored shale, thin interbedded sandstone and siltstone, and thin coal seams. Also, conglomerate beds that represent old channel deposits occur in localized areas. The conglomerate is usually interbedded with sandstone and can be up to 50 feet in thickness. The gravel and cobbles, which are fairly well rounded, consist of sandstone in a matrix of sand. An exposure of the conglomerate is visible in the southwestern quarter, sec. 10, T. 12 N., R. 56 E.

The Hell Creek Formation is exposed in a small area north of the Yellowstone River. It contains thin coal seams, indicating the repeated presence of swamps on coastal plains. Dinosaur remains, commonly those from Triceratops, are often discovered in this formation. Volcanic ash was deposited in the marine seas, and it devitrified to form bentonite. The Hell Creek Formation is generally eroded into a semi-badland topography. Cabbart, Cambeth, Delpoint, Lonna, Yamac, and Yawdim soils formed in material derived from the Hell Creek Formation.

Fort Union Formation.—The Paleocene Fort Union Formation is exposed on the surface in a large part of the survey area. This formation is more than 2,000 feet thick and is composed of three members—a basal member known as the Tullock Member, the Lebo Shale Member, and an upper member called the Tongue River Member.

The *Tullock Member* consists of as much as 800 feet of interbedded medium gray to light tan sandy or silty shale, sandstone, or siltstone and thin coal beds that grade to light gray carbonaceous shale. Cabbart, Cambeth, Delpoint, and Yamac soils formed in this member.

The *Lebo Shale Member* consists of dark gray to black clay and shale. The color and the predominance of clay distinguish the Lebo Shale Member from the prevailing yellow and red, sandy Tongue River Member that overlies it. The Lebo Shale Member has outcrops that form a broad belt north of the Yellowstone River. It extends in a northeasterly direction from the western county line to just north of Terry. South of the Yellowstone River, it is exposed along the Powder River and its tributary drainageways. The bottom of the Lebo Shale Member forms a distinctive marker known as the Big Dirty Bed. Thin layers of coal are associated with beds of carbonaceous shale in the Lebo Shale Member. The most distinguishing characteristics of this member are the dark color, the barren surface, and the ironstone concretions. The Lebo Shale Member weathers to badland with some banded, low and flat-topped buttes. Soils that formed in material derived from the Lebo Shale Member include Cabbart, Delpoint, Gerdrum, and Neldore soils.

The *Tongue River Member* contains the youngest bedrock strata in Prairie County. It is composed of light-colored shale, sandstone, sandy siltstone, and coal. About 1,200 feet of these beds are exposed in Prairie County. Most of Montana's coal is derived from the Tongue River Member.

Red clinker is the most distinguishing characteristic of the Tongue River Member. It has developed locally where thick seams of coal burned, resulting in the baking and reddening of the overlying material. In some places the heat from burning coal was so intense that it fused the overlying shale into liquid slag. The clinker deposits seldom extend far underground. In upland areas where the overburden was not thick, however, these deposits are as much as 100 feet thick. Because the clinker beds are resistant to erosion, they commonly stand out in sharp relief.

The sandstone of the Tongue River Member is massive and blocky. The outcrops are light gray to light tan. The sandstone may form cavern-faced cliffs that are 50 to 75 feet high and have many large knobs and sharp pinnacles. It is composed primarily of subangular quartz, and the cementing agents are calcium carbonate and clay. Concretions of pyrite and marcasite that weather to brown limonite are common in the sandstone.

Soils that formed in the lower part of the Tongue River Member include Busby, Cabba, Cabbart, Delpoint, Kirby, Lonna, and Yamac soils. Soils that formed at the higher elevations north of Terry include Cabba, Cambert, Cherry, Golva, and Shambo soils. Blackhall, Busby, Chinook, Twilight, and Yetull soils are in stratified sand and shale zones.

Oligocene or Miocene Terrace Gravel (20 to 30 Million Years)

Gravel deposits associated with the Cypress Hills geomorphic surface cap a plateau on the divide between the Redwater River, the Yellowstone River, and the tops of the highest hills and ridges in sections 21, 27, and 28 in T. 13 N., R. 47 E., and in the northern part of T. 15 N., R. 47 E. These deposits stand about 1,200 feet above the Yellowstone River and have a maximum thickness of about 60 feet. The lower portion of gravels are cemented into a conglomerate. The deposits contain stones and boulders a foot or more in diameter. They are composed of igneous rock that ranges in composition from granite to basalt. They contain agate, silicified wood, and fragments of coal clinker, which indicates that some of the coal was burned before the gravel was deposited. Wabek soils formed in these deposits.

Miocene or Pliocene Terrace Gravel (10 to 20 Million Years)

Terrace benches about 400 to 1,000 feet above the Yellowstone River are considered an extension of the Flaxville geomorphic surface. These gravel terraces, which range from 10 to 30 feet thick, are composed of well rounded quartzite and argillite pebbles that have a matrix of sand, clay, and volcanic ash. They are along the east side of the Powder River and east and southeast of the Cherry Creek Divide in T. 14 N., R. 46 E. Tinsley soils formed in these deposits.

Pleistocene Terrace (1 to 5 Million Years)

Along the Yellowstone River, about 100 to 400 feet above the river, are extensive, well developed terraces that are younger than those of the Miocene or Pliocene epochs. The Fallon Flats, in the northern part of T. 12 N., R. 52, and 53 E., is an example of one of these terraces. The maximum thickness of the Pleistocene gravel is about 50 feet. In several places it has been cemented by carbonate and iron oxide to form a hard conglomerate. In areas where they have not been eroded, the terraces are covered with several inches to several feet of loamy soils. Degrand, Lihen, Parshall, Tinsley, and Yetull soils formed in these deposits.

Recent Alluvium

Alluvial deposits are along the valleys of the major river systems and along small streams and their

tributaries. Most of the alluvium consists of clay, fine silt, and sand that may be underlain by gravel. The characteristics of the alluvium are largely dependent upon the type of material that is accessible to the stream. In areas of outcrops from the Lebo Shale Member and Hell Creek Shale Member, the alluvium is predominantly silt and clay with a small amount of sand. It typically does not have gravel. The alluvial deposits along the Yellowstone River contain gravel overlain by silty clay, silt, and sand. Glendive, Hanly, Harlem, Havre, Kobar, Spinekop, and Yamac soils are examples of soils that formed in recent alluvium.

Climate

Prairie County is usually warm in summer and has frequent hot days. In winter, periods of very cold weather occur when arctic air moves in from the north or northeast. Cold periods alternate with milder periods that occur often when westerly winds are warmed as they move downslope. Most precipitation falls as rain during the warmer part of the year. The rain is normally heaviest in late spring and early summer. Winter snowfalls are frequent, but the snow cover usually disappears during mild periods.

The three tables at the end of this section give climate data as recorded at Terry, Montana, for the period 1950 to 1993.

In winter, the average temperature is 17 degrees F and the average daily minimum temperature is 4 degrees. In summer, the average temperature is 69 degrees and the average daily maximum temperature is 84 degrees.

Growing degree days are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, about 7 inches, or 60 percent, usually falls in April through July. The growing season for most crops falls within this period. Thunderstorms occur on about 26 days each year. In some years, hailstorms cause severe local damage to crops.

The average seasonal snowfall is 17.6 inches. During winter in some years, a heavy blizzard with high winds and drifting snow strikes the area. The snow can remain on the ground for many weeks.

TEMPERATURE AND PRECIPITATION

(Recorded in the period 1950-93 at Terry, Montana)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	2 years in 10 will have--			Average number of days with 0.10 inch or more	Average snowfall In
				Maximum temperature higher than--	Minimum temperature lower than--		Less than--	More than--			
° F	° F	° F	° F	° F	Units	In	In	In		In	
January-----	25.7	0.2	12.9	56	-36	1	0.26	0.12	0.48	1	4.5
February-----	33.2	7.1	20.1	61	-29	4	.19	.10	.35	0	3.5
March-----	43.2	17.1	30.1	73	-18	35	.34	.13	.55	1	3.6
April-----	57.6	29.8	43.7	86	8	177	1.02	.31	1.72	3	1.1
May-----	69.5	41.4	55.5	94	23	469	1.90	.84	2.80	4	.3
June-----	79.1	51.0	65.1	101	35	716	2.38	1.24	3.38	5	.0
July-----	87.5	55.8	71.7	105	41	923	1.45	.62	2.21	3	.0
August-----	86.8	52.9	69.8	103	36	898	1.30	.37	2.16	3	.0
September---	73.9	41.2	57.6	98	22	523	1.19	.27	2.01	3	.2
October-----	61.7	29.8	45.7	88	8	220	.64	.13	1.12	1	.1
November-----	43.2	17.1	30.1	71	-15	23	.28	.11	.58	1	1.4
December-----	31.3	5.6	18.5	58	-32	2	.16	.07	.34	0	2.9
Yearly:											
Average----	57.7	29.1	43.4	----	----	----	---	---	---	---	---
Extreme----	110	-45	---	106	-39	----	---	---	---	---	---
Total-----	---	---	---	----	----	3,990	11.12	7.63	13.94	25	17.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1950-93 at Terry, Montana)

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
Last freezing temperature in spring:			
1 year in 10 later than-----	May 6	May 16	May 27
2 years in 10 later than-----	May 2	May 11	May 22
5 years in 10 later than-----	Apr. 24	May 2	May 14
First freezing temperature in fall:			
1 year in 10 earlier than----	Sept. 18	Sept. 7	Sept. 4
2 years in 10 earlier than---	Sept. 24	Sept. 13	Sept. 8
5 years in 10 earlier than---	Oct. 6	Sept. 24	Sept. 16

GROWING SEASON

(Recorded in the period 1950-93 at Terry, Montana)

Probability	Daily minimum temperature during growing season		
	Higher than 24 degrees F	Higher than 28 degrees F	Higher than 32 degrees F
	Days	Days	Days
9 years in 10-----	131	118	105
8 years in 10-----	138	125	111
5 years in 10-----	152	139	122
2 years in 10-----	166	152	134
1 year in 10-----	173	159	140

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, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils 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 soil map units in this survey have been grouped for broad interpretive purposes. Each of the broad groups and the map units in each group are described on the following pages.

The State Soil Geographic Data Base (STATSGO) for Montana is the base for the general soil map of Prairie County. The map symbols are the same as those used for the STATSGO map units. In each major soil group, only two or three major soils or miscellaneous areas in the map unit are listed for the map symbol. The textures given for the soils in the groups are for the fraction less than 2 millimeters (fine earth) of the particle-size class in the control section. For more information about the general soil map units, refer to the STATSGO map for Montana.

Dominantly Nearly Level to Moderately Sloping, Very Deep, Well Drained, Loamy and Clayey Soils that Formed in Alluvium and Eolian Deposits; on Alluvial Fans, Stream Terraces, and Flood Plains

359—Lonna-Kremlin

These soils are nearly level to moderately sloping and are on alluvial fans and stream terraces. They are

very deep, well drained, and loamy. The soils formed in alluvium. They are used mainly as nonirrigated cropland, irrigated cropland, or rangeland.

456—Busby-Pinelli-Glendive

These soils are nearly level to moderately sloping and are on alluvial fans, stream terraces, sedimentary plains, and flood plains. They are very deep and are well drained. Busby soils are loamy. They formed in alluvium or eolian material. Pinelli soils are clayey. They formed in alluvium. Glendive soils are loamy and are subject to flooding. They formed in alluvium. The soils in this unit are used mainly as nonirrigated cropland, irrigated cropland, or rangeland.

511—Kremlin-Gerdrum-Ryell

These soils are nearly level to moderately sloping and are on alluvial fans, stream terraces, sedimentary plains, and flood plains. The soils are very deep and are well drained. They formed in alluvium. Kremlin soils are loamy. Gerdrum soils are clayey. They have a high content of sodium and salts. Ryell soils are loamy. They are subject to flooding. The soils in this unit are used mainly as nonirrigated cropland, irrigated cropland, or rangeland.

669—Yamac-Gerdrum-Kobar

These soils are nearly level to moderately sloping and are on alluvial fans and sedimentary plains. The soils are very deep and are well drained. They formed in alluvium. Yamac soils are loamy. Gerdrum soils are clayey. They have a high content of sodium and salts. Kobar soils are clayey. The soils in this unit are used mainly as nonirrigated cropland, irrigated cropland, or rangeland.

Dominantly Nearly Level to Steep, Moderately Deep to Very Deep, Well Drained to Excessively Drained, Sandy and Loamy Soils that Formed in Alluvium, Eolian Material, and Semiconsolidated, Loamy Sedimentary Beds; on Alluvial Fans, Stream Terraces, Relict Stream Terraces, and Hills

161—Degrand-Kremlin

These soils are nearly level to gently sloping and are

on stream terraces and alluvial fans. They are very deep, well drained, and loamy. The soils formed in alluvium. They are used mainly as nonirrigated cropland or as rangeland.

336—Lihen-Tinsley-Delpoint

These soils are strongly sloping to steep and are on stream terraces, relict stream terraces, hills, and alluvial fans. Lihen soils are very deep, somewhat excessively drained, and sandy. They formed in alluvium or eolian material. Tinsley soils are very deep, excessively drained, and sandy. They formed in alluvium. Delpoint soils are moderately deep, well drained, and loamy. They formed in semiconsolidated, loamy sedimentary beds. The soils in this unit are used mainly as rangeland.

608—Wabek-Hedstrom-Cambert

These soils are gently sloping to steep and are on relict stream terraces, stream terraces, hills, and alluvial fans. Wabek soils are very deep, excessively drained, and sandy. They formed in alluvium. Hedstrom soils are very deep, well drained, and loamy. They formed in alluvium. Cambert soils are moderately deep, well drained, and loamy. They formed in semiconsolidated, loamy sedimentary beds.

Dominantly Nearly Level to Steep, Shallow to Very Deep, Well Drained, Loamy Soils that Formed in Alluvium, Eolian Material, and Semiconsolidated, Loamy Sedimentary Beds; on Alluvial Fans, Stream Terraces, Sedimentary Plains, and Hills

106—Cherry-Cambert-Subwell

These soils are nearly level to strongly sloping and are on alluvial fans, stream terraces, sedimentary plains, and hills. They are well drained and loamy. Cherry and Subwell soils are very deep. They formed in alluvium. Cambert soils are moderately deep. They formed in semiconsolidated, loamy sedimentary beds. The soils in this unit are used mainly as nonirrigated cropland or as rangeland.

109—Cherry-Cabba-Cambert

These soils are gently sloping to strongly sloping and are on sedimentary plains, alluvial fans, and hills. They are well drained and loamy. Cherry soils are very deep. They formed in alluvium. Cabba soils are shallow. They formed in semiconsolidated, loamy sedimentary beds. Cambert soils are moderately deep. They formed in semiconsolidated, loamy sedimentary beds. The soils in this unit are used mainly as

nonirrigated cropland or as rangeland.

207—Kremlin-Chinook

These soils are nearly level to strongly sloping and are on stream terraces, alluvial fans, sedimentary plains, and hills. They are very deep, well drained, and loamy. Kremlin soils formed in alluvium. Chinook soils formed in alluvium or eolian material. The soils in this unit are used mainly as nonirrigated cropland or as rangeland.

354—Lonna-Cambeth-Cabbart

These soils are gently sloping to steep and are on sedimentary plains, hills, and alluvial fans. They are well drained and loamy. Lonna soils are very deep. They formed in alluvium. Cambeth soils are moderately deep. They formed in semiconsolidated, loamy sedimentary beds. Cabbart soils are shallow. They formed in semiconsolidated, loamy sedimentary beds. The soils in this unit are used mainly as nonirrigated cropland or as rangeland.

355—Lonna-Cambeth

These soils are nearly level to strongly sloping and are on sedimentary plains, hills, alluvial fans, and stream terraces. They are well drained and loamy. Lonna soils are very deep. They formed in alluvium. Cambeth soils are moderately deep. They formed in semiconsolidated, loamy sedimentary beds. The soils in this unit are used mainly as nonirrigated cropland or as rangeland.

356—Lonna-Busby-Cambeth

These soils are nearly level to strongly sloping and are on sedimentary plains, hills, alluvial fans, and stream terraces. They are well drained and loamy. Lonna soils are very deep. They formed in alluvium. Busby soils are very deep. They formed in alluvium or eolian material. Cambeth soils are moderately deep. They formed in semiconsolidated, loamy sedimentary beds. The soils in this unit are used mainly as nonirrigated cropland or as rangeland.

358—Lonna-Cabbart-Cambeth

These soils are gently sloping to steep and are on alluvial fans, sedimentary plains, and hills (fig. 2). They are well drained and loamy. Lonna soils are very deep. They formed in alluvium. Cabbart soils are shallow, and Cambeth soils are moderately deep. Cabbart and Cambeth soils formed in semiconsolidated, loamy sedimentary beds. The soils in this unit are used mainly as nonirrigated cropland or as rangeland.



Figure 2.—An eroded area of the Lonna-Cabbart-Cambeth general soil map unit.

Dominantly Areas of Moderately Sloping to Very Steep, Shallow and Moderately Deep, Well Drained, Clayey and Loamy Soils that Formed in Semiconsolidated Shale and Semiconsolidated, Loamy Sedimentary Beds and Areas of Rock Outcrop and Badland; on Hills

25—Badland

This unit consists mainly of exposed soft shale, siltstone, and sandstone. It is mostly barren land that is dissected by many intermittent drainage channels. Geologic erosion is active.

419—Neldore-Rock outcrop

This unit is moderately sloping to moderately steep and is on hills. Neldore soils are shallow, well drained, and clayey. They formed in semiconsolidated shale. Rock outcrop consists mainly of semiconsolidated shale. This unit is used mainly as rangeland.

489—Abor-Cabbart

This unit is strongly sloping to very steep and is on hills. Abor soils are moderately deep, well drained, and clayey. They formed in semiconsolidated shale. Cabbart soils are shallow, well drained, and loamy. They formed in semiconsolidated, loamy sedimentary beds. The soils in this unit are used mainly as rangeland.

Formation and Classification of the Soils

Each soil in the survey area is a natural, three-dimensional body on the Earth's surface that supports or is capable of supporting plants. Physical and chemical processes have determined its morphology. These processes have resulted from the integration of five factors—parent material, climate, living organisms, relief, and time. Differences between soils can be traced to differences in one or more of these factors.

This section relates the major factors of soil formation to the soils in the survey area and describes the system of soil classification. The classification and extent of the soils in this survey area are shown in the tables "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," which are at the end of this section.

Formation of the Soils

Climate, plant life, and animal life are the active factors of soil formation. They act on parent material through weathering, slowly changing it into a natural body with individual, related horizons. The effects of these factors are conditioned by relief and time. Parent material affects the kind of soil that forms. It is the dominant factor in young soils, but its influence generally lessens as the soil develops. Time is necessary for the formation of a soil, but the length of time required depends upon the other factors of soil formation.

Climate

Climate, an active force in the formation of soils, is determined mainly by temperature and precipitation. Erosion and alternate periods of freezing and thawing break down rock into the material in which soils form. Water and wind are active agents in transporting and separating weathered material. The weathered material is further broken down by chemical reactions, such as solution and hydration. Precipitation and temperature affect the kind and amount of native vegetation that grows on the soil. As vegetation decays, it produces organic matter that subsequently becomes part of the soil. Soils with cool temperatures and high precipitation,

such as Golva soils, generally have a dark-colored surface layer, and soils with warm temperatures and low precipitation, such as Yamac soils, generally have a light-colored surface layer. In Prairie County, precipitation is 10 to 14 inches per year and the mean annual temperature is 40 to 46 degrees F.

Living Organisms

Living organisms are active in the formation of soils. Organic matter is the main source of the dark color of the surface layer of soils. Fungi and algae inhabit and help to decompose rocks. As the rock decomposes, grasses, shrubs, and trees are able to grow and support animal life.

The kinds of plants and animals in and on the soils largely determine the kinds and amount of organic matter added to the soil and the manner in which this matter is incorporated into the mineral part of the soil. Roots, rodents, and insects penetrate the soil and influence its structure. Leaves, roots, and whole plants remain in the surface layer, where they are changed to humus by micro-organisms, chemicals in the soil, and insects.

The native vegetation in the survey area consists of short and mid grasses, forbs, and shrubs. Common rodents include gophers, prairie dogs, badgers, rabbits, and field mice. Many of the pebbles and cobbles on the surface of terraces were dug up by the burrowing of these rodents.

Relief

Relief, or topography, is determined by the uplift of mountain masses and the resistance of bedrock and geologic formations to erosion by water and wind. In the eroded uplands of Prairie County, runoff water has carved deep valleys into the original bedrock. The rugged relief contrasts sharply with the smooth, low relief of the terraces and flood plains of the river valleys.

On uplands, soil horizons decrease in number, distinctness, and thickness as slope increases. Steep soils that have rapid runoff have many characteristics similar to those of soils that formed in arid climates.

Nearly level to moderately sloping soils that receive runoff from the soils above them on the landscape have many characteristics of soils that formed in a more humid climate.

Parent Material

Many of the soils in Prairie County formed in place over semiconsolidated sedimentary beds or shale. Some soils formed in alluvium and colluvium and were deposited in major valleys and on bordering uplands. Soils that formed in material derived from semiconsolidated, sandy sedimentary beds, such as Yetull soils, are generally sandy. Soils that formed in residuum derived from shale, such as Neldore soils, are clayey. The basic constituent of shale is clay. Soils that formed in mixed alluvium derived from semiconsolidated, loamy sedimentary beds, such as Yamac soils, are loamy. Some of the soils in the area, such as Alona soils, acquired salt and sodium from the parent material. The salts and sodium in these saline, alkaline, or saline-alkaline soils limit the kind and amount of plants that can grow. The density of the parent rock and its mineral composition can limit the rate of weathering and the depth of the soil.

Time

The changes that take place in a soil over long periods of time are called soil genesis. They give the soil distinct layers, or horizons. The kinds and arrangement of these horizons are called soil morphology and are described in terms of color, texture, structure, consistence, thickness, and permeability.

Soils can be classified from young to mature according to their approximate age. The age, or maturity, of a soil is generally indicated by the thickness and distinctness of the subsurface horizons, the content of organic matter and clay, the depth to which soluble material is leached, and the form and distribution of calcium carbonate and gypsum in the soil.

The young Havre soils are Entisols that formed in alluvium on flood plains. They contain little organic matter from which to form an A horizon and have no clay accumulation. Little translocation of carbonates has occurred in these soils.

The mature Evanston soils are Mollisols that formed in a parent material that is similar to that of the Havre soils but is much older. Evanston soils formed in alluvium on sedimentary plains and alluvial fans. They contain enough organic matter to have a dark A horizon and also have a distinct clay accumulation in the subsoil. Nearly all of the carbonates have been leached below a depth of about 10 inches.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Eleven 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 Orthid (*Orth*, meaning true, 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 Camborthids (*Camb*, meaning a cambic horizon, plus *orthid*, the suborder of the Aridisols that are most common).

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 *Borollic* identifies the subgroup that has more organic matter than is typical for the great group and that has a mean annual soil temperature lower than 8 degrees C. An example is Borollic Camborthids.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, 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-silty, mixed Borollic Camborthids.

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 underlying material can differ within a series.

CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series)

Soil name	Family or higher taxonomic class
Abor-----	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Aeric Fluvaquents-----	Aeric Fluvaquents
Alona-----	Fine-silty, mixed Borollic Camborthids
Bigsheep-----	Loamy-skeletal, mixed Entic Haploborolls
Blackhall-----	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Blanchard-----	Mixed, frigid Typic Ustipsamments
Borollic Camborthids-----	Borollic Camborthids
Busby-----	Coarse-loamy, mixed Borollic Camborthids
Cabba-----	Loamy, mixed (calcareous), frigid, shallow Typic Ustorthents
Cabbart-----	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Cambert-----	Fine-silty, mixed, frigid Typic Ustochrepts
Cambeth-----	Fine-silty, mixed Borollic Camborthids
Cherry-----	Fine-silty, mixed, frigid Typic Ustochrepts
Chinook-----	Coarse-loamy, mixed Aridic Haploborolls
*Creed-----	Fine, montmorillonitic Borollic Natrargids
Dast-----	Coarse-loamy, mixed, frigid Typic Ustochrepts
Degrad-----	Fine-loamy over sandy or sandy-skeletal, mixed Aridic Argiborolls
Delpoint-----	Fine-loamy, mixed Borollic Camborthids
Ethridge-----	Fine, montmorillonitic Aridic Argiborolls
Evanston-----	Fine-loamy, mixed Aridic Argiborolls
Farnuf-----	Fine-loamy, mixed Typic Argiborolls
Floweree-----	Fine-silty, mixed Aridic Haploborolls
Gerdrum-----	Fine, montmorillonitic Borollic Natrargids
Glendive-----	Coarse-loamy, mixed (calcareous), frigid Ustic Torrifluvents
Golva-----	Fine-silty, mixed Typic Haploborolls
Hanly-----	Sandy, mixed, frigid Ustic Torrifluvents
Harlem-----	Fine, montmorillonitic (calcareous), frigid Ustic Torrifluvents
Havre-----	Fine-loamy, mixed (calcareous), frigid Ustic Torrifluvents
Hedstrom-----	Fine-loamy over sandy or sandy-skeletal, mixed Typic Argiborolls
Ismay-----	Fine-silty, mixed (calcareous), frigid Ustic Torrifluvents
Kirby-----	Loamy-skeletal over fragmental, mixed (calcareous), frigid Ustic Torriorthents
Kobar-----	Fine, montmorillonitic Borollic Camborthids
Kremlin-----	Fine-loamy, mixed Aridic Haploborolls
Lihen-----	Sandy, mixed Entic Haploborolls
Lisk-----	Coarse-loamy, mixed, frigid Typic Ustochrepts
Lonna-----	Fine-silty, mixed Borollic Camborthids
Macar-----	Fine-loamy, mixed, frigid Typic Ustochrepts
Marias-----	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Marvan-----	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Neldore-----	Clayey, montmorillonitic, nonacid, frigid, shallow Ustic Torriorthents
Nesda-----	Sandy-skeletal, mixed Fluventic Haploborolls
Parshall-----	Coarse-loamy, mixed Pachic Haploborolls
Peerless-----	Fine-loamy, mixed Typic Haploborolls
Pinelli-----	Fine, montmorillonitic Borollic Haplargids
Rivra-----	Sandy-skeletal, mixed, frigid Ustic Torrifluvents
Ryell-----	Coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Ustic Torrifluvents
Shambo-----	Fine-loamy, mixed Typic Haploborolls
Spinekop-----	Fine-loamy, mixed Borollic Camborthids
Subwell-----	Loamy-skeletal, mixed Typic Haploborolls
Tally-----	Coarse-loamy, mixed Typic Haploborolls
Tinsley-----	Sandy-skeletal, mixed, frigid Typic Ustorthents
*Twilight-----	Coarse-loamy, mixed Borollic Camborthids
Typic Ustifluvents-----	Typic Ustifluvents
Ustic Torrifluvents-----	Ustic Torrifluvents
Ustic Torriorthents-----	Ustic Torriorthents
Vanda-----	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Vanstel-----	Fine-silty, mixed Borollic Haplargids
Wabek-----	Sandy-skeletal, mixed Entic Haploborolls

CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Weingart-----	Fine, montmorillonitic Borollic Natrargids
Yamac-----	Fine-loamy, mixed Borollic Camborthids
Yawdim-----	Clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents
Yetull-----	Mixed, frigid Ustic Torripsamments
Zatoville-----	Fine, montmorillonitic, frigid Cambic Gypsiorthids

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Abor-Cabbart-Delpoint complex, 8 to 25 percent slopes-----	12,550	1.1
2	Abor-Delpoint-Kobar complex, 4 to 15 percent slopes-----	4,370	0.4
3	Abor-Weingart-Neldore complex, 2 to 15 percent slopes-----	3,310	0.3
4	Aeric Fluvaquents-Cherry, calcareous, complex, 0 to 8 percent slopes-----	3,000	0.3
5	Alona silt loam, 0 to 4 percent slopes-----	3,540	0.3
6	Alona-Cambeth, calcareous-Gerdrum complex, 2 to 8 percent slopes-----	2,400	0.2
7	Badland-----	31,250	2.8
8	Blackhall-Busby-Rock outcrop complex, 8 to 45 percent slopes-----	2,810	0.3
9	Blackhall-Delpoint-Rock outcrop complex, 15 to 50 percent slopes-----	3,260	0.3
10	Blanchard-Dast complex, 4 to 15 percent slopes-----	1,060	0.1
11	Borollic Camborthids-Ustic Torrifluvents complex, 0 to 8 percent slopes-----	13,300	1.2
12	Busby fine sandy loam, 0 to 2 percent slopes-----	2,680	0.2
13	Busby fine sandy loam, 2 to 8 percent slopes-----	2,140	0.2
14	Busby loam, 0 to 2 percent slopes-----	770	0.1
15	Busby-Blackhall-Twilight fine sandy loams, 8 to 25 percent slopes-----	4,520	0.4
16	Busby-Twilight-Blackhall fine sandy loams, 4 to 15 percent slopes-----	3,030	0.3
17	Busby-Yetull complex, 0 to 8 percent slopes-----	1,250	0.1
18	Busby-Yetull-Rock outcrop complex, 8 to 25 percent slopes-----	1,040	0.1
19	Cabba-Cambert, calcareous-Rock outcrop complex, 8 to 70 percent slopes-----	15,480	1.4
20	Cabbart-Rock outcrop-Yawdim complex, 15 to 70 percent slopes-----	49,680	4.5
21	Cambert, calcareous-Bigsheep-Golva complex, 8 to 45 percent slopes-----	11,540	1.0
22	Cambert, calcareous-Cabba-Cherry, calcareous, complex, 8 to 25 percent slopes-----	36,220	3.3
23	Cambert, calcareous-Cabba-Dast complex, 4 to 15 percent slopes-----	6,050	0.5
24	Cambeth, calcareous-Bigsheep, bedrock substratum, complex, 8 to 45 percent slopes--	2,140	0.2
25	Cambeth, calcareous-Cabbart-Kirby complex, 8 to 45 percent slopes-----	15,440	1.4
26	Cambeth, calcareous-Cabbart-Lonna silt loams, 15 to 35 percent slopes-----	20,770	1.9
27	Cambeth, calcareous-Cabbart-Yawdim complex, 4 to 25 percent slopes-----	24,100	2.2
28	Cherry silt loam, calcareous, 0 to 2 percent slopes-----	3,750	0.3
29	Cherry silt loam, calcareous, 2 to 8 percent slopes-----	12,870	1.2
30	Cherry-Cambert silt loams, calcareous, 2 to 8 percent slopes-----	23,070	2.1
31	Cherry, calcareous-Cambert, calcareous-Cabba silt loams, 4 to 15 percent slopes----	34,320	3.1
32	Cherry, calcareous-Lisk-Cabba complex, 8 to 25 percent slopes-----	1,270	0.1
33	Cherry, calcareous-Typic Ustifluvents complex, 0 to 8 percent slopes-----	7,550	0.7
34	Chinook fine sandy loam, 2 to 8 percent slopes-----	4,830	0.4
35	Chinook-Kremlin complex, 2 to 6 percent slopes-----	3,950	0.4
36	Chinook-Tinsley complex, 4 to 25 percent slopes-----	2,810	0.3
37	Chinook-Twilight fine sandy loams, 2 to 8 percent slopes-----	5,410	0.5
38	Chinook-Twilight-Blackhall fine sandy loams, 8 to 15 percent slopes-----	5,460	0.5
39	Creed-Gerdrum complex, 2 to 8 percent slopes-----	2,610	0.2
40	Dast-Lisk fine sandy loams, 4 to 15 percent slopes-----	1,490	0.1
41	Degrand fine sandy loam, 0 to 4 percent slopes-----	9,610	0.9
42	Degrand loam, 0 to 4 percent slopes-----	26,660	2.4
43	Delpoint-Busby-Blackhall complex, 4 to 15 percent slopes-----	5,580	0.5
44	Delpoint-Cabbart loams, 4 to 15 percent slopes-----	2,020	0.2
45	Delpoint-Cabbart-Yawdim complex, 4 to 25 percent slopes-----	9,330	0.8
46	Delpoint-Cabbart-Yawdim complex, 25 to 70 percent slopes-----	14,360	1.3
47	Delpoint-Yamac-Cabbart loams, 8 to 25 percent slopes-----	14,740	1.3
48	Ethridge silty clay loam, 0 to 2 percent slopes-----	1,600	0.1
49	Ethridge silty clay loam, 2 to 8 percent slopes-----	1,180	0.1
50	Evanston loam, 0 to 2 percent slopes-----	800	0.1
51	Evanston loam, 2 to 6 percent slopes-----	1,360	0.1
52	Evanston-Delpoint loams, 2 to 8 percent slopes-----	1,190	0.1
53	Farnuf loam, 2 to 6 percent slopes-----	1,150	0.1
54	Floweree silt loam, 0 to 2 percent slopes-----	2,730	0.2
55	Floweree silt loam, 2 to 6 percent slopes-----	3,060	0.3
56	Floweree silt loam, calcareous, 0 to 2 percent slopes-----	5,610	0.5
57	Floweree silt loam, calcareous, 2 to 8 percent slopes-----	15,020	1.3
58	Floweree-Cambeth silt loams, 0 to 4 percent slopes-----	1,420	0.1
59	Gerdrum-Creed complex, 0 to 2 percent slopes-----	1,700	0.2
60	Gerdrum-Creed complex, 2 to 8 percent slopes-----	4,980	0.4
61	Gerdrum-Creed complex, 4 to 15 percent slopes, gullied-----	2,520	0.2

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
62	Glendive fine sandy loam, 0 to 2 percent slopes-----	4,650	0.4
63	Glendive loam, 0 to 2 percent slopes-----	1,430	0.1
64	Golva silt loam, 0 to 4 percent slopes-----	5,480	0.5
65	Golva silt loam, 4 to 8 percent slopes-----	3,560	0.3
66	Golva-Cambert silt loams, 2 to 8 percent slopes-----	4,950	0.4
67	Hanly-Glendive complex, 0 to 2 percent slopes-----	1,810	0.2
68	Havre loam, 0 to 2 percent slopes-----	4,730	0.4
69	Havre silty clay loam, 0 to 2 percent slopes-----	1,500	0.1
70	Havre-Harlem complex, 0 to 2 percent slopes-----	970	0.1
71	Hedstrom loam, 2 to 8 percent slopes-----	2,030	0.2
72	Ismay silty clay loam, 0 to 2 percent slopes-----	3,480	0.3
73	Kobar silty clay loam, 0 to 2 percent slopes-----	1,910	0.2
74	Kobar silty clay loam, 2 to 8 percent slopes-----	3,030	0.3
75	Kobar-Gerdrum silty clay loams, 2 to 8 percent slopes-----	1,410	0.1
76	Kremlin loam, 0 to 2 percent slopes-----	6,420	0.6
77	Kremlin loam, 2 to 8 percent slopes-----	12,130	1.1
78	Kremlin-Busby complex, 0 to 2 percent slopes-----	1,420	0.1
79	Kremlin-Tinsley-Degrad complex, 4 to 15 percent slopes-----	680	0.1
80	Lihen loamy sand, 4 to 15 percent slopes-----	4,400	0.4
81	Lihen-Parshall-Yetull complex, 4 to 15 percent slopes-----	5,350	0.5
82	Lihen-Tinsley complex, 8 to 35 percent slopes-----	2,620	0.2
83	Lihen-Yetull complex, 8 to 35 percent slopes-----	16,740	1.5
84	Lonna silt loam, 0 to 2 percent slopes-----	14,900	1.3
85	Lonna silt loam, 2 to 8 percent slopes-----	51,580	4.6
86	Lonna silt loam, 2 to 15 percent slopes, gullied-----	2,250	0.2
87	Lonna silty clay loam, 0 to 2 percent slopes-----	3,960	0.4
88	Lonna silty clay loam, 2 to 8 percent slopes-----	2,310	0.2
89	Lonna-Cambeth, calcareous, silt loams, 2 to 8 percent slopes-----	46,480	4.2
90	Lonna-Cambeth, calcareous-Cabbart silt loams, 4 to 12 percent slopes-----	93,780	8.4
91	Lonna-Cambeth, calcareous-Cabbart silt loams, 12 to 25 percent slopes-----	76,700	6.9
92	Macar loam, 2 to 8 percent slopes-----	540	*
93	Marias silty clay, 0 to 2 percent slopes-----	1,160	0.1
94	Marvan silty clay, 0 to 2 percent slopes-----	1,630	0.1
95	Marvan silty clay, 2 to 8 percent slopes-----	1,020	0.1
96	Marvan-Vanda silty clays, 0 to 4 percent slopes-----	1,980	0.2
97	Neldore-Rock outcrop complex, 4 to 25 percent slopes-----	3,930	0.4
98	Neldore-Rock outcrop-Abor complex, 15 to 50 percent slopes-----	27,220	2.4
99	Neldore-Weingart-Kirby complex, 4 to 25 percent slopes-----	1,040	0.1
100	Nesda gravelly sandy loam, 0 to 2 percent slopes-----	1,540	0.1
101	Parshall fine sandy loam, 2 to 6 percent slopes-----	4,770	0.4
102	Peerless loam, 0 to 4 percent slopes-----	3,120	0.3
103	Pinelli loam, 0 to 2 percent slopes-----	800	0.1
104	Pinelli loam, 2 to 8 percent slopes-----	2,520	0.2
105	Pinelli-Weingart-Gerdrum complex, 0 to 6 percent slopes-----	1,380	0.1
106	Riverwash-----	640	0.1
107	Rivra complex, 0 to 2 percent slopes-----	2,320	0.2
108	Rock outcrop-----	1,050	0.1
109	Rock outcrop-Cabbart-Kirby complex, 25 to 70 percent slopes-----	3,520	0.3
110	Ryell fine sandy loam, 0 to 2 percent slopes, occasionally flooded-----	1,140	0.1
111	Ryell very fine sandy loam, 0 to 2 percent slopes, rarely flooded-----	790	0.1
112	Ryell loam, 0 to 2 percent slopes, occasionally flooded-----	1,350	0.1
113	Shambo loam, 4 to 8 percent slopes-----	1,220	0.1
114	Shambo loam, 0 to 4 percent slopes-----	1,910	0.2
115	Spinekop silty clay loam, 0 to 2 percent slopes-----	2,880	0.3
116	Subwell-Bigsheep complex, 4 to 15 percent slopes-----	8,910	0.8
117	Subwell-Cambert, calcareous-Bigsheep, bedrock substratum, complex, 2 to 8 percent slopes-----	4,500	0.4
118	Subwell-Peerless loams, 0 to 4 percent slopes-----	14,680	1.3
119	Tally fine sandy loam, 2 to 8 percent slopes-----	310	*
120	Tally-Hedstrom fine sandy loams, 2 to 8 percent slopes-----	1,790	0.2
121	Tally-Wabek-Hedstrom complex, 4 to 25 percent slopes-----	4,410	0.4

* See footnote at end of table.

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
122	Tinsley-Delpoint-Cabbart complex, 8 to 45 percent slopes-----	5,820	0.5
123	Ustic Torrifluvents, 0 to 4 percent slopes, occasionally flooded-----	1,320	0.1
124	Ustic Torriorthents, shallow-Borollic Natrargids complex, 2 to 25 percent slopes, gullied-----	3,420	0.3
125	Ustic Torriorthents, saline-Rock outcrop complex, 8 to 35 percent slopes-----	3,620	0.3
126	Ustic Torriorthents-Ustic Torrifluvents-Rock outcrop complex, 0 to 35 percent slopes-----	20,680	1.9
127	Vanstel silt loam, 0 to 2 percent slopes-----	1,370	0.1
128	Vanstel silt loam, 2 to 8 percent slopes-----	1,540	0.1
129	Wabek gravelly sandy loam, 4 to 45 percent slopes-----	1,830	0.2
130	Wabek-Cambert, calcareous, complex, 8 to 45 percent slopes-----	11,380	1.0
131	Yamac loam, 0 to 2 percent slopes-----	3,600	0.3
132	Yamac loam, 2 to 8 percent slopes-----	9,620	0.9
133	Yamac-Busby complex, 2 to 8 percent slopes-----	2,840	0.3
134	Yamac-Busby complex, 8 to 15 percent slopes-----	2,150	0.2
135	Yamac-Busby-Blackhall complex, 8 to 25 percent slopes-----	18,230	1.6
136	Yamac-Delpoint loams, 2 to 8 percent slopes-----	4,490	0.4
137	Yamac-Delpoint-Cabbart complex, 4 to 15 percent slopes-----	9,380	0.8
138	Yamac-Gerdrum complex, 2 to 8 percent slopes-----	3,910	0.4
139	Yawdim-Cambeth, calcareous, complex, 2 to 8 percent slopes-----	740	0.1
140	Yetull-Busby complex, 0 to 2 percent slopes-----	1,190	0.1
141	Zatoville silty clay loam, loamy substratum, 0 to 2 percent slopes-----	1,230	0.1
W	Water-----	5,500	0.5
	Total-----	1,114,300	100.0

* Less than 0.05 percent.

Soil Series and Detailed Soil Map Units

In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed soil map units associated with the series.

Characteristics of the soil and the material in which it formed are identified for each soil series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (7). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (6). Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units on the detailed soil maps in Part III 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 about each map unit is given in Part II of this survey.

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils 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, are mapped without including areas of other taxonomic classes. Consequently, map units are made up of the soils or miscellaneous areas for which they are 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 description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics 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 is needed to define and locate the soils and miscellaneous areas.

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

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer 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. Busby loam, 0 to 2 percent slopes, is a phase of the Busby series.

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

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. Havre-Harlem complex, 0 to 2 percent slopes, is an example.

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

The table "Acreage and Proportionate Extent of the Soils" in Parts I and II of the manuscript 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.

Abor Series

Depth class: Moderately deep

Drainage class: Well drained

Landform: Hills, sedimentary plains

Parent material: Semiconsolidated shale residuum

Slope range: 2 to 45 percent

Taxonomic Class: Fine, montmorillonitic, frigid
Udorthentic Chromusterts

Typical Pedon

Abor silty clay, in an area of Abor-Cabbart-Delpoint complex, 8 to 25 percent slopes; in an area of rangeland, 800 feet north and 700 feet west of the southeast corner of sec. 20, T. 10 N., R. 54 E.

A—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; hard, friable, sticky and plastic; many very fine and few fine roots; many very fine pores; 5 percent hard shale fragments; cracks ½ inch wide at intervals of 2 to 3 inches; slightly effervescent; mildly alkaline; clear smooth boundary.

Bss—3 to 10 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate

coarse subangular blocky structure parting to strong medium granular; very hard, firm, sticky and plastic; common very fine and few fine roots; few very fine pores; few or common slickensides along cracks; slightly effervescent; moderately alkaline; clear smooth boundary.

Bssk—10 to 16 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; common very fine and few fine roots; few very fine pores; few or common slickensides along cracks; common fine masses of lime; strongly effervescent; strongly alkaline; clear smooth boundary.

Bky—16 to 32 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (2.5Y 5/2) moist; massive; very hard, firm, sticky and plastic; few very fine roots and pores; common medium masses of gypsum; few fine soft masses and threads of lime; slightly effervescent; moderately alkaline; gradual smooth boundary.

Cr—32 to 60 inches; light brownish gray (10YR 6/2), semiconsolidated shale, dark grayish brown (2.5Y 4/2) moist; mildly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F; 60 to 72 degrees F in the summer

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Depth to Bssk horizon: 10 to 20 inches

Depth to bedrock: 20 to 40 inches, but mainly 25 to 35 inches. These soils have cracks that extend to the paralithic contact, are as wide as ¼ inch to 3 inches at the surface, and are open for 150 days or less.

A horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 4; chroma of 1 inherited from the parent material

Texture: Silty clay or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 25 percent—0 to 20 percent cobbles and stones more than 3 inches in size, 0 to 25 percent pebbles less than 3 inches in size

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 8.4

Bss horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 4
 Texture: Silty clay, silty clay loam, or clay
 Clay content: 35 to 60 percent
 Content of rock fragments: 0 to 15 percent—0 to 3 percent cobbles and stones more than 3 inches in size, 0 to 12 percent pebbles less than 3 inches in size
 Electrical conductivity: 0 to 4 mmhos/cm
 Abundance of slickensides: Few to common
 Reaction: pH 7.4 to 9.0

Bssk horizon

Hue: 5Y to 10YR
 Value: 5 to 7 dry; 4 or 5 moist
 Chroma: 1 to 4
 Texture: Silty clay, silty clay loam, or clay
 Clay content: 35 to 60 percent
 Abundance of slickensides: Few to common
 Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles and stones more than 3 inches in size, 0 to 15 percent pebbles less than 3 inches in size
 Electrical conductivity: 0 to 4 mmhos/cm
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 9.0
 Other features: A Bssky horizon in some pedons

Bky horizon

Hue: 5Y to 10YR
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 1 to 4
 Texture: Silty clay, silty clay loam, or clay
 Clay content: 35 to 60 percent
 Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles and stones more than 3 inches in size, 0 to 15 percent pebbles less than 3 inches in size
 Electrical conductivity: 0 to 4 mmhos/cm
 Content of gypsum: 1 to 5 percent
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 9.0
 Other features: A By horizon in some pedons

1—Abor-Cabbart-Delpoint complex, 8 to 25 percent slopes

Composition

Abor and similar soils: 55 percent
 Cabbart and similar soils: 15 percent
 Delpoint and similar soils: 15 percent
 Inclusions: 15 percent

Setting

Landform:

- Abor—Hills

- Cabbart—Hills
 - Delpoint—Hills
- Position on landform:**
- Abor—Back slopes and foot slopes
 - Cabbart—Summits
 - Delpoint—Shoulders and summits
- Slope:**
- Abor—8 to 25 percent
 - Cabbart—8 to 25 percent
 - Delpoint—8 to 25 percent

Component Description

Abor

Surface layer texture: Silty clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.8 inches

Cabbart

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

Delpoint

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Areas of rock outcrop
- Kobar and similar soils
- Gerdrum and similar soils
- Neldore and similar soils

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

2—Abor-Delpoint-Kobar complex, 4 to 15 percent slopes

Composition

Abor and similar soils: 50 percent
Delpoint and similar soils: 20 percent
Kobar and similar soils: 15 percent
Inclusions: 15 percent

Setting

Landform:

- Abor—Hills
- Delpoint—Hills
- Kobar—Sedimentary plains

Position on landform:

- Abor—Back slopes and foot slopes
- Delpoint—Summits
- Kobar—Foot slopes and toe slopes

Slope:

- Abor—4 to 15 percent
- Delpoint—4 to 15 percent
- Kobar—4 to 8 percent

Component Description

Abor

Surface layer texture: Silty clay
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.8 inches

Delpoint

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.2 inches

Kobar

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Yawdim and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

3—Abor-Weingart-Neldore complex, 2 to 15 percent slopes

Composition

Abor and similar soils: 35 percent
Weingart and similar soils: 30 percent
Neldore and similar soils: 25 percent
Inclusions: 10 percent

Setting

Landform:

- Abor—Sedimentary plains
- Weingart—Sedimentary plains
- Neldore—Hills

Position on landform:

- Abor—Back slopes and foot slopes
- Weingart—Foot slopes and toe slopes
- Neldore—Summits

Slope:

- Abor—2 to 8 percent
- Weingart—2 to 8 percent
- Neldore—2 to 15 percent

Component Description

Abor

Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.1 inches

Weingart

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 4.0 inches

Neldore

Surface layer texture: Clay

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Areas of rock outcrop
- Delpoint and similar soils
- Gerdrum and similar soils
- Kobar and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Aeric Fluvaquents

Depth class: Very deep

Drainage class: Very poorly drained or poorly drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Typical Pedon

Aeric Fluvaquents, in an area of Aeric Fluvaquents-Cherry, calcareous, complex, 0 to 8 percent slopes; in an area of rangeland, 800 feet west and 1,800 feet north of the southeast corner of sec. 14, T. 16 N., R. 48 E.

Ag—0 to 2 inches; gray (10YR 6/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; hard, friable, slightly sticky and plastic; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Cg1—2 to 14 inches; white (5Y 8/1) silty clay loam, gray (2.5Y 6/0) moist; moderate medium platy structure; hard, friable, slightly sticky and plastic; strongly effervescent; moderately alkaline; clear smooth boundary.

Cg2—14 to 40 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; few gray (5Y 6/1) fine distinct mottles; massive; hard, very friable, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline; clear smooth boundary.

Cg3—40 to 60 inches; light brownish gray (10YR 6/2) loam, gray (2.5Y 6/0) moist; common olive (5Y 5/4) fine prominent mottles; massive; hard, very friable, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to seasonal high water table: 2 to 14 inches from April through September

Flooding: Occasional or frequent

Surface layer

Texture: Fine sandy loam to silty clay loam

Underlying material

Texture: Fine sandy loam to silty clay loam

Clay content: 15 to 40 percent

Content of rock fragments: 0 to 50 percent coarse fragments

4—Aeric Fluvaquents-Cherry, calcareous, complex, 0 to 8 percent slopes

Composition

Aeric Fluvaquents and similar soils: 60 percent

Cherry and similar soils: 30 percent

Inclusions: 10 percent

Setting

Landform:

- Aeric Fluvaquents—Flood plains
- Cherry—Alluvial fans, stream terraces, and drainageways

Slope:

- Aeric Fluvaquents—0 to 2 percent
- Cherry—0 to 8 percent

Component Description

Aeric Fluvaquents

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Cherry

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Very deep, salt-affected soils
- Soils that have slopes of more than 8 percent

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Alona Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 0 to 4 percent

Taxonomic Class: Fine-silty, mixed Borollic Camborthids

Typical Pedon

Alona silt loam, in an area of Alona-Cambeth, calcareous-Gerdrum complex, 2 to 8 percent slopes; in an area of rangeland, 2,600 feet east and 1,300 feet north of the southwest corner of sec. 9, T. 14 N., R. 49 E.

A—0 to 5 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 3/3) moist; moderate medium and coarse subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine pores; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw1—5 to 11 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; moderate coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine pores; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw2—11 to 16 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; moderate very coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots and pores; strongly effervescent; strongly alkaline; clear smooth boundary.

Bk—16 to 20 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; moderate very coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots and pores; common fine soft masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bkz1—20 to 25 inches; light gray (2.5Y 7/2) silt loam, light yellowish brown (2.5Y 6/4) moist; massive; slightly hard, very friable, sticky and plastic; common very fine roots and pores; few fine masses of salts; common fine soft masses and threads of lime; strongly effervescent; strongly alkaline; clear smooth boundary.

Bkz2—25 to 33 inches; light brownish gray (2.5Y 6/2) silt loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, sticky and plastic; few very fine roots; common very fine pores; few fine masses of salts; few fine soft masses of lime; strongly effervescent; strongly alkaline; clear smooth boundary.

Bz—33 to 60 inches; light gray (2.5Y 7/2) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, sticky and plastic; few very fine roots; common very fine pores; few fine

masses of salts; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Depth to Bk horizon: 6 to 18 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Effervescence: None to strong

Electrical conductivity: 2 to 4 mmhos/cm

Sodium adsorption ratio: 2 to 10

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.6 to 8.4

Bw1 horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture: Silt loam or silty clay loam

Clay content: 18 to 27 percent

Effervescence: None to violent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 2 to 10

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 8.4

Bw2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 25 to 35 percent

Effervescence: None to violent

Electrical conductivity: 2 to 16 mmhos/cm

Sodium adsorption ratio: 2 to 10

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.8 to 9.6

Bk horizon

Hue: 10YR to 5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 18 to 35 percent

Effervescence: Strong or violent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 40

Reaction: pH 8.4 to 9.6

Bkz horizon

Hue: 10YR to 5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silty clay loam, or silt loam

Clay content: 18 to 35 percent

Effervescence: Strong or violent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 40

Reaction: pH 9.0 to 9.6

Bz horizon

Hue: 10YR to 5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silty clay loam, or silt loam

Clay content: 18 to 35 percent

Effervescence: Strong or violent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 40

Reaction: pH 9.0 to 9.6

5—Alona silt loam, 0 to 4 percent slopes

Composition

Alona and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 0 to 4 percent

Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Lonna and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

6—Alona-Cambeth, calcareous-Gerdrum complex, 2 to 8 percent slopes

Composition

Alona and similar soils: 40 percent
Cambeth and similar soils: 30 percent
Gerdrum and similar soils: 15 percent
Inclusions: 15 percent

Setting

Landform:

- Alona—Sedimentary plains and alluvial fans
- Cambeth—Sedimentary plains
- Gerdrum—Sedimentary plains and alluvial fans

Position on landform:

- Alona—Foot slopes and toe slopes
- Cambeth—Back slopes
- Gerdrum—Foot slopes and toe slopes

Slope:

- Alona—2 to 4 percent
- Cambeth—2 to 8 percent
- Gerdrum—2 to 8 percent

Component Description

Alona

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within a depth of 30 inches
Sodium affected: Sodic within a depth of 30 inches
Available water capacity: Mainly 7.3 inches

Cambeth

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None

Available water capacity: Mainly 4.5 inches

Gerdrum

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within a depth of 30 inches
Sodium affected: Sodic within a depth of 30 inches
Available water capacity: Mainly 6.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Vanstel and similar soils
- Yamac and similar soils
- Yawdim and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

7—Badland

Composition

Badland: 85 percent
Inclusions: 15 percent

Component Description

Definition: Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Geologic erosion is active.

Flooding: None

Inclusions

- Blackhall and similar soils
- Cabbart and similar soils
- Neldore and similar soils
- Yamac and similar soils
- Deep soils in drainageways

Bigsheep Series*Depth class:* Very deep*Drainage class:* Well drained*Landform:* Hills, sedimentary plains*Parent material:* Alluvium*Slope range:* 2 to 45 percent**Taxonomic Class:** Loamy-skeletal, mixed Entic
Haploborolls**Typical Pedon**

Bigsheep very gravelly loam, in an area of Cambert, calcareous-Bigsheep-Golva complex, 8 to 45 percent slopes; in an area of rangeland, 2,300 feet south and 1,300 feet west of the northeast corner of sec. 32, T. 14 N., R. 47 E.

A1—0 to 4 inches; brown (10YR 4/3) very gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; 55 percent pebbles; mildly alkaline; clear smooth boundary.

A2—4 to 9 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; 50 percent pebbles; slightly effervescent; mildly alkaline; clear smooth boundary.

Bk—9 to 24 inches; very pale brown (10YR 7/3) very gravelly loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots; 55 percent pebbles; many medium lime coatings on pebbles; violently effervescent; moderately alkaline; gradual smooth boundary.

2C1—24 to 33 inches; very pale brown (10YR 7/3) silt loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly effervescent; strongly alkaline; gradual smooth boundary.

3C2—33 to 60 inches; pale yellow (2.5Y 7/4) very gravelly loam, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; 55 percent pebbles; common thin lime coatings on pebbles; strongly effervescent; strongly alkaline.

Range in Characteristics*Soil temperature:* 42 to 47 degrees F*Moisture control section:* Between the depths of 4 and 12 inches*Mollic epipedon thickness:* 7 to 9 inches*Depth to Bk horizon:* 7 to 9 inches

Content of coarse fragments: 35 to 60 percent, with an average of 45 percent, in the control section

Note: This series includes a phase that has a bedrock substratum. The semiconsolidated sedimentary beds are at a depth of 40 to 60 inches, and they crush to loamy fine sand, silt loam, or loam. Reaction is pH 7.4 to 9.0.

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 60 percent—0 to 5 percent cobbles, 0 to 55 percent pebbles

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 to 6

Texture: Loam, sandy loam, or sandy clay loam

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent cobbles, 35 to 55 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 9.0

2C1 horizon

Hue: 10YR to 5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 to 4

Texture: Silt loam or loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 8 to 15 percent

Reaction: pH 7.9 to 9.0

3C2 horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 to 6

Texture: Loam, sandy loam, or sandy clay loam

Clay content: 10 to 27 percent

Content of rock fragments: 35 to 75 percent—0 to 5 percent cobbles, 35 to 70 percent pebbles

Calcium carbonate equivalent: 8 to 15 percent

Reaction: pH 8.5 to 9.0

Blackhall Series*Depth class:* Shallow*Drainage class:* Well drained*Landform:* Hills*Parent material:* Semiconsolidated, sandy sedimentary beds*Slope range:* 4 to 50 percent

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents

Typical Pedon

Blackhall fine sandy loam, in an area of Yamac-Busby-Blackhall complex, 8 to 25 percent slopes; in an area of rangeland, 1,700 feet south and 1,250 feet east of the northwest corner of sec. 34, T. 10 N., R. 54 E.

A—0 to 4 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

C—4 to 17 inches; light gray (2.5Y 7/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—17 to 60 inches; light gray (2.5Y 7/2), semiconsolidated, sandy sedimentary beds that crush to loamy fine sand, grayish brown (2.5Y 5/2) moist; slightly hard, very friable, nonsticky and nonplastic; few very fine roots in cracks in the upper part; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 45 degrees F

Clay content: 5 to 15 percent in the control section

Content of rock fragments: 0 to 35 percent in the control section

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 2.5Y or 10YR

Value: 3 to 6 moist; 5 to 7 dry

Chroma: 2 to 6

Reaction: pH 7.4 to 8.4

C horizon

Hue: 5Y to 10YR

Value: 3 to 6 moist; 5 to 7 dry

Chroma: 2 to 6

Reaction: pH 7.9 to 8.4

8—Blackhall-Busby-Rock outcrop complex, 8 to 45 percent slopes

Composition

Blackhall and similar soils: 35 percent

Busby and similar soils: 35 percent

Rock outcrop: 20 percent

Inclusions: 10 percent

Setting

Landform:

- Blackhall—Hills
- Busby—Hills
- Rock outcrop—Hills

Position on landform:

- Blackhall—Back slopes and foot slopes
- Busby—Foot slopes
- Rock outcrop—Shoulders and summits

Slope:

- Blackhall—8 to 45 percent
- Busby—8 to 25 percent

Component Description

Blackhall

Surface layer texture: Fine sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.7 inches

Busby

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.5 inches

Rock outcrop

Definition: Exposures of bare bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Delpoint and similar soils
- Twilight and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

9—Blackhall-Delpoint-Rock outcrop complex, 15 to 50 percent slopes

Composition

Blackhall and similar soils: 30 percent

Delpoint and similar soils: 30 percent

Rock outcrop: 30 percent

Inclusions: 10 percent

Setting

Landform:

- Blackhall—Hills
- Delpoint—Hills
- Rock outcrop—Hills

Position on landform:

- Blackhall—Back slopes and shoulders
- Delpoint—Foot slopes
- Rock outcrop—Shoulders and summits

Slope:

- Blackhall—15 to 50 percent
- Delpoint—15 to 50 percent

Component Description

Blackhall

Surface layer texture: Very fine sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

Delpoint

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.9 inches

Rock outcrop

Definition: Exposures of bare bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Twilight and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Blanchard Series

Depth class: Very deep

Drainage class: Excessively drained

Landform: Hills

Parent material: Alluvium, eolian material

Slope range: 4 to 15 percent

Taxonomic Class: Mixed, frigid Typic Ustipsamments

Typical Pedon

Blanchard loamy fine sand, in an area of Blanchard-Dast complex, 4 to 15 percent slopes; in an area of rangeland, 200 feet north and 200 feet west of the southeast corner of sec. 22, T. 16 N., R. 47 E.

A—0 to 8 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, loose, nonsticky and nonplastic; many fine and very fine roots; slightly effervescent; mildly alkaline; gradual smooth boundary.

AC—8 to 20 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, olive brown (2.5Y 4/4) moist; single grain; loose, nonsticky and nonplastic; common fine and very fine roots; slightly effervescent; mildly alkaline; gradual smooth boundary.

C—20 to 60 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, olive brown (2.5Y 4/4) moist; massive; soft, loose, nonsticky and nonplastic; few fine and very fine roots; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 12 and 35 inches

Control section: 0 to 5 percent clay, less than 50 percent medium and coarse sand

Depth to free carbonates: Mainly 3 to 30 inches

Calcium carbonate equivalent: Less than 5 percent throughout the profile

A and AC horizons

Hue: 7.5YR to 2.5Y

Value: 3 to 6 dry; 2 to 4 moist

Chroma: 2 to 4

Clay content: 0 to 5 percent

Reaction: pH 5.6 to 7.8

C horizon

Hue: 7.5YR to 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Fine sand, loamy sand, or loamy fine sand

Clay content: 0 to 5 percent

Reaction: pH 6.6 to 7.8

10—Blanchard-Dast complex, 4 to 15 percent slopes

Composition

Blanchard and similar soils: 50 percent

Dast and similar soils: 30 percent

Inclusions: 20 percent

Setting

Landform:

- Blanchard—Hills
- Dast—Hills

Position on landform:

- Blanchard—Back slopes and foot slopes
- Dast—Back slopes and shoulders

Slope:

- Blanchard—4 to 15 percent
- Dast—4 to 15 percent

Component Description

Blanchard

Surface layer texture: Loamy fine sand

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

Dast

Surface layer texture: Fine sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cabba and similar soils
- Tally and similar soils
- Areas of rock outcrop
- Areas of blowouts

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Borollic Camborthids

Depth class: Very deep

Drainage class: Well drained

Landform: Alluvial fans, stream terraces, drainageways

Parent material: Alluvium

Slope range: 0 to 8 percent

Typical Pedon

Borollic Camborthids in an area of rangeland, 400 feet south and 2,050 feet west of the northeast corner of sec. 18, T. 11 N., R. 53 E.

A—0 to 3 inches; dark yellowish brown (10YR 4/4) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; mildly alkaline; clear smooth boundary.

Bw—3 to 12 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots and pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk—12 to 24 inches; light yellowish brown (2.5Y 6/4) silt loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine pores; common fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

C1—24 to 38 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, sticky and plastic; common very fine roots and pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—38 to 60 inches; pale yellow (2.5Y 7/4) silt loam, light yellowish brown (2.5Y 6/4) moist; massive;

slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Content of rock fragments: 0 to 35 percent throughout the profile

Surface layer

Texture: Loam or silt loam

Subsoil and substratum

Texture: Fine sandy loam to silty clay loam
Clay content: 15 to 40 percent

11—Borollic Camborthids-Ustic Torrifluents complex, 0 to 8 percent slopes

Composition

Borollic Camborthids and similar soils: 60 percent
Ustic Torrifluents and similar soils: 30 percent
Inclusions: 10 percent

Setting

Landform:

- Borollic Camborthids—Alluvial fans, stream terraces, and drainageways
- Ustic Torrifluents—Flood plains

Slope:

- Borollic Camborthids—0 to 8 percent
- Ustic Torrifluents—0 to 2 percent

Component Description

Borollic Camborthids

Dominant parent material: Alluvium

Flooding: None

Ustic Torrifluents

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Frequent

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Areas of soils that are rarely flooded
- Poorly drained soils
- Soils on steep terrace edges
- Soils that have coarse fragments

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Borollic Natrargids

Depth class: Very deep to moderately deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Material derived from semiconsolidated sedimentary beds

Slope range: 2 to 8 percent

Typical Pedon

Borollic Natrargids in an area of rangeland, 600 feet south and 600 feet west of the northeast corner of sec. 9, T. 11 N., R. 49 E.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

E—4 to 7 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and few fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Btn—7 to 16 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse columnar structure parting to moderate coarse subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots and pores; tops of columns coated with bleached sand and silt; common thin clay films on faces of peds; strongly effervescent; very strongly alkaline; gradual smooth boundary.

Bkz—16 to 29 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots and pores; few fine seams and soft masses of lime; few fine masses of salts; strongly effervescent; strongly alkaline; clear smooth boundary.

BC—29 to 35 inches; brown (10YR 5/3) channery loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few

very fine roots; 30 percent hard-baked shale fragments; strongly effervescent; strongly alkaline; clear smooth boundary.

Cr—35 to 60 inches; light brownish gray (10YR 6/2), semiconsolidated sedimentary beds that crush to silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; slightly effervescent; strongly alkaline.

Range in Characteristics

Depth to semiconsolidated sedimentary beds: 20 to 60 inches or more

Surface layer (mixed to a depth of 7 inches)

Texture: Fine sandy loam, loam, clay loam, or silty clay loam

Reaction: pH 6.6 to 8.4

Subsoil

Texture: Sandy clay loam, loam, clay loam, silty clay loam, or silty clay

Clay content: 20 to 45 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 25

Reaction: pH 7.9 to 9.1

Substratum

Texture: Fine sandy loam, sandy clay loam, loam, clay loam, or silty clay loam

Content of rock fragments: 0 to 35 percent

Electrical conductivity: 2 to 10 mmhos/cm

Reaction: pH 7.9 to 9.0

Busby Series

Depth class: Very deep

Drainage class: Well drained

Landform: Hills, stream terraces, sedimentary plains, alluvial fans

Parent material: Alluvium or eolian material

Slope range: 0 to 25 percent

Taxonomic Class: Coarse-loamy, mixed Borollic Camborthids

Typical Pedon

Busby fine sandy loam, in an area of Yamac-Busby-Blackhall complex, 8 to 25 percent slopes; in an area of rangeland, 1,350 feet south and 1,350 feet east of the northwest corner of sec. 21, T. 12 N., R. 54 E.

A—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine, and few medium roots; many very fine pores; mildly alkaline; clear smooth boundary.

Bw—3 to 11 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine and few medium roots; common very fine pores; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bk1—11 to 17 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine and few medium roots; common medium masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—17 to 42 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots and pores; common medium masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C—42 to 60 inches; light brownish gray (2.5Y 6/2) loamy fine sand, grayish brown (2.5Y 5/2) moist; massive; loose, nonsticky and nonplastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 8 and 24 inches, dry in all parts between 40 and 50 percent of the cumulative days when the soil temperature at 20 inches is 41 degrees or higher

Depth to Bk horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Fine sandy loam or loam

Clay content: 10 to 25 percent

Effervescence: None to slight

Reaction: pH 7.4 to 8.4

Note: When mixed to a depth of 7 inches, the surface layer does not meet the requirements for a mollic epipedon.

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam, sandy loam, or loam

Clay content: 10 to 18 percent

Reaction: pH 7.4 to 8.4

Effervescence: None to strong

Bk horizon

Hue: 10YR to 5Y

Value: 6 or 7 dry; 4 to 6 moist
 Chroma: 2 to 4
 Texture: Fine sandy loam or sandy loam
 Clay content: 10 to 18 percent
 Effervescence: Strong or violent
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 8.4

C horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 5 or 6 moist
 Chroma: 2 to 4
 Texture: Loamy fine sand, loamy sand, or fine sand below a depth of 40 inches or fine sandy loam or sandy loam
 Clay content: 3 to 18 percent
 Reaction: pH 7.9 to 8.4
 Effervescence: Slight to violent

12—Busby fine sandy loam, 0 to 2 percent slopes***Composition***

Busby and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Kobar and similar soils
- Kremlin and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section

- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

13—Busby fine sandy loam, 2 to 8 percent slopes***Composition***

Busby and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains
Slope: 2 to 8 percent

Component Description

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Yamac and similar soils
- Yetull and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

14—Busby loam, 0 to 2 percent slopes***Composition***

Busby and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Kremlin and similar soils
- Ryell and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

15—Busby-Blackhall-Twilight fine sandy loams, 8 to 25 percent slopes

Composition

Busby and similar soils: 40 percent

Blackhall and similar soils: 25 percent

Twilight and similar soils: 20 percent

Inclusions: 15 percent

Setting

Landform:

- Busby—Hills
- Blackhall—Hills
- Twilight—Hills

Position on landform:

- Busby—Foot slopes and toe slopes
- Blackhall—Shoulders and summits
- Twilight—Back slopes and foot slopes

Slope:

- Busby—8 to 15 percent

- Blackhall—8 to 25 percent

- Twilight—8 to 25 percent

Component Description

Busby

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.4 inches

Blackhall

Surface layer texture: Fine sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.5 inches

Twilight

Surface layer texture: Fine sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Yamac and similar soils
- Yetull and similar soils
- Areas of rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

16—Busby-Twilight-Blackhall fine sandy loams, 4 to 15 percent slopes

Composition

Busby and similar soils: 45 percent
 Twilight and similar soils: 25 percent
 Blackhall and similar soils: 15 percent
 Inclusions: 15 percent

Setting

Landform:

- Busby—Hills
- Twilight—Hills
- Blackhall—Hills

Position on landform:

- Busby—Foot slopes and toe slopes
- Twilight—Back slopes and foot slopes
- Blackhall—Summits

Slope:

- Busby—4 to 15 percent
- Twilight—4 to 15 percent
- Blackhall—4 to 15 percent

Component Description

Busby

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.4 inches

Twilight

Surface layer texture: Fine sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.0 inches

Blackhall

Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Kremlin and similar soils
- Yetull and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

17—Busby-Yetull complex, 0 to 8 percent slopes

Composition

Busby and similar soils: 50 percent
 Yetull and similar soils: 35 percent
 Inclusions: 15 percent

Setting

Landform:

- Busby—Sedimentary plains
- Yetull—Sedimentary plains

Slope:

- Busby—0 to 8 percent
- Yetull—0 to 8 percent

Component Description

Busby

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

Yetull

Surface layer texture: Loamy fine sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Delpoint and similar soils
- Twilight and similar soils
- Areas of blowouts

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

18—Busby-Yetull-Rock outcrop complex, 8 to 25 percent slopes

Composition

Busby and similar soils: 40 percent
 Yetull and similar soils: 30 percent
 Rock outcrop: 15 percent
 Inclusions: 15 percent

Setting

Landform:

- Busby—Hills
- Yetull—Hills
- Rock outcrop—Hills

Position on landform:

- Busby—Foot slopes and toe slopes
- Yetull—Foot slopes and toe slopes
- Rock outcrop—Shoulders and summits

Slope:

- Busby—8 to 25 percent
- Yetull—8 to 15 percent

Component Description

Busby

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

Yetull

Surface layer texture: Loamy fine sand

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.6 inches

Rock outcrop

Definition: Exposures of bare bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Chinook and similar soils
- Areas of blowouts

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Cabba Series

Depth class: Shallow
Drainage class: Well drained
Landform: Hills
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 4 to 70 percent

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Typic Ustorthents

Typical Pedon

Cabba silt loam, in an area of Cherry, calcareous-Cambert, calcareous-Cabba silt loams, 4 to 15 percent slopes; in an area of rangeland, 600 feet north and 50 feet east of the southwest corner of sec. 27, T. 15 N., R. 48 E.

A—0 to 4 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—4 to 10 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

C2—10 to 16 inches; light brownish gray (2.5Y 6/2) silt loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Cr1—16 to 24 inches; pale brown (10YR 6/3), semiconsolidated, loamy sedimentary beds that crush to silt loam, brown (10YR 5/3) moist; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots in cracks and along bedding planes; violently effervescent; moderately alkaline; gradual smooth boundary.

Cr2—24 to 60 inches; olive yellow (2.5Y 6/6) and grayish brown (10YR 5/2), semiconsolidated, loamy sedimentary beds that crush to silt loam, light olive brown (2.5Y 5/6) and yellowish brown (2.5Y 5/4) moist; hard, firm, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches or to the paralithic contact, frozen from November through March and dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Clay content: 20 to 35 percent in the control section

Content of rock fragments: 0 to 35 percent in the control section

Depth to Cr horizon: 10 to 20 inches

Note: The soils that have chroma of 1 are lithochromic.

A horizon

Hue: 10YR or 2.5Y

Value: 3 to 6 dry; 3 or 4 moist

Chroma: 1 to 4

Texture: Loam or silt loam

Clay content: 10 to 27 percent

Content of rock fragments: 0 to 60 percent—0 to 40 percent stones, cobbles, or boulders, 0 to 30 percent pebbles or channers

Electrical conductivity: 0 to 4 mmhos/cm

Effervescence: Strong or violent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 9.0

C horizon

Hue: 10YR to 5Y

Value: 5 to 8 dry; 4 to 7 moist

Chroma: 1 to 6

Texture: Loam, silt loam, clay loam, or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles, 0 to 30 percent pebbles or channers

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 2 to 8 mmhos/cm

Effervescence: Slight to violent

Reaction: pH 7.4 to 9.0

19—Cabba-Cambert, calcareous-Rock outcrop complex, 8 to 70 percent slopes

Composition

Cabba and similar soils: 30 percent

Cambert and similar soils: 25 percent

Rock outcrop: 25 percent

Inclusions: 20 percent

Setting

Landform:

- Cabba—Hills
- Cambert—Hills
- Rock outcrop—Hills

Position on landform:

- Cabba—Back slopes and shoulders
- Cambert—Back slopes and foot slopes
- Rock outcrop—Shoulders and summits

Slope:

- Cabba—8 to 70 percent
- Cambert—8 to 25 percent

Component Description

Cabba

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

Cambert

Surface layer texture: Silt loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.6 inches

Rock outcrop

Definition: Exposures of bare bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Blanchard and similar soils
- Cherry and similar soils
- Dast and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Cabbart Series

Depth class: Shallow

Drainage class: Well drained

Landform: Hills

Parent material: Semiconsolidated, loamy sedimentary beds

Slope range: 4 to 70 percent

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents

Typical Pedon

Cabbart silt loam, in an area of Lonna-Cambeth, calcareous-Cabbart silt loams, 4 to 12 percent slopes; in an area of rangeland, 1,200 feet north and 20 feet west of the southeast corner of sec. 34, T. 12 N., R. 54 E.

A—0 to 3 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine and few medium roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Bk—3 to 12 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak very coarse prismatic structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; common very fine pores; many fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Cr1—12 to 16 inches; very pale brown (10YR 7/3), semiconsolidated, loamy sedimentary beds that crush to silty clay loam, light olive brown (2.5Y 5/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; common very fine roots in horizontal cracks; violently effervescent; strongly alkaline; clear smooth boundary.

Cr2—16 to 60 inches; olive yellow (2.5Y 6/6), semiconsolidated, loamy sedimentary beds that crush to silty clay loam, light olive brown (2.5Y 5/4) moist; massive; hard, friable, sticky and slightly plastic; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches or to the paralithic contact, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees

Depth to Cr horizon: 10 to 20 inches

A horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Loam or silt loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 60 percent hard fragments—0 to 20 percent cobbles, 0 to 50 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 9.0

Bk horizon

Hue: 10YR to 5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, clay loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 45 percent—0 to 15 percent hard pebbles, 0 to 45 percent soft pebbles

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 1 to 5

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.4 to 9.0

20—Cabbart-Rock outcrop-Yawdim complex, 15 to 70 percent slopes**Composition**

Cabbart and similar soils: 35 percent

Rock outcrop: 30 percent
 Yawdim and similar soils: 20 percent
 Inclusions: 15 percent

Setting

Landform:

- Cabbart—Hills
- Rock outcrop—Hills
- Yawdim—Hills

Position on landform:

- Cabbart—Back slopes and shoulders
- Rock outcrop—Shoulders and summits
- Yawdim—Back slopes and shoulders

Slope:

- Cabbart—15 to 70 percent
- Yawdim—15 to 70 percent

Component Description

Cabbart

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.0 inches

Rock outcrop

Definition: Exposures of bare bedrock

Yawdim

Surface layer texture: Silty clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Busby and similar soils
- Delpoint and similar soils
- Lonna and similar soils
- Very shallow soils

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Cambert Series

Depth class: Moderately deep

Drainage class: Well drained

Landform: Hills, sedimentary plains

Parent material: Semiconsolidated, loamy sedimentary beds

Slope range: 2 to 25 percent

Taxonomic Class: Fine-silty, mixed, frigid Typic Ustochrepts

Typical Pedon

Cambert silt loam, calcareous, in an area of Cambert, calcareous-Cabba-Cherry, calcareous, complex, 8 to 25 percent slopes; in an area of rangeland, 1,900 feet north and 1,000 feet east of the southwest corner of sec. 5, T. 15 N., R. 47 E.

A—0 to 5 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw—5 to 13 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—13 to 18 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common soft masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—18 to 27 inches; pale yellow (2.5Y 7/4) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and plastic; common very fine roots; many soft masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Cr1—27 to 35 inches; pale yellow (2.5Y 7/4),

semiconsolidated, loamy sedimentary beds that crush to silty clay loam, light olive brown (2.5Y 5/6) moist; hard, friable, sticky and plastic; slightly effervescent; mildly alkaline; clear smooth boundary.

Cr2—35 to 60 inches; light gray (2.5Y 7/2), semiconsolidated, loamy sedimentary beds that crush to silty clay loam, light brownish gray (2.5Y 6/2) moist; hard, friable, sticky and plastic; slightly effervescent; mildly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Control section: 18 to 35 percent clay and less than 15 percent fine sand or coarser

Depth to Cr horizon: 20 to 40 inches

Soil phases: Noncalcareous—0 to 5 percent calcium carbonate; calcareous—5 to 10 percent calcium carbonate

A horizon

Hue: 10YR to 5Y

Value: 4 to 7 dry; 3 to 6 moist

Chroma: 2 or 3

Texture: Loam or silt loam

Clay content: 18 to 25 percent

Effervescence: None to violent; 5 percent or more calcium carbonate equivalent in calcareous phase

Reaction: pH 6.6 to 8.4; pH 7.4 to 8.4 in calcareous phase

Bw horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silt loam, or silty clay loam; mainly very fine sand makes up the sand fraction.

Calcium carbonate equivalent: 5 to 10 percent

Clay content: 18 to 35 percent

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 2 to 6

Texture: Loam, silt loam, or silty clay loam; very fine sand makes up more than half of the sand fraction.

Clay content: 18 to 35 percent

Effervescence: Strong or violent

Sodium adsorption ratio: 0 to 13

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.4 to 9.0

21—Cambert, calcareous-Bigsheep-Golva complex, 8 to 45 percent slopes

Composition

Cambert and similar soils: 30 percent

Bigsheep and similar soils: 25 percent

Golva and similar soils: 20 percent

Inclusions: 25 percent

Setting

Landform:

- Cambert—Hills
- Bigsheep—Hills
- Golva—Sedimentary plains and alluvial fans

Position on landform:

- Cambert—Back slopes
- Bigsheep—Shoulders and summits
- Golva—Foot slopes and toe slopes

Slope:

- Cambert—8 to 25 percent
- Bigsheep—8 to 45 percent
- Golva—8 to 15 percent

Component Description

Cambert

Surface layer texture: Silt loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.6 inches

Bigsheep

Surface layer texture: Very gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.4 inches

Golva

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cabba and similar soils
- Bigsheep and similar soils
- Dast and similar soils
- Lisk and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

22—Cambert, calcareous-Cabba-Cherry, calcareous, complex, 8 to 25 percent slopes**Composition**

Cambert and similar soils: 30 percent
 Cabba and similar soils: 25 percent
 Cherry and similar soils: 25 percent
 Inclusions: 20 percent

Setting*Landform:*

- Cambert—Hills
- Cabba—Hills
- Cherry—Hills

Position on landform:

- Cambert—Back slopes
- Cabba—Shoulders and summits
- Cherry—Foot slopes

Slope:

- Cambert—8 to 25 percent
- Cabba—8 to 25 percent
- Cherry—8 to 15 percent

Component Description**Cambert**

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.0 inches

Cabba

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.8 inches

Cherry

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Bigsheep and similar soils
- Golva and similar soils
- Dast and similar soils
- Areas of rock outcrop
- Deep soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

23—Cambert, calcareous-Cabba-Dast complex, 4 to 15 percent slopes**Composition**

Cambert and similar soils: 30 percent
 Cabba and similar soils: 25 percent
 Dast and similar soils: 25 percent
 Inclusions: 20 percent

Setting*Landform:*

- Cambert—Hills
- Cabba—Hills
- Dast—Hills

Position on landform:

- Cambert—Back slopes
- Cabba—Back slopes and shoulders
- Dast—Shoulders and summits

Slope:

- Cambert—4 to 15 percent
- Cabba—4 to 15 percent
- Dast—4 to 15 percent

Component Description**Cambert***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated, loamy sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 4.3 inches**Cabba***Surface layer texture:* Silt loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated, loamy sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 2.6 inches**Dast***Surface layer texture:* Fine sandy loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated, sandy sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 4.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Blanchard and similar soils
- Golva and similar soils
- Cherry and similar soils
- Lisk and similar soils

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Cambeth Series*Depth class:* Moderately deep*Drainage class:* Well drained*Landform:* Hills, sedimentary plains*Parent material:* Semiconsolidated, loamy sedimentary beds*Slope range:* 0 to 25 percent**Taxonomic Class:** Fine-silty, mixed Borollic Camborthids**Typical Pedon**

Cambeth silt loam, calcareous, in an area of Lonna-Cambeth, calcareous-Cabbart silt loams, 12 to 25 percent slopes; in an area of rangeland, 300 feet west and 2,200 feet south of the northeast corner of sec. 17, T. 13 N., R. 50 E.

A—0 to 3 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; weak medium and fine subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky and slightly plastic; many fine and very fine and few medium roots; slightly effervescent; mildly alkaline; clear wavy boundary.

Bw—3 to 11 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; few very fine pores; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk1—11 to 17 inches; pale yellow (2.5Y 7/4) silt loam, light yellowish brown (2.5Y 6/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine pores; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—17 to 30 inches; pale yellow (2.5Y 7/4) silt loam, light yellowish brown (2.5Y 6/4) moist; massive; slightly sticky and slightly plastic; common very fine roots; few very fine pores; common fine masses of lime; strongly effervescent; strongly alkaline; clear smooth boundary.

Cr—30 to 60 inches; pale yellow (2.5Y 7/4), semiconsolidated, loamy sedimentary beds that crush to silt loam, light yellowish brown (2.5Y 6/4) moist; massive; hard, friable, nonsticky and nonplastic; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Textural control section: 18 to 35 percent clay and less than 15 percent fine sand or coarser

Depth to Bk horizon: 10 to 15 inches

Depth to Cr horizon: 20 to 40 inches

Soil phases: Noncalcareous—0 to 5 percent calcium carbonate equivalent; calcareous—5 to 10 percent calcium carbonate equivalent

A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 or 4 moist

Chroma: 2 to 4

Clay content: 18 to 27 percent

Effervescence: None to violent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Silt loam, silty clay loam, or loam

Clay content: 18 to 35 percent

Effervescence: None to violent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 8.4

Bk1 horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 10 to 20 percent

Effervescence: Strong or violent

Reaction: pH 7.9 to 9.0

Bk2 horizon

Hue: 10YR to 5Y

Value: 6 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 10 to 20 percent

Effervescence: Strong or violent

Reaction: pH 7.9 to 9.0

24—Cambeth, calcareous-Bigsheep, bedrock substratum, complex, 8 to 45 percent slopes

Composition

Cambeth and similar soils: 50 percent

Bigsheep and similar soils: 30 percent

Inclusions: 20 percent

Setting

Landform:

- Cambeth—Hills

- Bigsheep—Hills

Position on landform:

- Cambeth—Back slopes and foot slopes

- Bigsheep—Back slopes and shoulders

Slope:

- Cambeth—8 to 25 percent

- Bigsheep—8 to 45 percent

Component Description

Cambeth

Surface layer texture: Silt loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.8 inches

Bigsheep

Surface layer texture: Very gravelly loam

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Blackhall and similar soils

- Cabbart and similar soils

- Lonna and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

25—Cambeth, calcareous-Cabbart-Kirby complex, 8 to 45 percent slopes

Composition

Cambeth and similar soils: 35 percent
 Cabbart and similar soils: 25 percent
 Kirby and similar soils: 20 percent
 Inclusions: 20 percent

Setting

Landform:

- Cambeth—Hills
- Cabbart—Hills
- Kirby—Hills

Position on landform:

- Cambeth—Back slopes and foot slopes
- Cabbart—Back slopes and shoulders
- Kirby—Shoulders and summits

Slope:

- Cambeth—8 to 25 percent
- Cabbart—8 to 45 percent
- Kirby—8 to 45 percent

Component Description

Cambeth

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

Cabbart

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

Kirby

Surface layer texture: Channery loam
Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained
Dominant parent material: Material weathered from baked sandstone and shale
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Lonna and similar soils
- Yawdim and similar soils
- Areas of rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

26—Cambeth, calcareous-Cabbart-Lonna silt loams, 15 to 35 percent slopes

Composition

Cambeth and similar soils: 30 percent
 Cabbart and similar soils: 25 percent
 Lonna and similar soils: 20 percent
 Inclusions: 25 percent

Setting

Landform:

- Cambeth—Hills
- Cabbart—Hills
- Lonna—Hills

Position on landform:

- Cambeth—Back slopes and foot slopes
- Cabbart—Shoulders and summits
- Lonna—Foot slopes and toe slopes

Slope:

- Cambeth—15 to 25 percent
- Cabbart—15 to 35 percent
- Lonna—15 to 25 percent

Component Description

Cambeth

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

Cabbart

Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

Lonna

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Busby and similar soils
- Yawdim and similar soils
- Deep soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

27—Cambeth, calcareous-Cabbart-Yawdim complex, 4 to 25 percent slopes

Composition

Cambeth and similar soils: 40 percent
 Cabbart and similar soils: 25 percent
 Yawdim and similar soils: 20 percent
 Inclusions: 15 percent

Setting

Landform:

- Cambeth—Hills
- Cabbart—Hills
- Yawdim—Hills

Position on landform:

- Cambeth—Back slopes and foot slopes
- Cabbart—Shoulders and summits
- Yawdim—Shoulders and summits

Slope:

- Cambeth—4 to 15 percent
- Cabbart—4 to 25 percent
- Yawdim—4 to 15 percent

Component Description

Cambeth

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.0 inches

Cabbart

Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.0 inches

Yawdim

Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Abor and similar soils
- Lonna and similar soils
- Areas of rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Cherry Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, hills, stream terraces, alluvial fans, drainageways

Parent material: Alluvium

Slope range: 0 to 15 percent

Taxonomic Class: Fine-silty, mixed, frigid Typic Ustochrepts

Typical Pedon

Cherry silt loam, in an area of Cherry-Cambert silt loams, calcareous, 2 to 8 percent slopes; in an area of rangeland, 1,700 feet east and 2,600 feet north of the southwest corner of sec. 5, T. 16 N., R. 48 E.

A—0 to 5 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to moderate fine and medium granular; soft, very friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw—5 to 12 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine and few fine pores; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—12 to 18 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine pores; violently effervescent; strongly alkaline; gradual smooth boundary.

Bk2—18 to 29 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; common very fine roots and pores; violently effervescent; strongly alkaline; gradual smooth boundary.

C1—29 to 40 inches; light yellowish brown (2.5Y 6/4) silt loam, olive brown (2.5Y 4/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; strongly effervescent; strongly alkaline; gradual smooth boundary.

C2—40 to 60 inches; pale yellow (2.5Y 7/4) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; hard, friable, slightly sticky and plastic; common very fine pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Moisture control section: Between the depths of 4 and 12 inches

Clay content: 18 to 35 percent in the control section

A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 2 or 3

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 10YR to 5Y

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 9.0

Bk horizon

Hue: 10YR to 5Y

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 10 to 15 percent

Reaction: pH 7.9 to 9.0

C horizon

Hue: 10YR to 5Y

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 2 to 4

Texture: Silt loam, silty clay loam, or clay loam

Clay content: 18 to 35 percent

Reaction: pH 7.9 to 9.0

28—Cherry silt loam, calcareous, 0 to 2 percent slopes

Composition

Cherry and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Golva and similar soils
- Cambert and similar soils
- Shambo and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

29—Cherry silt loam, calcareous, 2 to 8 percent slopes

Composition

Cherry and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Golva and similar soils
- Cabba and similar soils
- Cambert and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

30—Cherry-Cambert silt loams, calcareous, 2 to 8 percent slopes

Composition

Cherry and similar soils: 45 percent
Cambert and similar soils: 40 percent
Inclusions: 15 percent

Setting

Landform:

- Cherry—Sedimentary plains
- Cambert—Sedimentary plains

Position on landform:

- Cherry—Toe slopes
- Cambert—Back slopes and foot slopes

Slope:

- Cherry—2 to 8 percent
- Cambert—2 to 8 percent

Component Description**Cherry***Surface layer texture:* Silt loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 10.4 inches**Cambert***Surface layer texture:* Silt loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated, loamy sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Golva and similar soils
- Cabba and similar soils
- Dast and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

31—Cherry, calcareous-Cambert, calcareous-Cabba silt loams, 4 to 15 percent slopes

Composition

Cherry and similar soils: 35 percent

Cambert and similar soils: 30 percent

Cabba and similar soils: 20 percent

Inclusions: 15 percent

Setting*Landform:*

- Cherry—Hills
- Cambert—Hills
- Cabba—Hills

Position on landform:

- Cherry—Toe slopes
- Cambert—Back slopes and foot slopes
- Cabba—Shoulders and summits

Slope:

- Cherry—4 to 15 percent
- Cambert—4 to 15 percent
- Cabba—4 to 15 percent

Component Description**Cherry***Surface layer texture:* Silt loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 10.4 inches**Cambert***Surface layer texture:* Silt loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated, loamy sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.0 inches**Cabba***Surface layer texture:* Silt loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated, loamy sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bigsheep and similar soils
- Golva and similar soils

- Dast and similar soils
- Lisk and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

32—Cherry, calcareous-Lisk-Cabba complex, 8 to 25 percent slopes

Composition

Cherry and similar soils: 45 percent
Lisk and similar soils: 20 percent
Cabba and similar soils: 15 percent
Inclusions: 20 percent

Setting

Landform:

- Cherry—Hills
- Lisk—Hills
- Cabba—Hills

Position on landform:

- Cherry—Toe slopes
- Lisk—Back slopes
- Cabba—Shoulders and summits

Slope:

- Cherry—8 to 15 percent
- Lisk—8 to 25 percent
- Cabba—8 to 25 percent

Component Description

Cherry

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

Lisk

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.8 inches

Cabba

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cambert and similar soils
- Dast and similar soils
- Tally and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

33—Cherry, calcareous-Typic Ustifluents complex, 0 to 8 percent slopes

Composition

Cherry and similar soils: 60 percent

Typic Ustifluents and similar soils: 30 percent

Inclusions: 10 percent

Setting

Landform:

- Cherry—Alluvial fans, stream terraces, and drainageways
- Typic Ustifluents—Flood plains

Slope:

- Cherry—0 to 8 percent
- Typic Ustifluents—0 to 2 percent

Component Description

Cherry

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

Typic Ustifluvents

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Frequent

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cambert and similar soils
- Poorly drained soils
- Soils on steep terrace edges

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Chinook Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans, hills

Parent material: Alluvium or eolian material

Slope range: 2 to 15 percent

Taxonomic Class: Coarse-loamy, mixed Aridic
Haploborolls

Typical Pedon

Chinook fine sandy loam, 2 to 8 percent slopes, in an area of rangeland, 1,400 feet west and 100 feet south of the northeast corner of sec. 2, T. 10 N., R. 52 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and very fine subangular blocky and weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine and few fine roots; mildly alkaline; clear smooth boundary.

Bw1—5 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting

to moderate medium subangular blocky; slightly hard, very friable, nonsticky and slightly plastic; many very fine and few fine roots; common very fine pores; mildly alkaline; clear smooth boundary.

Bw2—9 to 14 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; slightly hard, very friable, nonsticky and slightly plastic; many very fine and few fine roots; common very fine pores; moderately alkaline; clear smooth boundary.

Bk1—14 to 18 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine roots; common very fine pores; violently effervescent; strongly alkaline; gradual smooth boundary.

Bk2—18 to 48 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; massive; hard, friable, nonsticky and slightly plastic; common very fine roots and pores; violently effervescent; strongly alkaline; irregular diffuse boundary.

BC—48 to 60 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, nonsticky and slightly plastic; few very fine roots and pores; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 8 and 24 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to Bk horizon: 10 to 35 inches

A horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 35 percent pebbles

Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Note: More than 50 percent of the sand is fine or coarser.

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

Bk1 horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 or 5 moist
 Chroma: 2 to 4
 Texture: Fine sandy loam or sandy loam
 Note: More than 50 percent of the sand is fine or coarser.
 Clay content: 5 to 18 percent
 Content of rock fragments: 0 to 15 percent pebbles
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.9 to 8.4

Bk2 horizon

Hue: 10YR to 5Y
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 2 to 4
 Texture: Fine sandy loam or sandy loam
 Note: More than 50 percent of the sand is fine or coarser.
 Clay content: 5 to 18 percent
 Content of rock fragments: 0 to 15 percent pebbles
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 8.4

BC horizon

Hue: 10YR to 5Y
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 2 to 4
 Texture: Fine sandy loam, sandy loam, loamy fine sand, or loamy sand
 Clay content: 5 to 15 percent
 Content of rock fragments: 0 to 15 percent pebbles
 Reaction: pH 7.4 to 8.4

34—Chinook fine sandy loam, 2 to 8 percent slopes**Composition**

Chinook and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Busby and similar soils
- Kremlin and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

35—Chinook-Kremlin complex, 2 to 6 percent slopes**Composition**

Chinook and similar soils: 50 percent
 Kremlin and similar soils: 40 percent
 Inclusions: 10 percent

Setting**Landform:**

- Chinook—Sedimentary plains and alluvial fans
- Kremlin—Sedimentary plains and alluvial fans

Position on landform:

- Chinook—Foot slopes
- Kremlin—Toe slopes

Slope:

- Chinook—2 to 6 percent
- Kremlin—2 to 6 percent

Component Description**Chinook**

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.2 inches

Kremlin

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Delpoint and similar soils
- Twilight and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

36—Chinook-Tinsley complex, 4 to 25 percent slopes

Composition

Chinook and similar soils: 55 percent
Tinsley and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform:

- Chinook—Hills
- Tinsley—Relict stream terraces

Position on landform:

- Chinook—Back slopes and foot slopes
- Tinsley—Shoulders and summits

Slope:

- Chinook—4 to 15 percent
- Tinsley—8 to 25 percent

Component Description

Chinook

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches

Tinsley

Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained

Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bigsheep and similar soils
- Parshall and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

37—Chinook-Twilight fine sandy loams, 2 to 8 percent slopes

Composition

Chinook and similar soils: 50 percent
Twilight and similar soils: 40 percent
Inclusions: 10 percent

Setting

Landform:

- Chinook—Sedimentary plains and alluvial fans
- Twilight—Sedimentary plains

Position on landform:

- Chinook—Foot slopes
- Twilight—Back slopes and shoulders

Slope:

- Chinook—2 to 8 percent
- Twilight—2 to 8 percent

Component Description

Chinook

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.2 inches

Twilight

Surface layer texture: Fine sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Bigsheep and similar soils
- Delpoint and similar soils
- Kremlin and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

38—Chinook-Twilight-Blackhall fine sandy loams, 8 to 15 percent slopes**Composition**

Chinook and similar soils: 40 percent

Twilight and similar soils: 25 percent

Blackhall and similar soils: 20 percent

Inclusions: 15 percent

Setting

Landform:

- Chinook—Hills
- Twilight—Hills
- Blackhall—Hills

Position on landform:

- Chinook—Foot slopes
- Twilight—Back slopes
- Blackhall—Shoulders and summits

Slope:

- Chinook—8 to 15 percent
- Twilight—8 to 15 percent

- Blackhall—8 to 15 percent

Component Description**Chinook**

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.8 inches

Twilight

Surface layer texture: Fine sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

Blackhall

Surface layer texture: Fine sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Kremlin and similar soils
- Areas of rock outcrop
- Areas of blowouts

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Creed Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 0 to 15 percent

Taxonomic Class: Fine, montmorillonitic Borollic
Natrargids

Typical Pedon

Creed loam, in an area of Creed-Gerdrum complex, 2 to 8 percent slopes; in an area of rangeland, 2,550 feet north and 2,300 feet west of the southeast corner of sec. 12, T. 11 N., R. 53 E.

A—0 to 5 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; neutral; clear smooth boundary.

Bt—5 to 8 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; very dark grayish brown (2.5Y 3/2) organic stains on vertical faces of peds; moderate coarse prismatic structure parting to strong fine and medium angular blocky; hard, friable, sticky and plastic; common very fine roots; many very fine pores; few thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btn—8 to 18 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure parting to strong coarse angular blocky; very hard, firm, sticky and plastic; common very fine roots; many very fine pores; common thin patchy clay films; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk—18 to 30 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; few very fine roots; common very fine pores; common fine masses of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

Bky—30 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; common fine and medium pores; common masses of lime; common masses and seams of gypsum; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and

12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at 20 inches is 41 degrees or higher

Depth to secondary lime: 10 to 20 inches

Depth to gypsum and other salts: 22 to 30 inches

A horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 8.4

Btn horizon

Hue: 10YR to 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, clay, or silty clay

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 15 percent pebbles

Electrical conductivity: 2 to 4 mmhos/cm; 0 to 2 mmhos/cm in the sandy substratum phase

Sodium adsorption ratio: 8 to 13

Reaction: pH 6.6 to 9.0

Bk horizon

Hue: 10YR to 5Y

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Silty clay loam, clay loam, clay, or silty clay

Content of rock fragments: 0 to 15 percent pebbles

Clay content: 27 to 45 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 20

Content of gypsum: 1 to 2 percent

Reaction: pH 7.9 to 9.0

Bky horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay loam, silty clay loam, clay, or silty clay

Clay content: 27 to 45 percent

Content of rock fragments: 0 to 15 percent pebbles

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 20

Content of gypsum: 1 to 5 percent

Reaction: pH 7.9 to 9.0

39—Creed-Gerdrum complex, 2 to 8 percent slopes

Composition

Creed and similar soils: 65 percent
Gerdrum and similar soils: 25 percent
Inclusions: 10 percent

Setting

Landform:

- Creed—Sedimentary plains and alluvial fans
- Gerdrum—Sedimentary plains and alluvial fans

Position on landform:

- Creed—Microhighs
- Gerdrum—Microlows

Slope:

- Creed—2 to 8 percent
- Gerdrum—2 to 8 percent

Component Description

Creed

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.6 inches

Gerdrum

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Kobar and similar soils
- Pinelli and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Dast Series

Depth class: Moderately deep

Drainage class: Well drained

Landform: Hills

Parent material: Material derived from semiconsolidated, sandy sedimentary beds

Slope range: 4 to 15 percent

Taxonomic Class: Coarse-loamy, mixed, frigid Typic Ustochrepts

Typical Pedon

Dast fine sandy loam, in an area of Blanchard-Dast complex, 4 to 15 percent slopes; in an area of rangeland, 1,100 feet north and 1,400 feet west of the southeast corner of sec. 1, T. 16 N., R. 47 E.

A—0 to 3 inches; pale brown (10YR 6/3) fine sandy loam, olive brown (2.5Y 4/4) moist; weak fine granular structure; loose, nonsticky and nonplastic; many fine and very fine and few medium roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Bw1—3 to 9 inches; pale brown (10YR 6/3) fine sandy loam, olive brown (2.5Y 4/4) moist; weak coarse and very coarse prismatic structure parting to weak fine subangular blocky; soft, very friable, nonsticky and nonplastic; many fine and common very fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bw2—9 to 21 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk—21 to 35 inches; very pale brown (10YR 7/3) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and slightly plastic; few fine and very fine roots; many soft masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—35 to 60 inches; brownish yellow (10YR 6/6), semiconsolidated, sandy sedimentary beds that crush to loamy fine sand, yellowish brown (10YR 5/6) moist; slightly hard, very friable, nonsticky and nonplastic; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 8 and 24 inches

Depth to Bk horizon: 12 to 24 inches

Depth to bedrock: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 to 4

Clay content: 2 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

Bw1 horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam, sandy loam, or loam

Clay content: 2 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

Bw2 horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Fine sandy loam, sandy loam, or loam

Clay content: 2 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Fine sandy loam, sandy loam, or loam

Clay content: 2 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

40—Dast-Lisk fine sandy loams, 4 to 15 percent slopes

Composition

Dast and similar soils: 50 percent

Lisk and similar soils: 35 percent

Inclusions: 15 percent

Setting

Landform:

- Dast—Hills
- Lisk—Hills

Position on landform:

- Dast—Back slopes and foot slopes
- Lisk—Foot slopes and toe slopes

Slope:

- Dast—4 to 15 percent
- Lisk—4 to 15 percent

Component Description

Dast

Surface layer texture: Fine sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.7 inches

Lisk

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Blanchard and similar soils
- Cabba and similar soils
- Cambert and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Degrad Series

Depth class: Very deep

Drainage class: Well drained

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 8 percent

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed Aridic Argiborolls

Typical Pedon

Degradand loam, 0 to 4 percent slopes, in an area of pasture, 200 feet east and 2,400 feet south of the northwest corner of sec. 7, T. 11 N., R. 52 E.

Ap—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine angular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many very fine roots; neutral; abrupt smooth boundary.

Bt1—4 to 12 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine pores; common thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—12 to 18 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and pores; common thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bk—18 to 33 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, slightly sticky and plastic; common very fine roots and pores; many medium soft masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

2C—33 to 60 inches; light brownish gray (2.5Y 6/2) sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; 10 percent pebbles; thin lime coatings on pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in some parts 60 percent or more of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Mollic epipedon thickness: 7 to 16 inches, which includes part of the Bt horizon

Depth to calcic horizon: 10 to 23 inches

Depth to 2C horizon: 20 to 40 inches, commonly 28 to 37 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Fine sandy loam or loam

Clay content: 10 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 20 to 35 percent and 35 to 55 percent sand

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Sandy clay loam, loam, or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles

Electrical conductivity: Less than 4 mmhos/cm

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.4 to 9.0

2C horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sand, coarse sand, fine sand, or loamy sand

Clay content: 0 to 5 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles, 0 to 30 percent pebbles

Calcium carbonate equivalent: 8 to 15 percent

Reaction: pH 7.9 to 8.4

41—Degrand fine sandy loam, 0 to 4 percent slopes

Composition

Degradand and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Stream terraces

Slope: 0 to 4 percent

Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Kremlin and similar soils
- Parshall and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

42—Degrand loam, 0 to 4 percent slopes

Composition

Degrad and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 4 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chinook and similar soils

- Kremlin and similar soils
- Parshall and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Delpoint Series

Depth class: Moderately deep
Drainage class: Well drained
Landform: Hills, sedimentary plains
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 2 to 70 percent

Taxonomic Class: Fine-loamy, mixed Borollic Camborthids

Typical Pedon

Delpoint loam, in an area of Delpoint-Busby-Blackhall complex, 4 to 15 percent slopes; in an area of rangeland, 1,450 feet west and 700 feet north of the southeast corner of sec. 27, T. 10 N., R. 52 E.

A—0 to 3 inches; pale brown (10YR 6/3) loam, dark grayish brown (2.5Y 4/2) moist; weak very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; moderately alkaline; clear smooth boundary.

Bw—3 to 14 inches; yellowish brown (10YR 5/4) loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common very fine pores; very slightly effervescent; mildly alkaline; clear smooth boundary.

Bk—14 to 26 inches; light gray (2.5Y 7/2) loam, light yellowish brown (2.5Y 6/4) moist; weak medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and pores; strongly effervescent; strongly alkaline; gradual smooth boundary.

Cr—26 to 60 inches; light gray (2.5Y 7/2), semiconsolidated, loamy sedimentary beds that crush to loamy fine sand, light brownish gray (2.5Y 6/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Depth to Bk horizon: 10 to 20 inches

Depth to bedrock: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Effervescence: None to strong

Reaction: pH 6.6 to 8.4

Note: When mixed to a depth of 7 inches, the surface layer does not meet the requirements for a mollic epipedon.

Bw horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 0 to 5 percent

Content of rock fragments: 0 to 15 percent pebbles

Effervescence: None to violent

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, sandy loam, clay loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Note: The horizon does not meet the requirements for a calcic horizon because it does not have a calcium carbonate equivalent that is 5 percent or more higher than that of the underlying material or does not have 5 percent or more (by volume) identifiable secondary carbonates.

Effervescence: Strong or violent

Reaction: pH 7.9 to 9.0

43—Delpoint-Busby-Blackhall complex, 4 to 15 percent slopes**Composition**

Delpoint and similar soils: 35 percent

Busby and similar soils: 30 percent

Blackhall and similar soils: 20 percent

Inclusions: 15 percent

Setting**Landform:**

- Delpoint—Hills
- Busby—Hills
- Blackhall—Hills

Position on landform:

- Delpoint—Back slopes
- Busby—Foot slopes
- Blackhall—Shoulders and summits

Slope:

- Delpoint—4 to 15 percent
- Busby—4 to 15 percent
- Blackhall—4 to 15 percent

Component Description**Delpoint**

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.2 inches

Busby

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.2 inches

Blackhall

Surface layer texture: Fine sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Yamac and similar soils
- Yetull and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

44—Delpoint-Cabbart loams, 4 to 15 percent slopes

Composition

Delpoint and similar soils: 60 percent
Cabbart and similar soils: 30 percent
Inclusions: 10 percent

Setting

Landform:

- Delpoint—Hills
- Cabbart—Hills

Position on landform:

- Delpoint—Back slopes and foot slopes
- Cabbart—Back slopes and shoulders

Slope:

- Delpoint—4 to 15 percent
- Cabbart—4 to 15 percent

Component Description

Delpoint

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.7 inches

Cabbart

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil

Properties” section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Busby and similar soils
- Yamac and similar soils
- Areas of rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

45—Delpoint-Cabbart-Yawdim complex, 4 to 25 percent slopes

Composition

Delpoint and similar soils: 45 percent
Cabbart and similar soils: 25 percent
Yawdim and similar soils: 15 percent
Inclusions: 15 percent

Setting

Landform:

- Delpoint—Hills
- Cabbart—Hills
- Yawdim—Hills

Position on landform:

- Delpoint—Back slopes and foot slopes
- Cabbart—Back slopes and shoulders
- Yawdim—Back slopes and shoulders

Slope:

- Delpoint—4 to 25 percent
- Cabbart—4 to 25 percent
- Yawdim—4 to 25 percent

Component Description

Delpoint

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.4 inches

Cabbart

Surface layer texture: Silt loam

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.0 inches

Yawdim

Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Busby and similar soils
- Gerdrum and similar soils
- Kobar and similar soils
- Neldore and similar soils
- Yamac and similar soils
- Areas of rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

46—Delpoint-Cabbart-Yawdim complex, 25 to 70 percent slopes**Composition**

Delpoint and similar soils: 30 percent
 Cabbart and similar soils: 25 percent
 Yawdim and similar soils: 20 percent
 Inclusions: 25 percent

Setting

Landform:

- Delpoint—Hills
- Cabbart—Hills

- Yawdim—Hills
- Position on landform:*
- Delpoint—Back slopes and foot slopes
 - Cabbart—Back slopes and shoulders
 - Yawdim—Back slopes and shoulders
- Slope:*
- Delpoint—25 to 70 percent
 - Cabbart—25 to 70 percent
 - Yawdim—25 to 45 percent

Component Description**Delpoint**

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

Cabbart

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.0 inches

Yawdim

Surface layer texture: Silty clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Areas of rock outcrop
- Abor and similar soils
- Busby and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

47—Delpoint-Yamac-Cabbart loams, 8 to 25 percent slopes

Composition

Delpoint and similar soils: 35 percent
 Yamac and similar soils: 30 percent
 Cabbart and similar soils: 20 percent
 Inclusions: 15 percent

Setting

Landform:

- Delpoint—Hills
- Yamac—Hills
- Cabbart—Hills

Position on landform:

- Delpoint—Back slopes and foot slopes
- Yamac—Toe slopes
- Cabbart—Back slopes and shoulders

Slope:

- Delpoint—8 to 25 percent
- Yamac—8 to 15 percent
- Cabbart—8 to 25 percent

Component Description

Delpoint

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.9 inches

Yamac

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Cabbart

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Busby and similar soils
- Gerdrum and similar soils
- Kobar and similar soils
- Yawdim and similar soils
- Areas of rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Ethridge Series

Depth class: Very deep
Drainage class: Well drained
Landform: Sedimentary plains, alluvial fans
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic Aridic Argiborolls

Typical Pedon

Ethridge silty clay loam, 0 to 2 percent slopes, in an area of rangeland, 500 feet north and 15 feet west of the southeast corner of sec. 4, T. 10 N., R. 52 E.

A—0 to 5 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; strong very fine subangular blocky structure; hard, friable, slightly sticky and plastic; many very fine and fine roots; neutral; clear smooth boundary.

Bt—5 to 14 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure parting to strong medium angular blocky; very hard, friable, sticky and plastic; many very fine and fine roots; common very fine pores; few thin clay films on faces of peds; mildly alkaline; clear wavy boundary.

Bk—14 to 24 inches; brown (10YR 5/3) silty clay loam,

dark grayish brown (2.5Y 4/2) moist; strong medium and coarse prismatic structure; very hard, friable, slightly sticky and plastic; many very fine roots; few very fine pores; few fine masses of lime; slightly effervescent; moderately alkaline; clear smooth boundary.

Bky—24 to 40 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and plastic; common very fine roots; few very fine pores; common fine masses of lime and gypsum; strongly effervescent; moderately alkaline; gradual smooth boundary.

BC—40 to 60 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and plastic; few very fine roots and pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 7 to 14 inches, which may include all or only part of the Bt horizon

Textural control section: 35 to 45 percent clay

Depth to Bk horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.8

Bt horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 moist

Chroma: 2 to 4

Texture: Clay, silty clay, clay loam, or silty clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Clay, silty clay loam, clay loam, or silty clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 9.0

Bky horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Clay loam, silt loam, loam, or silty clay loam; strata of finer or coarser material in some pedons

Clay content: 25 to 40 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity: 2 to 4 mmhos/cm

Calcium carbonate equivalent: 5 to 15 percent

Content of gypsum: 1 to 3 percent

Reaction: pH 7.4 to 9.0

BC horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Clay loam, silt loam, or silty clay loam; strata of finer or coarser material in some pedons

Clay content: 25 to 40 percent

Content of rock fragments: 0 to 5 percent

Electrical conductivity: 2 to 4 mmhos/cm

Content of gypsum: 1 to 3 percent

Reaction: pH 7.4 to 9.0

48—Ethridge silty clay loam, 0 to 2 percent slopes

Composition

Ethridge and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Degrand and similar soils

- Kremlin and similar soils
- Marias and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

49—Ethrige silty clay loam, 2 to 8 percent slopes

Composition

Ethrige and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Creed and similar soils
- Degrand and similar soils
- Kobar and similar soils
- Kremlin and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Evanston Series

Depth class: Very deep
Drainage class: Well drained
Landform: Sedimentary plains, alluvial fans
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine-loamy, mixed Aridic Argiborolls

Typical Pedon

Evanston loam, in an area of Evanston-Delpoint loams, 2 to 8 percent slopes; in an area of rangeland, 50 feet north and 850 feet east of the southwest corner of sec. 24, T. 10 N., R. 54 E.

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; neutral; clear smooth boundary.

A2—4 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and few fine pores; neutral; clear smooth boundary.

Bt—6 to 13 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, friable, sticky and slightly plastic; common very fine and fine roots; common very fine pores; common thin clay films on faces of peds; neutral; clear smooth boundary.

Bk1—13 to 19 inches; pale brown (10YR 6/3) clay loam, grayish brown (10YR 5/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine and few fine roots; common very fine pores; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—19 to 36 inches; light gray (10YR 7/2) clay loam, grayish brown (10YR 5/2) moist; massive; hard, friable, sticky and slightly plastic; common very fine roots and pores; common fine masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.

BC—36 to 60 inches; pale brown (10YR 6/3) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; slightly effervescent; moderately alkaline.

Range in Characteristics

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to Bk horizon: 10 to 20 inches

A horizon

Hue: 2.5Y to 7.5YR

Value: 2 or 3 moist; 3 to 5 dry

Chroma: 2 or 3

Clay content: 20 to 27 percent

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 2.5Y to 7.5YR

Value: 3 to 5 moist; 3 to 6 dry

Chroma: 2 to 4

Texture: Clay loam, silty clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 20 percent

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 2.5Y to 7.5YR

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 3 or 4

Texture: Loam, clay loam, or silty clay loam

Clay content: 0 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

BC horizon

Hue: 2.5Y to 7.5YR

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 2 to 4

Texture: Loam, clay loam, or fine sandy loam

Clay content: 15 to 30 percent

Reaction: pH 7.9 to 9.0

50—Evanston loam, 0 to 2 percent slopes

Composition

Evanston and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as

horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Degrand and similar soils
- Kremlin and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

51—Evanston loam, 2 to 6 percent slopes

Composition

Evanston and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 2 to 6 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Ethridge and similar soils
- Kremlin and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section

- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

52—Evanston-Delpoint loams, 2 to 8 percent slopes

Composition

Evanston and similar soils: 50 percent

Delpoint and similar soils: 35 percent

Inclusions: 15 percent

Setting

Landform:

- Evanston—Sedimentary plains and alluvial fans
- Delpoint—Sedimentary plains

Position on landform:

- Evanston—Foot slopes and toe slopes
- Delpoint—Back slopes and shoulders

Slope:

- Evanston—2 to 8 percent
- Delpoint—2 to 8 percent

Component Description

Evanston

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.2 inches

Delpoint

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Kremlin and similar soils
- Twilight and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Farnuf Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 2 to 6 percent

Taxonomic Class: Fine-loamy, mixed Typic Argiborolls

Typical Pedon

Farnuf loam, 2 to 6 percent slopes, in an area of pasture, 2,300 feet south and 175 feet east of the northwest corner of sec. 30, T. 16 N., R. 49 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; neutral; clear smooth boundary.

Bt—5 to 11 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common very fine and few fine roots; many very fine and few fine pores; common thin clay films on faces of peds; neutral; clear smooth boundary.

Bk1—11 to 19 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate coarse subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine and few fine roots; many very fine and few fine pores; common fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—19 to 40 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and slightly plastic; few very fine roots; many very fine and few fine pores; common medium masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

BC—40 to 60 inches; light brownish gray (10YR 6/2) clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and slightly plastic; few very fine pores; 5 percent pebbles; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches, which includes all or only part of the argillic horizon

Depth to secondary lime horizon: 10 to 25 inches

Ap horizon

Hue: 2.5Y or 10YR

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles and stones, 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.8

Bt horizon

Hue: 2.5Y to 7.5YR

Value: 3 to 6 dry; 2 to 4 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or silty clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.8

Bk horizon

Hue: 2.5Y to 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Fine sandy loam, loam, silt loam, silty clay loam, or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

BC horizon

Hue: 2.5Y to 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Stratified gravelly sandy loam to silty clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 30 percent—0 to 10 percent cobbles, 0 to 20 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Electrical conductivity: 2 to 8 mmhos/cm

Reaction: pH 7.4 to 9.0

53—Farnuf loam, 2 to 6 percent slopes**Composition**

Farnuf and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 2 to 6 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Hedstrom and similar soils
- Subwell and similar soils
- Tally and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Floweree Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 0 to 8 percent

Taxonomic Class: Fine-silty, mixed Aridic Haploborolls

Typical Pedon

Floweree silt loam, 2 to 6 percent slopes, in an area of rangeland, 2,400 feet south and 600 feet east of the northwest corner of sec. 32, T. 10 N., R. 54 E.

A1—0 to 2 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; neutral; clear smooth boundary.

A2—2 to 6 inches; grayish brown (10YR 5/2) silt loam,

very dark grayish brown (10YR 3/2) moist; moderate very coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots and pores; neutral; clear smooth boundary.

Bw—6 to 13 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine pores; mildly alkaline; clear smooth boundary.

Bk1—13 to 16 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine roots and pores; many fine and medium masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—16 to 31 inches; light gray (2.5Y 7/2) silt loam, brown (10YR 5/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; common very fine roots and pores; many fine and common medium masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

BC—31 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 7 to 16 inches

Depth to Bk horizon: 5 to 25 inches

Soil phases: Noncalcareous and calcareous; the calcareous phases have approximately 5 percent calcium carbonate equivalent and an electrical conductivity of less than 4 mmhos/cm.

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Effervescence: None to strong

Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Silt loam or silty clay loam

Effervescence: None to strong

Clay content: 20 to 35 percent

Reaction: pH 7.4 to 8.4

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Bk2 horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.9 to 9.0

BC horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Silt loam, silty clay loam, or loam

Clay content: 20 to 35 percent

Reaction: pH 7.9 to 9.0

54—Floweree silt loam, 0 to 2 percent slopes

Composition

Floweree and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Alluvial fans

Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Kremlin and similar soils
- Lonna and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

55—Floweree silt loam, 2 to 6 percent slopes**Composition**

Floweree and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Alluvial fans
Slope: 2 to 6 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cambeth and similar soils
- Chinook and similar soils
- Kremlin and similar soils
- Lonna and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section

- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

56—Floweree silt loam, calcareous, 0 to 2 percent slopes**Composition**

Floweree and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Kremlin and similar soils
- Lonna and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

57—Floweree silt loam, calcareous, 2 to 8 percent slopes**Composition**

Floweree and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cambeth and similar soils
- Kremlin and similar soils
- Lonna and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

58—Floweree-Cambeth silt loams, 0 to 4 percent slopes

Composition

Floweree and similar soils: 50 percent
 Cambeth and similar soils: 40 percent
 Inclusions: 10 percent

Setting

Landform:

- Floweree—Sedimentary plains and alluvial fans
- Cambeth—Sedimentary plains

Position on landform:

- Floweree—Toe slopes
- Cambeth—Foot slopes

Slope:

- Floweree—0 to 4 percent
- Cambeth—0 to 4 percent

Component Description

Floweree

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.5 inches

Cambeth

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Lonna and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Gerdrum Series

Depth class: Very deep
Drainage class: Well drained
Landform: Sedimentary plains, alluvial fans
Parent material: Alluvium
Slope range: 0 to 15 percent

Taxonomic Class: Fine, montmorillonitic Borollic Natrargids

Typical Pedon

Gerdrum silty clay loam, in an area of Gerdrum-Creed complex, 2 to 8 percent slopes; in an area of rangeland, 425 feet east and 1,600 feet south of the northwest corner of sec. 23, T. 10 N., R. 53 E.

E—0 to 2 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium granular structure;

slightly hard, very friable, slightly sticky and plastic; many very fine and few fine roots; neutral; clear smooth boundary.

Btn—2 to 12 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; common very fine and few fine roots; few fine pores; common thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

Btnk—12 to 17 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots and pores; few thin clay films on faces of peds; common fine masses of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

Bkyz—17 to 27 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, firm, sticky and plastic; few very fine roots; common very fine pores; common medium masses of lime; few fine masses of gypsum and salts; strongly effervescent; strongly alkaline; gradual smooth boundary.

BC—27 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at 20 inches is 41 degrees or higher

Depth to Btnk horizon: 10 to 24 inches; as deep as 40 inches in some pedons

Depth to gypsum: 10 to 28 inches

Soil phases: Nongullied and gullied

E horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Silty clay loam or clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Btn horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay, silty clay, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent pebbles

Hardness: When dry, extremely hard or very hard

Electrical conductivity: 1 to 8 mmhos/cm

Sodium adsorption ratio: 10 to 20

Note: When the sodium adsorption ratio is less than 13, the horizon has more exchangeable magnesium plus sodium than calcium plus exchange acidity at pH 8.2.

Reaction: pH 7.4 to 9.0

Btnk horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Clay, silty clay, or silty clay loam, or clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 0 to 5 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 13 to 20

Reaction: pH 7.4 to 9.0

Bkyz horizon

Hue: 10YR to 5Y

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Textures: Clay loam, sandy clay loam; clay, or silty clay

Clay content: 30 to 50 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Content of gypsum: 1 to 5 percent

Reaction: pH 7.9 to 9.0

BC horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 1 to 4

Note: The soils that have chroma of 1 are lithochromic.

Texture: Clay loam, silty clay loam, clay, or silty clay

Clay content: 30 to 50 percent

Content of rock fragments: 0 to 30 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Content of gypsum: 1 to 5 percent

Reaction: pH 7.9 to 9.0

59—Gerdrum-Creed complex, 0 to 2 percent slopes

Composition

Gerdrum and similar soils: 45 percent

Creed and similar soils: 40 percent

Inclusions: 15 percent

Setting

Landform:

- Gerdrum—Sedimentary plains and alluvial fans
- Creed—Sedimentary plains and alluvial fans

Position on landform:

- Gerdrum—Microlows
- Creed—Microhighs

Slope:

- Gerdrum—0 to 2 percent
- Creed—0 to 2 percent

Component Description

Gerdrum

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.3 inches

Creed

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Kobar and similar soils
- Lonna and similar soils
- Pinelli and similar soils
- Areas of slick spots

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

60—Gerdrum-Creed complex, 2 to 8 percent slopes

Composition

Gerdrum and similar soils: 45 percent

Creed and similar soils: 40 percent

Inclusions: 15 percent

Setting

Landform:

- Gerdrum—Sedimentary plains and alluvial fans
- Creed—Sedimentary plains and alluvial fans

Position on landform:

- Gerdrum—Microlows
- Creed—Microhighs

Slope:

- Gerdrum—2 to 8 percent
- Creed—2 to 8 percent

Component Description

Gerdrum

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.1 inches

Creed

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Kobar and similar soils
- Lonna and similar soils
- Pinelli and similar soils
- Areas of slick spots

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

61—Gerdrum-Creed complex, 4 to 15 percent slopes, gullied**Composition**

Gerdrum and similar soils: 45 percent

Creed and similar soils: 40 percent

Inclusions: 15 percent

Setting

Landform:

- Gerdrum—Sedimentary plains and alluvial fans
- Creed—Sedimentary plains and alluvial fans

Position on landform:

- Gerdrum—Microlows
- Creed—Microhighs

Slope:

- Gerdrum—4 to 15 percent
- Creed—4 to 15 percent

Component Description**Gerdrum**

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.1 inches

Creed

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Kobar and similar soils
- Lonna and similar soils
- Pinelli and similar soils
- Weingart and similar soils
- Areas of slick spots
- Delpoint and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Glendive Series

Depth class: Very deep

Drainage class: Well drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Coarse-loamy, mixed (calcareous), frigid Ustic Torrifluvents

Typical Pedon

Glendive fine sandy loam, 0 to 2 percent slopes, in an area of rangeland, 700 feet north and 800 feet west of the southeast corner of sec. 27, T. 12 N., R. 55 E.

A—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine and few coarse roots; slightly effervescent; mildly alkaline; clear smooth boundary.

C1—6 to 26 inches; pale brown (10YR 6/3) fine sandy loam that has very thin strata of loamy sand, brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine and few coarse roots; slightly effervescent; mildly alkaline; clear smooth boundary.

C2—26 to 60 inches; light brownish gray (2.5Y 6/2) fine sandy loam that has very thin strata of loamy fine sand and silt loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine, very fine, and coarse roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 8 and 24 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

A horizon

Hue: 10YR to 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 2 or 3

Texture: Loam or fine sandy loam

Clay content: 5 to 18 percent

Reaction: pH 6.6 to 8.4

Note: If this horizon has value of 4 or 5 dry, value of 3 moist, and chroma of 2 or 3, it may meet the all of the requirements for a mollic epipedon except thickness.

C horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Stratified silt loam to loamy fine sand

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Effervescence: Slight to violent

Reaction: pH 7.4 to 9.0

62—Glendive fine sandy loam, 0 to 2 percent slopes

Composition

Glendive and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Available water capacity: Mainly 8.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Hanly and similar soils
- Harlem and similar soils
- Havre and similar soils
- Ryell and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

63—Glendive loam, 0 to 2 percent slopes

Composition

Glendive and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Available water capacity: Mainly 7.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Hanly and similar soils
- Harlem and similar soils
- Havre and similar soils

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Golva Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 0 to 15 percent

Taxonomic Class: Fine-silty, mixed Typic Haploborolls

Typical Pedon

Golva silt loam, in an area of Golva-Cambert silt loams, 2 to 8 percent slopes; in an area of rangeland, 50 feet north and 2,200 feet west of the southeast corner of sec. 6, T. 16 N., R. 47 E.

A—0 to 7 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few medium roots; mildly alkaline; clear smooth boundary.

Bw—7 to 14 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and common fine pores; mildly alkaline; clear smooth boundary.

Bk1—14 to 20 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—20 to 32 inches; very pale brown (10YR 7/3) silt loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

BC—32 to 60 inches; pale brown (10YR 6/3) loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly effervescent; strongly alkaline.

Range in Characteristics

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 7 to 16 inches

Clay content: 22 to 35 percent in the control section

Depth to Bk horizon: 11 to 14 inches

A horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist; 4 or 5 dry

Chroma: 2 or 3

Clay content: 18 to 27 percent

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 moist; 5 or 6 dry

Chroma: 2 or 3

Clay content: 18 to 27 percent

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 moist; 6 or 7 dry

Chroma: 3 or 4

Texture: Silt loam, clay loam, silty clay loam, or loam

Clay content: 22 to 35 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

BC horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 moist; 6 or 7 dry

Chroma: 3 or 4

Texture: Silt loam, silty clay loam, or loam

Clay content: 22 to 35 percent

Reaction: pH 7.4 to 8.4

64—Golva silt loam, 0 to 4 percent slopes

Composition

Golva and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 0 to 4 percent

Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cambert and similar soils
- Cherry and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

65—Golva silt loam, 4 to 8 percent slopes

Composition

Golva and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 4 to 8 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cambert and similar soils
- Cherry and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section

- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

66—Golva-Cambert silt loams, 2 to 8 percent slopes

Composition

Golva and similar soils: 45 percent
Cambert and similar soils: 40 percent
Inclusions: 15 percent

Setting

Landform:

- Golva—Sedimentary plains and alluvial fans
- Cambert—Sedimentary plains

Position on landform:

- Golva—Foot slopes and toe slopes
- Cambert—Back slopes and foot slopes

Slope:

- Golva—2 to 8 percent
- Cambert—2 to 8 percent

Component Description

Golva

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.9 inches

Cambert

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cabba and similar soils
- Cherry and similar soils
- Dast and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Hanly Series

Depth class: Very deep

Drainage class: Somewhat excessively drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Sandy, mixed, frigid Ustic
Torrifluvents

Typical Pedon

Hanly loamy fine sand, in an area of Hanly-Glendive complex, 0 to 2 percent slopes; in an area of rangeland, 800 feet south and 1,100 feet west of the northeast corner of sec. 31, T. 10 N., R. 51 E.

A—0 to 8 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; weak medium granular structure parting to single grain; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; neutral; clear wavy boundary.

C1—8 to 27 inches; light gray (10YR 7/2) loamy sand that has few very thin strata of very fine sandy loam, light brownish gray (10YR 6/2) moist; single grain; loose, nonsticky and nonplastic; few fine and very fine roots; slightly effervescent; mildly alkaline; clear wavy boundary.

C2—27 to 60 inches; light brownish gray (10YR 6/2) sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; slightly effervescent; mildly alkaline.

Range in Characteristics

Moisture control section: Between the depths of 12 and 35 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 moist; 5 to 7 dry

Chroma: 2 or 3

Clay content: 5 to 10 percent

Reaction: pH 6.6 to 7.8

C horizon

Hue: 10YR to 5Y

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 2 to 4

Texture: Stratified fine sandy loam to sand

Clay content: 5 to 10 percent

Reaction: pH 6.6 to 8.4

67—Hanly-Glendive complex, 0 to 2 percent slopes

Composition

Hanly and similar soils: 50 percent

Glendive and similar soils: 40 percent

Inclusions: 10 percent

Setting

Landform:

- Hanly—Flood plains
- Glendive—Flood plains

Slope:

- Hanly—0 to 2 percent
- Glendive—0 to 2 percent

Component Description

Hanly

Surface layer texture: Loamy fine sand

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Available water capacity: Mainly 5.7 inches

Glendive

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Available water capacity: Mainly 9.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Havre and similar soils
- Poorly drained soils
- Rivra and similar soils

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Harlem Series

Depth class: Very deep

Drainage class: Well drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Ustic Torrfluvents

Typical Pedon

Harlem silty clay, in an area of Havre-Harlem complex, 0 to 2 percent slopes; in an area of cropland, 2,300 feet south and 1,950 feet east of the northwest corner of sec. 31, T. 13 N., R. 53 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; strong very fine subangular blocky structure; hard, firm, sticky and plastic; common very fine and few fine and coarse roots; common very fine, fine, and medium pores; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—8 to 19 inches; grayish brown (10YR 5/2) silty clay that has very thin strata of loam and silt loam, dark grayish brown (10YR 4/2) moist; weak medium and coarse blocky structure; hard, firm, sticky and plastic; common very fine and few fine and coarse roots; common very fine, fine, and medium pores; slightly effervescent; mildly alkaline; gradual smooth boundary.

C2—19 to 38 inches; grayish brown (10YR 5/2) silty clay that has very thin strata of loam, fine sandy loam, and silt loam, dark grayish brown (10YR 4/2) moist; massive; very hard, firm, sticky and plastic; common very fine and few fine and coarse roots; common very fine and few fine pores; slightly effervescent; mildly alkaline; clear smooth boundary.

C3—38 to 60 inches; grayish brown (10YR 5/2) silty clay that has very thin strata of loam, fine sandy loam, and silt loam, dark grayish brown (10YR 4/2) moist; massive; very hard, firm, sticky and plastic; few very fine roots and pores; slightly effervescent; mildly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Textural control section: 35 to 55 percent clay and less than 15 percent sand coarser than very fine sand

Ap horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 40 to 55 percent

Effervescence: Slight or strong

Reaction: pH 7.4 to 8.4

Other features: Some pedons have a thin, dark surface layer about 4 inches thick that has value of 4 or 5 dry, value of 3 moist, and chroma of 2 or 3.

C1 horizon

Hue: 10YR to 5Y

Value: 4 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay, silty clay, or silty clay loam that has stratified layers of clay, silt loam, silty clay loam, and silty clay

Clay content: 35 to 55 percent

Reaction: pH 7.4 to 8.4

C2 horizon

Hue: 10YR to 5Y

Value: 4 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay, silty clay, or silty clay loam that has stratified layers of clay, silt loam, silty clay loam, and silty clay

Clay content: 35 to 55 percent

Reaction: pH 7.4 to 8.4

C3 horizon

Hue: 10YR to 5Y

Value: 4 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silt loam, loam, clay loam, or fine sandy loam that has stratified layers of silty clay loam, silt loam, and fine sandy loam

Havre Series

Depth class: Very deep

Drainage class: Well drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Fine-loamy, mixed (calcareous), frigid Ustic Torrfluvents

Typical Pedon

Havre loam, 0 to 2 percent slopes, in an area of rangeland, 2,200 feet north and 850 feet west of the southeast corner of sec. 11, T. 13 N., R. 48 E.

A—0 to 10 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and nonplastic; many very fine and common fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

C1—10 to 38 inches; pale brown (10YR 6/3) loam that has thin strata of fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—38 to 60 inches; pale brown (10YR 6/3) loam that has thin strata of fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine and fine roots; common very fine pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam or silty clay loam

Clay content: 10 to 35 percent

Calcium carbonate equivalent: 1 to 5 percent

Effervescence: None to strong

Reaction: pH 7.4 to 8.4

Other features: Some pedons have a thin A horizon that has value of 4 dry and 3 moist and does not meet the requirements for a mollic epipedon after mixing to a depth of 7 inches.

C1 horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam, silt loam, or clay loam that has strata of silt loam, fine sandy loam, silty clay loam, and clay loam

Clay content: 18 to 30 percent

Calcium carbonate equivalent: 1 to 5 percent

Effervescence: Slight or strong

Reaction: pH 7.4 to 8.4

C2 horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam, silt loam, or clay loam that has strata of silt loam, fine sandy loam, silty clay loam, and clay loam

Clay content: 18 to 30 percent

Calcium carbonate equivalent: 1 to 5 percent

Effervescence: Slight or strong

Reaction: pH 7.4 to 8.4

68—Havre loam, 0 to 2 percent slopes

Composition

Havre and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glendive and similar soils
- Harlem and similar soils
- Ryell and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

69—Havre silty clay loam, 0 to 2 percent slopes

Composition

Havre and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Available water capacity: Mainly 9.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glendive and similar soils
- Harlem and similar soils
- Ismay and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

70—Havre-Harlem complex, 0 to 2 percent slopes

Composition

Havre and similar soils: 55 percent
Harlem and similar soils: 35 percent
Inclusions: 10 percent

Setting

Landform:
• Havre—Flood plains
• Harlem—Flood plains

Slope:

- Havre—0 to 2 percent
- Harlem—0 to 2 percent

Component Description

Havre

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Frequent
Available water capacity: Mainly 9.6 inches

Harlem

Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Frequent
Available water capacity: Mainly 9.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glendive and similar soils
- Poorly drained soils
- Ismay and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Hedstrom Series

Depth class: Very deep
Drainage class: Well drained
Landform: Stream terraces, alluvial fans
Parent material: Alluvium
Slope range: 2 to 8 percent

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed Typic Argiborolls

Typical Pedon

Hedstrom loam, 2 to 8 percent slopes, in an area of pasture, 2,350 feet west and 300 feet south of the northeast corner of sec. 6, T. 16 N., R. 50 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine angular blocky structure parting to moderate fine granular; soft, friable, nonsticky and slightly plastic; many very fine roots; neutral; abrupt smooth boundary.

Bt1—7 to 15 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate coarse angular blocky; slightly hard, friable, slightly sticky and plastic; common very fine roots and pores; common thin clay films on faces of peds and in pores; neutral; abrupt smooth boundary.

Bt2—15 to 22 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium coarse prismatic structure; slightly hard, friable, sticky and plastic; common very fine roots; many very fine pores; many thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bk—22 to 31 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; moderate medium angular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; many very fine pores; many medium soft masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

2C—31 to 60 inches; pale brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 5 percent pebbles; thin lime coatings on surface of pebbles; strongly effervescent; mildly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 10 to 16 inches, which includes part of the Bt horizon

Depth to Bk horizon: 15 to 30 inches

Depth to 2C horizon: 20 to 40 inches

A horizon

Value: 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Fine sandy loam or loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Sandy clay loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Sandy clay loam or loam

Clay content: 20 to 30 percent

Content of rock fragments: 0 to 10 percent pebbles

Electrical conductivity: Less than 4 mmhos/cm

Calcium carbonate equivalent: 8 to 15 percent

Reaction: pH 7.9 to 9.0

2C horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sand, fine sand, or loamy fine sand

Clay content: 0 to 5 percent

Content of rock fragments: 0 to 15 percent pebbles

Electrical conductivity: Less than 4 mmhos/cm

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

71—Hedstrom loam, 2 to 8 percent slopes**Composition**

Hedstrom and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Stream terraces

Slope: 2 to 8 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Subwell and similar soils

- Tally and similar soils
- Wabek and similar soils
- Farnuf and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ismay Series

Depth class: Very deep

Drainage class: Moderately well drained

Landform: Flood plains, terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Fine-silty, mixed (calcareous), frigid
Ustic Torrifuvents

Typical Pedon

Ismay silty clay loam, 0 to 2 percent slopes, in an area of rangeland, 900 feet north and 1,700 feet east of the southwest corner of sec. 28, T. 12 N., R. 55 E.

A—0 to 8 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 4/4) moist; moderate fine and medium granular structure; hard, firm, sticky and plastic; common medium and fine and many very fine roots; common very fine pores; strongly effervescent; many fine soft masses of salt; moderately alkaline; clear smooth boundary.

C1—8 to 17 inches; light yellowish brown (2.5Y 6/4) silty clay loam that has very thin strata of fine sandy loam and silt loam, olive brown (2.5Y 4/4) moist; massive; hard, firm, sticky and plastic; common medium and fine and very fine roots; common fine and very fine pores; strongly effervescent; common fine soft masses of salt; moderately alkaline; clear smooth boundary.

C2—17 to 25 inches; light yellowish brown (2.5Y 6/4) silt loam that has very thin strata of fine sandy loam, loam, and silty clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; many very fine and few fine pores; strongly effervescent; common fine soft masses of salt; strongly alkaline; gradual smooth boundary.

C3—25 to 50 inches; light yellowish brown (2.5Y 6/4) loam that has very thin strata of fine sandy loam, silt loam, and clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few medium and common fine and very fine roots; common very fine and few fine pores; strongly effervescent; common fine soft masses and threads of salt; strongly alkaline; gradual smooth boundary.

C4—50 to 60 inches; light yellowish brown (2.5Y 6/4) loam that has very thin strata of fine sandy loam, silt loam, and clay loam, olive brown (2.5Y 4/4) moist; common fine distinct yellowish brown (10YR 5/6) mottles and few fine faint dark grayish brown (10YR 4/2) mottles; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; strongly effervescent; few fine soft masses and threads of salt; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Depth to seasonal high water table: 40 to 60 inches for a short period during May or June

A horizon

Hue: 2.5Y or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Clay content: 27 to 40 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 5 to 20

Reaction: pH 7.4 to 9.0

C1 horizon

Chroma: 2 to 4

Texture: Silty clay loam, loam, clay loam, or silt loam that may have thin strata of fine sandy loam, silty clay loam, loam, clay loam, or silt loam

Clay content: 18 to 35 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 20

Reaction: pH 7.9 to 9.0

C2 horizon

Chroma: 2 to 4

Texture: Silt loam, loam, or silty clay loam that has thin strata of very fine sandy loam, loam, silt loam, clay loam, or silty clay loam

Clay content: 18 to 35 percent

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Reaction: pH 7.9 to 9.0

C3 horizon

Chroma: 2 to 4

Texture: Loam, silt loam, or clay loam that has thin strata of very fine sandy loam, loam, silt loam, or clay loam

Clay content: 18 to 35 percent

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 10 to 35

Reaction: pH 7.9 to 9.0

C4 horizon

Chroma: 2 to 4

Texture: Loam or clay loam that has thin strata of very fine sandy loam, loam, silt loam, clay loam, or silty clay loam

Clay content: 18 to 35 percent

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 5 to 35

Reaction: pH 7.9 to 9.0

72—Ismay silty clay loam, 0 to 2 percent slopes

Composition

Ismay and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Moderately well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Water table: Apparent

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 7.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glendive and similar soils
- Poorly drained, ponded soils
- Havre and similar soils
- Lonna and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Kirby Series

Depth class: Very deep

Drainage class: Excessively drained

Landform: Hills

Parent material: Material weathered from baked sandstone and shale

Slope range: 4 to 70 percent

Taxonomic Class: Loamy-skeletal over fragmental, mixed (calcareous), frigid Ustic Torriorthents

Typical Pedon

Kirby channery loam, in an area of Cambeth, calcareous-Cabbart-Kirby complex, 8 to 45 percent slopes; in an area of rangeland, 2,500 feet east and 900 feet north of the southwest corner of sec. 12, T. 11 N., R. 55 E.

A—0 to 6 inches; reddish brown (5YR 5/3) channery loam, reddish brown (5YR 4/3) moist; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; 33 percent hard-baked shale fragments; mildly alkaline; clear smooth boundary.

Bk—6 to 12 inches; reddish brown (5YR 5/4) extremely channery loam, reddish brown (5YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots between coarse fragments; 65 percent hard-baked shale fragments 1 to 2 inches thick; few thin lime coatings on undersides of coarse fragments; slightly effervescent; moderately alkaline; gradual smooth boundary.

2Ck—12 to 22 inches; light reddish brown (5YR 6/4), hard, fractured, baked shale, yellowish red (5YR 4/6) moist; common very fine roots in cracks; shale fragments 2 to 7 inches in length and 1 to 3 inches thick; common thin lime coatings on the lower surface of coarse fragments; gradual smooth boundary.

2C—22 to 60 inches; light red (2.5YR 6/6), hard, fractured, baked shale, red (2.5YR 4/8) moist; few

very fine roots in cracks; shale fragments 6 to 8 inches in length and 2 to 4 inches thick.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 8 and 24 inches

Textural control section: 8 to 22 percent clay and 40 to 90 percent rock fragments

Note: The rock fragments in Kirby soils are called scorio. They resulted from the baking of shale and sandstone bedrock that was adjacent to burning coal beds.

Depth to fragmental material: 11 to 20 inches

A horizon

Hue: 5YR or 7.5YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 to 6

Clay content: 10 to 22 percent

Content of rock fragments: 15 to 70 percent—0 to 10 percent flagstones and stones, 15 to 70 percent channers

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 5YR or 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 3 to 6

Texture: Loam or sandy loam

Clay content: 8 to 22 percent

Content of rock fragments: 40 to 90 percent—5 to 20 percent flagstones and cobbles, 35 to 70 percent channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

2C horizons

Hue: 2.5YR to 7.5YR

Value: 4 to 7 dry; 4 to 6 moist

Chroma: 3 to 8

Content of rock fragments: 90 to 95 percent flagstones, cobbles, and channers

Kobar Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic Borollic Camborthids

Typical Pedon

Kobar silty clay loam, 2 to 8 percent slopes, in an area

of rangeland, 1,000 feet south and 20 feet east of the northwest corner of sec. 30, T. 11 N., R. 54 E.

A—0 to 3 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine and common fine roots; neutral; clear smooth boundary.

Bw1—3 to 9 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common very fine and fine roots; few very fine pores; mildly alkaline; clear smooth boundary.

Bw2—9 to 16 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, friable, sticky and plastic; common very fine and few fine roots; few very fine pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—16 to 29 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; very hard, friable, sticky and plastic; common very fine roots; few very fine pores; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bky—29 to 35 inches; pale brown (10YR 6/3) silty clay, olive brown (2.5Y 4/4) moist; massive; very hard, friable, sticky and plastic; few very fine roots and pores; common medium masses of lime; few fine masses of gypsum; violently effervescent; moderately alkaline; clear smooth boundary.

BC—35 to 44 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and plastic; few very fine roots and pores; slightly effervescent; moderately alkaline; clear smooth boundary.

C—44 to 60 inches; light brownish gray (10YR 6/2) silty clay loam, brown (10YR 4/3) moist; massive; slightly hard, friable, sticky and plastic; common very fine pores; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Textural control section: 35 to 45 percent clay and less than 15 percent fine sand or coarser

Depth to Bk horizon: 12 to 17 inches

Depth to Bky horizon: 20 to 40 inches

Note: The soils that have chroma of 1 in the B horizon are lithochromic.

A horizon

Hue: 10YR or 2.5Y
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 or 3
 Clay content: 27 to 40 percent
 Content of rock fragments: 0 to 5 percent pebbles
 Electrical conductivity: 0 to 2 mmhos/cm
 Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 10YR to 5Y
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 1 to 4
 Texture: Silty clay loam or silty clay
 Clay content: 35 to 40 percent
 Content of rock fragments: 0 to 5 percent pebbles
 Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR to 5Y
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 1 to 4
 Texture: Silty clay loam, silty clay, or clay
 Clay content: 35 to 45 percent
 Content of rock fragments: 0 to 5 percent pebbles
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 8.4

Bky horizon

Hue: 10YR to 5Y
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 1 to 4
 Texture: Silty clay loam, silty clay, or clay
 Clay content: 35 to 45 percent
 Content of rock fragments: 0 to 5 percent pebbles
 Calcium carbonate equivalent: 5 to 15 percent
 Content of gypsum: 1 to 5 percent
 Reaction: pH 7.9 to 8.4

BC and C horizons

Hue: 10YR to 5Y
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 1 to 4
 Texture: Silty clay loam, silty clay, or clay
 Clay content: 35 to 45 percent
 Content of rock fragments: 0 to 5 percent pebbles
 Reaction: pH 7.9 to 8.4

73—Kobar silty clay loam, 0 to 2 percent slopes

Composition

Kobar and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Gerdrum and similar soils
- Marvan and similar soils
- Vanstel and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

74—Kobar silty clay loam, 2 to 8 percent slopes

Composition

Kobar and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Abor and similar soils
- Gerdrum and similar soils
- Marvan and similar soils
- Vanstel and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

75—Kobar-Gerdrum silty clay loams, 2 to 8 percent slopes

Composition

Kobar and similar soils: 60 percent
Gerdrum and similar soils: 30 percent
Inclusions: 10 percent

Setting

Landform:

- Kobar—Sedimentary plains and alluvial fans
- Gerdrum—Sedimentary plains and alluvial fans

Position on landform:

- Kobar—Foot slopes
- Gerdrum—Toe slopes

Slope:

- Kobar—2 to 8 percent
- Gerdrum—2 to 8 percent

Component Description

Kobar

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

Gerdrum

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Creed and similar soils
- Pinelli and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Kremlin Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans, stream terraces

Parent material: Alluvium

Slope range: 0 to 15 percent

Taxonomic Class: Fine-loamy, mixed Aridic Haploborolls

Typical Pedon

Kremlin loam, 2 to 8 percent slopes, in an area of rangeland, 1,100 feet east and 400 feet south of the northwest corner of sec. 31, T. 11 N., R. 53 E.

A—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; neutral; clear smooth boundary.

Bw—4 to 11 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular

blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; neutral; clear smooth boundary.

- Bk1**—11 to 18 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine pores; many fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.
- Bk2**—18 to 38 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine pores; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.
- BC**—38 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common very fine pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in some parts 60 percent or more of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Mollic epipedon thickness: 7 to 15 inches; includes the Bw1 horizon or only the upper part of the Bw1 horizon in some pedons

Depth to Bk horizon: 10 to 24 inches

A horizon

Hue: 10YR or 2.5Y
Value: 2 or 3 moist
Chroma: 2 or 3
Clay content: 18 to 27 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.1 to 7.8

Bw horizon

Hue: 10YR or 2.5Y
Value: 4 to 6 dry; 3 to 5 moist
Chroma: 2 or 3
Texture: Loam, silt loam, clay loam, or sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 5 percent pebbles
Reaction: pH 6.6 to 7.8

Bk1 horizon

Hue: 10YR or 2.5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 or 3

Texture: Loam, silt loam, clay loam, or sandy clay loam

Clay content: 18 to 30 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Effervescence: Strong or violent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

Bk2 horizon

Hue: 10YR to 5Y
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loam, silt loam, clay loam, or sandy clay loam
Clay content: 18 to 30 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 3 to 12 percent
Effervescence: Strong or violent
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 8.4

BC horizon

Hue: 10YR to 5Y
Value: 6 to 8 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Stratified sandy loam to silt loam
Clay content: 18 to 25 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 3 to 12 percent
Effervescence: Strong or violent
Electrical conductivity: 0 to 4 mmhos/cm
Reaction: pH 7.4 to 8.4

76—Kremlin loam, 0 to 2 percent slopes

Composition

Kremlin and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Degrand and similar soils
- Kobar and similar soils
- Spinekop and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

77—Kremlin loam, 2 to 8 percent slopes

Composition

Kremlin and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Delpoint and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

78—Kremlin-Busby complex, 0 to 2 percent slopes

Composition

Kremlin and similar soils: 50 percent
Busby and similar soils: 40 percent
Inclusions: 10 percent

Setting

Landform:
• Kremlin—Stream terraces
• Busby—Stream terraces
Slope:
• Kremlin—0 to 2 percent
• Busby—0 to 2 percent

Component Description

Kremlin

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.4 inches

Busby

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Kobar and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

79—Kremlin-Tinsley-Degrad complex, 4 to 15 percent slopes

Composition

Kremlin and similar soils: 30 percent
 Tinsley and similar soils: 30 percent
 Degrand and similar soils: 25 percent
 Inclusions: 15 percent

Setting

Landform:

- Kremlin—Stream terraces
- Tinsley—Relict stream terraces
- Degrand—Stream terraces

Position on landform:

- Kremlin—Toe slopes
- Tinsley—Shoulders and summits
- Degrand—Back slopes and foot slopes

Slope:

- Kremlin—4 to 15 percent
- Tinsley—4 to 15 percent
- Degrand—4 to 8 percent

Component Description

Kremlin

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.8 inches

Tinsley

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.4 inches

Degrad

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Lihen and similar soils
- Parshall and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Lihen Series

Depth class: Very deep

Drainage class: Somewhat excessively drained

Landform: Alluvial fans, stream terraces

Parent material: Alluvium or eolian material

Slope range: 4 to 35 percent

Taxonomic Class: Sandy, mixed Entic Haploborolls

Typical Pedon

Lihen loamy sand, in an area of Lihen-Yetull complex, 8 to 35 percent slopes; in an area of rangeland, 2,400 feet north and 1,200 feet west of the southeast corner of sec. 34, T. 11 N., R. 51 E.

A1—0 to 13 inches; brown (10YR 4/3) loamy sand, dark brown (10YR 3/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many fine and common very fine roots; neutral; gradual smooth boundary.

A2—13 to 20 inches; brown (10YR 4/3) loamy sand, dark brown (10YR 3/3) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; 10 percent pebbles; neutral; clear smooth boundary.

C—20 to 60 inches; pale brown (10YR 6/3) sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 12 and 35 inches

Mollic epipedon thickness: 12 to 30 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 5 to 10 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.1 to 8.4

C horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 or 3

Texture: Loamy fine sand, loamy sand, fine sand, or sand

Clay content: 0 to 10 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.4 to 8.4

80—Lihen loamy sand, 4 to 15 percent slopes

Composition

Lihen and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 15 percent

Component Description

Surface layer texture: Loamy sand

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Parshall and similar soils
- Tinsley and similar soils

Management

For general and detailed information about managing

this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

81—Lihen-Parshall-Yetull complex, 4 to 15 percent slopes

Composition

Lihen and similar soils: 40 percent

Parshall and similar soils: 25 percent

Yetull and similar soils: 15 percent

Inclusions: 20 percent

Setting

Landform:

- Lihen—Hills
- Parshall—Hills
- Yetull—Hills

Position on landform:

- Lihen—Back slopes and foot slopes
- Parshall—Toe slopes
- Yetull—Back slopes and shoulders

Slope:

- Lihen—4 to 15 percent
- Parshall—4 to 15 percent
- Yetull—4 to 15 percent

Component Description

Lihen

Surface layer texture: Loamy sand

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

Parshall

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.9 inches

Yetull

Surface layer texture: Gravelly loamy sand

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Tinsley and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

82—Lihen-Tinsley complex, 8 to 35 percent slopes

Composition

Lihen and similar soils: 45 percent

Tinsley and similar soils: 35 percent

Inclusions: 20 percent

Setting

Landform:

- Lihen—Stream terraces
- Tinsley—Stream terraces

Position on landform:

- Lihen—Back slopes and foot slopes
- Tinsley—Shoulders and summits

Slope:

- Lihen—8 to 35 percent
- Tinsley—8 to 35 percent

Component Description

Lihen

Surface layer texture: Loamy sand

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.1 inches

Tinsley

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Degrand and similar soils
- Delpoint and similar soils
- Parshall and similar soils
- Yetull and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

83—Lihen-Yetull complex, 8 to 35 percent slopes

Composition

Lihen and similar soils: 60 percent

Yetull and similar soils: 25 percent

Inclusions: 15 percent

Setting

Landform:

- Lihen—Sedimentary plains and alluvial fans
- Yetull—Sedimentary plains and alluvial fans

Position on landform:

- Lihen—Back slopes and foot slopes
- Yetull—Back slopes and shoulders

Slope:

- Lihen—8 to 35 percent
- Yetull—8 to 35 percent

Component Description

Lihen

Surface layer texture: Loamy sand

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

Yetull

Surface layer texture: Very gravelly loamy sand

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Parshall and similar soils
- Tinsley and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Lisk Series

Depth class: Very deep

Drainage class: Well drained

Landform: Hills

Parent material: Alluvium or eolian material

Slope range: 4 to 25 percent

Taxonomic Class: Coarse-loamy, mixed, frigid Typic Ustochrepts

Typical Pedon

Lisk fine sandy loam, in an area of Dast-Lisk fine sandy loams, 4 to 15 percent slopes; in an area of rangeland, 2,400 feet north and 1,250 feet east of the southwest corner of sec. 1, T. 15 N., R. 47 E.

A—0 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; slightly

effervescent; mildly alkaline; clear smooth boundary.

Bw1—5 to 12 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, olive brown (2.5Y 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bw2—12 to 20 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; moderate coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—20 to 45 inches; pale yellow (2.5Y 7/4) fine sandy loam, light yellowish brown (2.5Y 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; violently effervescent; moderately alkaline; gradual smooth boundary.

2C—45 to 60 inches; pale olive (5Y 6/3) loamy fine sand, olive (5Y 5/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 8 and 24 inches

Textural control section: 5 to 18 percent clay

Depth to Bk horizon: 14 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 5 to 18 percent

Reaction: pH 7.4 to 8.4

Note: If the A1 horizon has mollic colors, it does not meet the thickness requirements for a mollic epipedon when mixed to a depth of 7 inches.

Bw horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Reaction: pH 7.9 to 8.4

Bk horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Calcium carbonate equivalent: 5 to 8 percent
Reaction: pH 7.9 to 8.4

2C horizon

Hue: 10YR to 5Y
Value: 5 to 7 dry; 4 to 6 moist
Chroma: 2 to 4
Texture: Loamy sand or loamy fine sand
Clay content: 0 to 10 percent
Reaction: pH 7.9 to 8.4

Lonna Series

Depth class: Very deep
Drainage class: Well drained
Landform: Sedimentary plains, alluvial fans, hills
Parent material: Alluvium
Slope range: 0 to 25 percent

Taxonomic Class: Fine-silty, mixed Borollic
Camborthids

Typical Pedon

Lonna silt loam, 0 to 2 percent slopes, in an area of rangeland, 1,950 feet east and 450 feet north of the southwest corner of sec. 11, T. 13 N., R. 48 E.

A—0 to 4 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw1—4 to 8 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; soft, very friable, slightly sticky and plastic; many very fine and fine roots; common very fine pores; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw2—8 to 12 inches; light yellowish brown (2.5Y 6/4) silt loam, dark yellowish brown (2.5Y 4/4) moist; moderate medium and coarse subangular blocky structure; soft, very friable, slightly sticky and plastic; common very fine and fine roots; common very fine pores; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—12 to 19 inches; light yellowish brown (2.5Y 6/4) silt loam, yellowish brown (2.5Y 5/4) moist; moderate medium prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine pores; violently effervescent; strongly alkaline; gradual smooth boundary.

Bk2—19 to 30 inches; light yellowish brown (2.5Y 6/4)

silt loam, yellowish brown (2.5Y 5/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine pores; violently effervescent; strongly alkaline; gradual smooth boundary.

BC—30 to 60 inches; light yellowish brown (2.5Y 6/4) silt loam, dark yellowish brown (2.5Y 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots and pores; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Textural control section: 18 to 35 percent clay

Depth to Bk horizon: 10 to 12 inches

Soil phases: Nongullied and gullied

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

Effervescence: Strong or violent

Reaction: pH 7.9 to 9.0

Bk2 horizon

Hue: 10YR or 2.5Y

Value: 5 to 8 dry; 4 to 7 moist

Chroma: 2 to 4

Texture: Silt loam or silty clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 1 to 13
 Effervescence: Strong or violent
 Reaction: pH 7.9 to 9.0

BC horizon

Hue: 10YR or 2.5Y
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 2 to 4
 Texture: Silt loam or silty clay loam
 Clay content: 18 to 35 percent
 Electrical conductivity: 2 to 8 mmhos/cm
 Sodium adsorption ratio: 1 to 13
 Effervescence: Strong or violent
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.9 to 9.0

84—Lonna silt loam, 0 to 2 percent slopes**Composition**

Lonna and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Alona and similar soils
- Floweree and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

85—Lonna silt loam, 2 to 8 percent slopes**Composition**

Lonna and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Cambeth and similar soils
- Floweree and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

86—Lonna silt loam, 2 to 15 percent slopes, gullied**Composition**

Lonna and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Hills
Slope: 2 to 15 percent

Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Cambeth and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

87—Lonna silty clay loam, 0 to 2 percent slopes

Composition

Lonna and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Alona and similar soils

- Kobar and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

88—Lonna silty clay loam, 2 to 8 percent slopes

Composition

Lonna and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cambeth and similar soils
- Kobar and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

89—Lonna-Cambeth, calcareous, silt loams, 2 to 8 percent slopes

Composition

Lonna and similar soils: 50 percent
Cambeth and similar soils: 35 percent
Inclusions: 15 percent

Setting

Landform:

- Lonna—Sedimentary plains and alluvial fans
- Cambeth—Sedimentary plains

Position on landform:

- Lonna—Foot slopes
- Cambeth—Back slopes and shoulders

Slope:

- Lonna—2 to 8 percent
- Cambeth—2 to 8 percent

Component Description

Lonna

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.9 inches

Cambeth

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Floweree and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section

- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

90—Lonna-Cambeth, calcareous-Cabbart silt loams, 4 to 12 percent slopes

Composition

Lonna and similar soils: 40 percent
Cambeth and similar soils: 30 percent
Cabbart and similar soils: 15 percent
Inclusions: 15 percent

Setting

Landform:

- Lonna—Hills
- Cambeth—Hills
- Cabbart—Hills

Position on landform:

- Lonna—Foot slopes
- Cambeth—Back slopes and foot slopes
- Cabbart—Back slopes and shoulders

Slope:

- Lonna—4 to 12 percent
- Cambeth—4 to 12 percent
- Cabbart—4 to 12 percent

Component Description

Lonna

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.8 inches

Cambeth

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

Cabbart

Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None

Available water capacity: Mainly 2.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Busby and similar soils
- Floweree and similar soils
- Yawdim and similar soils
- Areas of rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

91—Lonna-Cambeth, calcareous-Cabbart silt loams, 12 to 25 percent slopes

Composition

Lonna and similar soils: 40 percent
Cambeth and similar soils: 25 percent
Cabbart and similar soils: 20 percent
Inclusions: 15 percent

Setting

Landform:

- Lonna—Hills
- Cambeth—Hills
- Cabbart—Hills

Position on landform:

- Lonna—Foot slopes
- Cambeth—Back slopes
- Cabbart—Back slopes and shoulders

Slope:

- Lonna—12 to 15 percent
- Cambeth—12 to 25 percent
- Cabbart—12 to 25 percent

Component Description

Lonna

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.8 inches

Cambeth

Surface layer texture: Silt loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

Cabbart

Surface layer texture: Silt loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Busby and similar soils
- Floweree and similar soils
- Yawdim and similar soils
- Areas of rock outcrop
- Deep soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Macar Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 2 to 8 percent

Taxonomic Class: Fine-loamy, mixed, frigid Typic Ustochrepts

Typical Pedon

Macar loam, 2 to 8 percent slopes, in an area of rangeland, 2,200 feet east and 40 feet south of the northwest corner of sec. 14, T. 14 N., R. 51 E.

A—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to weak fine and very fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw1—4 to 12 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate fine and medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw2—12 to 19 inches; pale brown (10YR 6/3) loam, light olive brown (2.5Y 5/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—19 to 28 inches; very pale brown (10YR 7/3) loam, light olive brown (2.5Y 5/4) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; few fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

BC—28 to 37 inches; very pale brown (10YR 7/3) silt loam, light yellowish brown (2.5Y 6/4) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; violently effervescent; strongly alkaline; gradual smooth boundary.

C—37 to 60 inches; very pale brown (10YR 7/3) silt loam, light olive brown (2.5Y 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; violently effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Depth to Bk horizon: 11 to 24 inches

A horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles, 0 to 25 percent pebbles

Effervescence: None to slight

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 6.6 to 8.4

Note: The dark A horizon does not meet the requirements for a mollic epipedon after mixing to a depth of 7 inches.

Bw horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 3 to 5 moist

Chroma: 2 to 6

Texture: Loam, clay loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 6

Texture: Clay loam, loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 8 to 15 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.4 to 8.4

BC and C horizons

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 6

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent pebbles

Effervescence: Strong or violent

Calcium carbonate equivalent: 8 to 15 percent

Electrical conductivity: 0 to 2 mmhos/cm

Reaction: pH 7.9 to 8.4

92—Macar loam, 2 to 8 percent slopes

Composition

Macar and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 2 to 8 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabba and similar soils
- Cambert and similar soils
- Dast and similar soils
- Shambo and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Marias Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Clayey alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Fine, montmorillonitic, frigid
Udorthentic Chromusterts

Typical Pedon

Marias silty clay, 0 to 2 percent slopes, in an area of irrigated cropland, 1,500 feet east and 2,100 feet north of the southwest corner of sec. 20, T. 12 N., R. 51 E.

A—0 to 8 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium granular structure; very hard, firm, very sticky and very plastic; common fine and very fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

Bw1—8 to 13 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; strong coarse angular blocky structure; very hard, firm, very sticky and very plastic; common fine and very fine roots; common very fine pores; few or common slickensides; slightly effervescent; moderately alkaline; clear wavy boundary.

Bw2—13 to 26 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; strong medium prismatic structure; very hard, firm, very sticky and very plastic; common fine and very fine roots; common very fine pores; few slickensides; slightly effervescent; moderately alkaline; clear wavy boundary.

Bw3—26 to 34 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; strong coarse angular blocky structure; very hard, firm, very sticky and very plastic; common very fine roots and pores; slightly effervescent; strongly alkaline; clear wavy boundary.

By—34 to 60 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive; very hard, firm, very sticky and very plastic; few very fine pores; common medium masses of gypsum; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Depth to By horizon: 20 to 45 inches

Linear extensibility: 0.06 to 0.10 in the upper 30 inches; cracks 5 mm or more wide that extend to a depth of 50 cm

A horizon

Hue: 10YR to 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 1 to 3

Clay content: 40 to 60 percent

Electrical conductivity: 0 to 4 mmhos/cm

Sodium adsorption ratio: 1 to 4

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Electrical conductivity: 0 to 4 mmhos/cm

Sodium adsorption ratio: 1 to 4

Calcium carbonate equivalent: 1 to 10 percent

Reaction: pH 7.9 to 8.4

By horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 1 to 3

Texture: Clay or silty clay

Clay content: 40 to 60 percent
 Content of gypsum: 1 to 6 percent
 Electrical conductivity: 2 to 8 mmhos/cm
 Sodium adsorption ratio: 4 to 13
 Calcium carbonate equivalent: 5 to 10 percent
 Reaction: pH 7.9 to 9.0

93—Marias silty clay, 0 to 2 percent slopes

Composition

Marias and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Ethridge and similar soils
- Marvan and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Marvan Series

Depth class: Very deep
Drainage class: Well drained
Landform: Sedimentary plains, alluvial fans
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic, frigid
 Udorthentic Chromusterts

Typical Pedon

Marvan silty clay, 0 to 2 percent slopes, in an area of rangeland, 2,550 feet south and 2,450 feet east of the northwest corner of sec. 21, T. 12 N., R. 51 E.

- A—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium granular structure; very hard, firm, sticky and plastic; common very fine and few fine roots; moderately alkaline; clear smooth boundary.
- Bw—3 to 14 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine blocky structure; very hard, very firm, sticky and plastic; common very fine roots and pores; common or many slickensides along cracks; strongly effervescent; strongly alkaline; clear smooth boundary.
- By—14 to 30 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; common very fine roots and pores; few slickensides along cracks; common fine masses and filaments of gypsum; strongly effervescent; strongly alkaline; gradual smooth boundary.
- Byz—30 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; few very fine roots; common very fine pores; common fine masses and filaments of gypsum and other salts; slightly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F
Moisture control section: Between the depths of 4 and 12 inches, dry all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher
Other features: When dry, ¼- to 1-inch cracks extend to a depth of about 20 inches; few or common slickensides in all horizons except the surface layer

A horizon

Hue: 2.5Y or 5Y
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 to 4
 Clay content: 40 to 60 percent
 Electrical conductivity: 0 to 4 mmhos/cm
 Calcium carbonate equivalent: 1 to 5 percent
 Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 2.5Y or 5Y
 Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4
 Texture: Clay or silty clay
 Clay content: 45 to 60 percent
 Electrical conductivity: 2 to 4 mmhos/cm
 Sodium adsorption ratio: 4 to 13
 Calcium carbonate equivalent: 1 to 10 percent
 Reaction: pH 7.9 to 9.0

By horizon

Hue: 2.5Y or 5Y
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 to 4
 Texture: Clay or silty clay
 Clay content: 45 to 60 percent
 Content of gypsum: 1 to 5 percent
 Electrical conductivity: 2 to 4 mmhos/cm
 Calcium carbonate equivalent: 1 to 10 percent
 Reaction: pH 7.9 to 9.0

By horizon

Hue: 2.5Y or 5Y
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 to 4
 Texture: Clay or silty clay
 Clay content: 45 to 60 percent
 Content of gypsum: 1 to 5 percent
 Electrical conductivity: 8 to 16 mmhos/cm
 Sodium adsorption ratio: 13 to 38
 Calcium carbonate equivalent: 5 to 10 percent
 Reaction: pH 7.9 to 9.0

94—Marvan silty clay, 0 to 2 percent slopes**Composition**

Marvan and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within a depth of 30 inches
Sodium affected: Sodic within a depth of 30 inches
Available water capacity: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Kobar and similar soils
- Marias and similar soils
- Vanda and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

95—Marvan silty clay, 2 to 8 percent slopes**Composition**

Marvan and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Silty clay
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Abor and similar soils
- Kobar and similar soils
- Vanda and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section

- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

96—Marvan-Vanda silty clays, 0 to 4 percent slopes

Composition

Marvan and similar soils: 50 percent

Vanda and similar soils: 35 percent

Inclusions: 15 percent

Setting

Landform:

- Marvan—Sedimentary plains and alluvial fans
- Vanda—Sedimentary plains and alluvial fans

Slope:

- Marvan—0 to 4 percent
- Vanda—0 to 4 percent

Component Description

Marvan

Surface layer texture: Silty clay

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.7 inches

Vanda

Surface layer texture: Silty clay

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Gerdrum and similar soils
- Kobar and similar soils
- Marias and similar soils
- Areas of slick spots

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Neldore Series

Depth class: Shallow

Drainage class: Well drained

Landform: Hills

Parent material: Semiconsolidated shale residuum

Slope range: 2 to 50 percent

Taxonomic Class: Clayey, montmorillonitic, nonacid, frigid, shallow Ustic Torriorthents

Typical Pedon

Neldore clay, in an area of Neldore-Rock outcrop-Abor complex, 15 to 50 percent slopes; in an area of rangeland, 1,400 feet south and 1,600 feet east of the northwest corner of sec. 29, T. 11 N., R. 54 E.

A—0 to 3 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; very hard, firm, sticky and very plastic; common very fine and few fine roots; 5 percent soft shale fragments; very slightly effervescent; mildly alkaline; clear smooth boundary.

C1—3 to 11 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (10YR 3/2) moist; weak very coarse subangular blocky structure; very hard, very firm, sticky and very plastic; common very fine roots; many very fine and fine pores; 5 percent soft shale fragments; very slightly effervescent; mildly alkaline; gradual smooth boundary.

C2—11 to 16 inches; grayish brown (2.5Y 5/2) clay, very dark gray (10YR 3/1) moist; massive; very hard, very firm, sticky and very plastic; few very fine roots; common very fine pores; 65 percent soft shale fragments; mildly alkaline; gradual smooth boundary.

Cr—16 to 60 inches; light gray (10YR 7/2), semiconsolidated shale, dark grayish brown (10YR 4/2) moist; neutral.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50

percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Depth to shale: 10 to 20 inches

Note: Dark colors below the A horizon are inherited from the parent material.

A horizon

Hue: 10YR to 5Y

Value: 4 to 6 dry; 3 to 5 moist

Chroma: 1 or 2

Texture: Clay or silty clay

Clay content: 40 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent stones and cobbles, 0 to 5 percent pebbles

Electrical conductivity: Less than 2 mmhos/cm

Reaction: pH 5.6 to 7.8

C1 horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Texture: Clay or silt clay

Clay content: 40 to 60 percent

Content of rock fragments: 5 to 35 percent—5 to 25 percent soft shale fragments, 0 to 10 percent hard shale fragments

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 5.6 to 7.8

C2 horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 1 or 2

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Electrical conductivity: 0 to 4 mmhos/cm

Content of rock fragments: 65 to 90 percent shale fragments—65 to 75 percent soft shale fragments, 0 to 15 percent hard shale fragments

Reaction: pH 5.6 to 7.8

Cr horizon

Note: The shale fragments are extremely hard or very hard when dry and extremely firm or very firm when moist.

Reaction: pH 5.1 to 7.3

97—Neldore-Rock outcrop complex, 4 to 25 percent slopes

Composition

Neldore and similar soils: 60 percent

Rock outcrop: 30 percent

Inclusions: 10 percent

Setting

Landform:

- Neldore—Hills
- Rock outcrop—Hills

Position on landform:

- Neldore—Back slopes and foot slopes
- Rock outcrop—Shoulders and summits

Slope: 4 to 25 percent

Component Description

Neldore

Surface layer texture: Silty clay

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.6 inches

Rock outcrop

Definition: Exposures of bare bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Abor and similar soils
- Marvan and similar soils
- Very shallow soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

98—Neldore-Rock outcrop-Abor complex, 15 to 50 percent slopes

Composition

Neldore and similar soils: 30 percent

Rock outcrop: 30 percent

Abor and similar soils: 20 percent

Inclusions: 20 percent

Setting

Landform:

- Neldore—Hills
- Rock outcrop—Hills
- Abor—Hills

Position on landform:

- Neldore—Back slopes and shoulders
- Rock outcrop—Shoulders and summits
- Abor—Back slopes and foot slopes

Slope:

- Neldore—15 to 50 percent
- Abor—15 to 45 percent

Component Description

Neldore

Surface layer texture: Clay

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.3 inches

Rock outcrop

Definition: Exposures of bare bedrock

Abor

Surface layer texture: Silty clay

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Delpoint and similar soils
- Gerdrum and similar soils
- Twilight and similar soils
- Yamac and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section

- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

99—Neldore-Weingart-Kirby complex, 4 to 25 percent slopes

Composition

Neldore and similar soils: 30 percent

Weingart and similar soils: 25 percent

Kirby and similar soils: 20 percent

Inclusions: 25 percent

Setting

Landform:

- Neldore—Hills
- Weingart—Sedimentary plains
- Kirby—Hills

Position on landform:

- Neldore—Back slopes
- Weingart—Foot slopes
- Kirby—Shoulders and summits

Slope:

- Neldore—4 to 25 percent
- Weingart—4 to 8 percent
- Kirby—4 to 25 percent

Component Description

Neldore

Surface layer texture: Silty clay

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.2 inches

Weingart

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 4.2 inches

Kirby

Surface layer texture: Channery loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Material weathered from baked sandstone and shale

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Cambeth and similar soils
- Gerdrum and similar soils
- Areas of rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Nesda Series

Depth class: Very deep

Drainage class: Well drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Sandy-skeletal, mixed Fluventic Haploborolls

Typical Pedon

Nesda gravelly sandy loam, 0 to 2 percent slopes, in an area of rangeland, 2,400 feet east and 500 feet south of the northwest corner of sec. 32, T. 16 N., R. 50 E.

A1—0 to 6 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine and common fine roots; 20 percent pebbles; mildly alkaline; gradual smooth boundary.

A2—6 to 14 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and fine roots; 20 percent pebbles; slightly effervescent; mildly alkaline; clear smooth boundary.

2C1—14 to 44 inches; light yellowish brown (2.5Y 6/4)

very gravelly sand, olive brown (2.5Y 4/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 60 percent pebbles; slightly effervescent; moderately alkaline; diffuse wavy boundary.

2C2—44 to 60 inches; pale yellow (2.5Y 7/4) very gravelly coarse sand, light olive brown (2.5Y 5/4) moist; single grain; loose, nonsticky and nonplastic; 60 percent pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 12 and 35 inches

Mollic epipedon thickness: 10 to 16 inches

Depth to 2C horizon: 10 to 20 inches

A horizon

Hue: 10YR to 5Y

Value: 3 to 5 dry; 2 or 3 moist

Chroma: 1 to 3

Clay content: 10 to 20 percent

Content of rock fragments: 0 to 65 percent—0 to 15 percent stones and cobbles, 0 to 55 percent pebbles

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 6.6 to 7.8

2C horizon

Hue: 10YR to 5Y

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 1 to 4

Texture: Sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to 15 percent stones and cobbles, 35 to 65 percent pebbles

Calcium carbonate equivalent: 1 to 5 percent

Reaction: pH 7.4 to 8.4

100—Nesda gravelly sandy loam, 0 to 2 percent slopes

Composition

Nesda and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Frequent

Available water capacity: Mainly 3.6 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cherry and similar soils
- Poorly drained, ponded soils
- Subwell and similar soils
- Areas of riverwash

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Parshall Series

Depth class: Very deep

Drainage class: Well drained

Landform: Stream terraces

Parent material: Alluvium or eolian material

Slope range: 2 to 15 percent

Taxonomic Class: Coarse-loamy, mixed Pachic Haploborolls

Typical Pedon

Parshall fine sandy loam, 2 to 6 percent slopes, in an area of rangeland, 650 feet north and 200 feet west of the southeast corner of sec. 17, T. 12 N., R. 53 E.

A—0 to 5 inches; brown (10YR 4/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure parting to weak fine and medium granular; soft, very friable, slightly sticky and nonplastic; many very fine roots and pores; neutral; clear smooth boundary.

Bw1—5 to 10 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots; many very fine pores; mildly alkaline; clear smooth boundary.

Bw2—10 to 15 inches; brown (10YR 5/3) sandy loam,

dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots; many very fine pores; mildly alkaline; clear smooth boundary.

Bw3—15 to 24 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine pores; 10 percent pebbles; mildly alkaline; clear smooth boundary.

C1—24 to 46 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; neutral; gradual smooth boundary.

C2—46 to 60 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; slightly effervescent; moderately alkaline.

Range in Characteristics

Moisture control section: Between the depths of 12 and 24 inches

Mollic epipedon thickness: 16 to 45 inches

A horizon

Value: 2 or 3 moist; 2 to 5 dry

Chroma: 2 or 3

Clay content: 10 to 18 percent

Reaction: pH 6.6 to 7.3

Bw horizon

Hue: 10YR or 2.5Y

Value: 2 to 5 moist; 3 to 6 dry

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 10 to 18 percent

Reaction: pH 6.6 to 7.8

C horizon

Hue: 10YR to 5Y

Value: 3 to 6 moist; 4 to 7 dry

Chroma: 2 to 6

Texture: Loamy sand, loamy fine sand, fine sandy loam, or sandy loam

Clay content: 5 to 18 percent

Reaction: pH 7.4 to 8.4

101—Parshall fine sandy loam, 2 to 6 percent slopes

Composition

Parshall and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Stream terraces

Slope: 2 to 6 percent

Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Chinook and similar soils
- Degrand and similar soils
- Lihen and similar soils
- Tinsley and similar soils
- Yetull and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Peerless Series

Depth class: Very deep

Drainage class: Well drained

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 4 percent

Taxonomic Class: Fine-loamy, mixed Typic Haploborolls

Typical Pedon

Peerless loam, 0 to 4 percent slopes, in an area of rangeland, 50 feet north and 1,400 feet west of the southeast corner of sec. 33, T. 16 N., R. 50 E.

A—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very

fine and few fine roots; 5 percent pebbles; mildly alkaline; clear smooth boundary.

Bw1—5 to 14 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate coarse subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine pores; 5 percent pebbles; mildly alkaline; clear wavy boundary.

Bw2—14 to 20 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate coarse prismatic structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine pores; 5 percent pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk1—20 to 27 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine pores; 10 percent pebbles; common fine soft masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

2Bk2—27 to 37 inches; pale brown (10YR 6/3) very gravelly sandy clay loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky and nonplastic; few very fine roots; 55 percent pebbles; many distinct lime coatings on pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

2BC—37 to 60 inches; light yellowish brown (2.5Y 6/4) very gravelly sandy loam, olive brown (2.5Y 4/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots in the upper part; 55 percent pebbles; common distinct lime coatings on undersides of pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 7 to 16 inches

Depth to calcic horizon: 11 to 24 inches

Textural control section: 18 to 27 percent clay and 15 to 35 percent rock fragments

Depth to 2Bk2 horizon: 22 to 38 inches

A horizon

Value: 4 or 5 dry

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bw1 horizon

Value: 4 or 5 dry
 Chroma: 2 or 3
 Texture: Loam or clay loam
 Clay content: 18 to 30 percent
 Content of rock fragments: 0 to 10 percent pebbles
 Electrical conductivity: Less than 2 mmhos/cm
 Reaction: pH 7.4 to 8.4

Bw2 horizon

Value: 5 or 6 dry; 3 or 4 moist
 Chroma: 2 or 3
 Texture: Loam or clay loam
 Clay content: 18 to 30 percent
 Content of rock fragments: 0 to 15 percent pebbles
 Electrical conductivity: Less than 2 mmhos/cm
 Reaction: pH 7.4 to 8.4

Bk1 horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 2 to 4
 Clay content: 18 to 27 percent
 Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles, 5 to 20 percent pebbles
 Calcium carbonate equivalent: 20 to 35 percent
 Electrical conductivity: Less than 4 mmhos/cm
 Reaction: pH 7.9 to 9.0

2Bk2 horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 2 to 4
 Texture: Loam or sandy clay loam
 Clay content: 18 to 27 percent
 Content of rock fragments: 35 to 60 percent—0 to 5 percent cobbles, 35 to 55 percent pebbles
 Calcium carbonate equivalent: 15 to 20 percent
 Electrical conductivity: Less than 4 mmhos/cm
 Reaction: pH 7.9 to 9.0

2BC horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 2 to 4
 Texture: Loam, sandy loam, or sandy clay loam
 Clay content: 10 to 27 percent
 Content of rock fragments: 35 to 60 percent—0 to 5 percent cobbles, 35 to 55 percent pebbles
 Calcium carbonate equivalent: 8 to 15 percent
 Electrical conductivity: Less than 4 mmhos/cm
 Reaction: pH 7.9 to 9.0

102—Peerless loam, 0 to 4 percent slopes**Composition**

Peerless and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Stream terraces
Slope: 0 to 4 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bigsheep and similar soils
- Shambo and similar soils
- Subwell and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Pinelli Series

Depth class: Very deep
Drainage class: Well drained
Landform: Sedimentary plains, alluvial fans
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic Borollic Haplargids

Typical Pedon

Pinelli loam, 2 to 8 percent slopes, in an area of rangeland, 800 feet south and 2,000 feet west of the northeast corner of sec. 4, T. 11 N., R. 52 E.

A—0 to 7 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure parting to moderate thin and medium platy; slightly hard, very

friable, slightly sticky and slightly plastic; common very fine roots; mildly alkaline; abrupt smooth boundary.

Bt1—7 to 12 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; strong fine and medium prismatic structure; hard, friable, sticky and plastic; common fine and very fine roots; common fine and many very fine pores; common thin clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt2—12 to 18 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; strong medium prismatic structure; very hard, friable, sticky and plastic; common very fine roots and pores; common thin clay films on faces of peds and in pores; slightly effervescent; mildly alkaline; clear smooth boundary.

Bk1—18 to 34 inches; light gray (2.5Y 7/2) silty clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure; hard, friable, sticky and plastic; common very fine roots and pores; few fine masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—34 to 60 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, sticky and plastic; common very fine roots; many fine masses and threads of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Moisture control section: Between the depths of 4 and 12 inches

A horizon

Hue: 5Y to 7.5YR

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 1 to 4

Clay content: 18 to 27 percent

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 5Y to 7.5YR

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 1 to 6

Texture: Clay loam, silty clay loam, silty clay, sandy clay, or clay

Clay content: 35 to 50 percent

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 5Y to 7.5YR

Value: 4 to 6 moist; 6 to 8 dry

Chroma: 1 to 6

Texture: Loam, silty clay loam, or clay loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 4 to 14 percent

Reaction: pH 7.9 to 8.4

103—Pinelli loam, 0 to 2 percent slopes

Composition

Pinelli and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Creed and similar soils
- Gerdrum and similar soils
- Kobar and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

104—Pinelli loam, 2 to 8 percent slopes

Composition

Pinelli and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Alluvial fans

Slope: 2 to 8 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Creed and similar soils
- Gerdrum and similar soils
- Kobar and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

105—Pinelli-Weingart-Gerdrum complex, 0 to 6 percent slopes

Composition

Pinelli and similar soils: 45 percent

Weingart and similar soils: 30 percent

Gerdrum and similar soils: 15 percent

Inclusions: 10 percent

Setting

Landform:

- Pinelli—Sedimentary plains and alluvial fans
- Weingart—Sedimentary plains
- Gerdrum—Sedimentary plains and alluvial fans

Slope:

- Pinelli—0 to 6 percent
- Weingart—0 to 6 percent
- Gerdrum—0 to 6 percent

Component Description

Pinelli

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.1 inches

Weingart

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 4.6 inches

Gerdrum

Surface layer texture: Clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 6.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cambeth and similar soils
- Degrand and similar soils
- Areas of slick spots

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

106—Riverwash

Composition

Riverwash: 85 percent

Inclusions: 15 percent

Component Description

Definition: Areas of unstable sandy, silty, clayey, or gravelly sediments that are frequently flooded, washed, and reworked by water and support little or no vegetation

Flooding: Frequent

Inclusions

- Poorly drained, ponded soils
- Glendive and similar soils
- Hanly and similar soils
- Rivra and similar soils
- Ryell and similar soils

Rivra Series

Depth class: Very deep

Drainage class: Well drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Sandy-skeletal, mixed, frigid Ustic
Torrifluvents

Typical Pedon

Rivra gravelly sandy loam, in an area of Rivra complex, 0 to 2 percent slopes; in an area of rangeland, 2,100 feet west and 500 feet south of the northeast corner of sec. 31, T. 13 N., R. 51 E.

A—0 to 9 inches; brown (10YR 5/3) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; 35 percent pebbles; slightly effervescent; mildly alkaline; clear wavy boundary.

C—9 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine roots in the upper 10 inches and few very fine roots below that depth; 15 percent cobbles, 60 percent pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 12 and 35 inches

Depth to water table: 0 to 4 feet at some time during the period from April through July

A horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 5 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent stones and cobbles, 0 to 25 percent pebbles

Reaction: pH 6.6 to 8.4

C horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sand or loamy coarse sand and strata of sand, loamy coarse sand, and some finer sands

Clay content: 0 to 5 percent

Content of rock fragments: 55 to 80 percent—10 to 20 percent stones and cobbles, 45 to 70 percent pebbles

Reaction: pH 7.4 to 8.4

107—Rivra complex, 0 to 2 percent slopes

Composition

Rivra loam and similar soils: 45 percent

Rivra gravelly sandy loam and similar soils: 35 percent

Inclusions: 20 percent

Setting

Landform:

- Rivra loam—Flood plains
- Rivra gravelly sandy loam—Flood plains

Slope:

- Rivra loam—0 to 2 percent
- Rivra gravelly sandy loam—0 to 2 percent

Component Description

Rivra loam

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Water table: Apparent

Available water capacity: Mainly 2.7 inches

Rivra gravelly sandy loam

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Frequent

Water table: Apparent

Available water capacity: Mainly 2.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Areas of riverwash
- Poorly drained, ponded soils
- Glendive and similar soils
- Hanly and similar soils
- Havre and similar soils
- Ryell and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

108—Rock outcrop

Composition

Rock outcrop: 85 percent
Inclusions: 15 percent

Component Description

Definition: Exposures of bare bedrock

Inclusions

- Cabbart and similar soils
- Neldore and similar soils
- Yawdim and similar soils
- Very shallow soils

109—Rock outcrop-Cabbart-Kirby complex, 25 to 70 percent slopes

Composition

Rock outcrop: 35 percent
Cabbart and similar soils: 30 percent
Kirby and similar soils: 25 percent
Inclusions: 10 percent

Setting

Landform:

- Cabbart—Hills
- Kirby—Hills

Position on landform:

- Cabbart—Back slopes and shoulders
- Kirby—Shoulders and summits

Slope:

- Cabbart—25 to 70 percent
- Kirby—25 to 70 percent

Component Description

Rock outcrop

Definition: Exposures of bare bedrock

Cabbart

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.3 inches

Kirby

Surface layer texture: Very channery loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Material weathered from baked sandstone and shale

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 0.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Delpoint and similar soils
- Yawdim and similar soils
- Very shallow soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Ryell Series

Depth class: Very deep

Drainage class: Well drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), frigid Ustic Torrfluvents

Typical Pedon

Ryell loam, 0 to 2 percent slopes, occasionally flooded, in an area of rangeland, 700 feet north and 1,350 feet east of the southwest corner of sec. 30, T. 13 N., R. 51 E.

A—0 to 9 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many fine and common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—9 to 25 inches; pale brown (10YR 6/3) very fine sandy loam that has thin strata of loam and fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

2C2—25 to 60 inches; light brownish gray (10YR 6/2) extremely gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine roots in the upper 5 inches and few very fine roots below that depth; 5 percent cobbles, 65 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between the depths of 8 and 24 inches

Depth to 2C2 horizon: 18 to 36 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam, very fine sandy loam, or fine sandy loam

Clay content: 10 to 27 percent

Effervescence: None to strong

Reaction: pH 7.4 to 8.4

C1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Very fine sandy loam, loamy very fine sand, or loam that has thin strata of silt loam and fine sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity: 0 to 2 mmhos/cm

Effervescence: Slight or strong

Reaction: pH 7.4 to 8.4

2C2 horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 70 percent—0 to 15 percent cobbles, 35 to 55 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm

Effervescence: Slight or strong

Reaction: pH 7.4 to 8.4

110—Ryell fine sandy loam, 0 to 2 percent slopes, occasionally flooded

Composition

Ryell and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Available water capacity: Mainly 4.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Glendive and similar soils
- Poned soils
- Hanly and similar soils
- Rivra and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

111—Ryell very fine sandy loam, 0 to 2 percent slopes, rarely flooded

Composition

Ryell and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Very fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Available water capacity: Mainly 4.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Rivra and similar soils
- Ponded soils
- Busby and similar soils
- Kremlin and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

112—Ryell loam, 0 to 2 percent slopes, occasionally flooded

Composition

Ryell and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Available water capacity: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Rivra and similar soils
- Poorly drained, ponded soils
- Glendive and similar soils
- Hanly and similar soils
- Harlem and similar soils
- Soils that are salt affected

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Shambo Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 0 to 8 percent

Taxonomic Class: Fine-loamy, mixed Typic Haploborolls

Typical Pedon

Shambo loam, 0 to 4 percent slopes, in an area of cropland, 80 feet north and 2,600 feet east of the southwest corner of sec. 12, T. 15 N., R. 50 E.

Ap—0 to 5 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to strong fine granular; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; few fine and very fine pores; neutral; abrupt smooth boundary.

Bw—5 to 13 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; strong medium

prismatic structure parting to strong medium angular blocky; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and pores; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk1—13 to 23 inches; brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to strong medium and fine angular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine pores; disseminated lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—23 to 30 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium angular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine pores; 5 percent pebbles; lime coatings on the undersides of coarse fragments; violently effervescent; moderately alkaline; clear wavy boundary.

BC—30 to 60 inches; light yellowish brown (2.5Y 6/4) loam, dark yellowish brown (2.5Y 4/4) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; common very fine roots; 5 percent pebbles; violently effervescent; moderately alkaline.

Range in Characteristics

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 7 to 16 inches

A horizon

Value: 3 to 5 dry; 2 or 3 moist
 Chroma: 2 or 3
 Clay content: 18 to 27 percent
 Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR or 2.5Y
 Value: 4 to 6 dry; 3 or 4 moist
 Chroma: 2 to 4
 Texture: Loam, silt loam, or clay loam
 Clay content: 18 to 35 percent
 Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR to 5Y
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 2 to 4
 Texture: Loam, clay loam, silty clay loam, or silt loam
 Clay content: 18 to 30 percent

Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 8.4

BC horizon

Hue: 10YR to 5Y
 Value: 5 to 7 dry; 4 to 6 moist
 Chroma: 2 to 4
 Texture: Loam, clay loam, silty clay loam, or silt loam
 Clay content: 18 to 35 percent
 Reaction: pH 7.4 to 8.4

113—Shambo loam, 4 to 8 percent slopes

Composition

Shambo and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 4 to 8 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Golva and similar soils
- Cherry and similar soils
- Cambert and similar soils
- Peerless and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

114—Shambo loam, 0 to 4 percent slopes**Composition**

Shambo and similar soils: 85 percent
Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 4 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cherry and similar soils
- Macar and similar soils
- Peerless and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Spinekop Series

Depth class: Very deep
Drainage class: Well drained
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 2 percent

Taxonomic Class: Fine-loamy, mixed Borollic Camborthids

Typical Pedon

Spinekop silty clay loam, 0 to 2 percent slopes, in an area of irrigated cropland (fig. 3), 1,200 feet west and

450 feet south of the northeast corner of sec. 34, T. 13 N., R. 52 E.

Ap—0 to 11 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw—11 to 15 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few medium pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—15 to 19 inches; pale brown (10YR 6/2) loam, grayish brown (10YR 5/2) moist; moderate coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine pores; disseminated lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

2BC—19 to 60 inches; pale brown (10YR 6/3) loam that has strata of fine sandy loam, clay loam, and silty clay loam, dark grayish brown (10YR 5/2) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 44 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

Depth to stratified material: 18 to 45 inches

Ap horizon

Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 27 to 40 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 10YR or 2.5Y
Value: 5 or 6 dry; 4 or 5 moist
Chroma: 2 or 3
Clay content: 27 to 35 percent
Electrical conductivity: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 7.8



Figure 3.—Irrigated crops in an area of Spinekop silty clay loam, 0 to 2 percent slopes, are in the foreground. An area of Badland is in the background. If irrigated, the Spinekop soil is suitable for any type of crop rotation adapted to the climate.

Bk horizon

Hue: 10YR or 2.5Y
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 to 4
 Texture: Loam or clay loam
 Calcium carbonate equivalent: 5 to 15 percent
 Clay content: 18 to 35 percent
 Electrical conductivity: 0 to 4 mmhos/cm
 Reaction: pH 7.9 to 8.4

2BC horizon

Hue: 10YR or 2.5Y
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 or 3

Texture: Loam or clay loam that has thin layers of fine sandy loam and clay loam or silty clay loam or both

Clay content: 18 to 30 percent
 Electrical conductivity: 0 to 4 mmhos/cm
 Reaction: pH 7.9 to 8.4

115—Spinekop silty clay loam, 0 to 2 percent slopes

Composition

Spinekop and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Kremlin and similar soils
- Marias and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Subwell Series

Depth class: Very deep

Drainage class: Well drained

Landform: Alluvial fans, stream terraces

Parent material: Alluvium

Slope range: 0 to 8 percent

Taxonomic Class: Loamy-skeletal, mixed Typic Haploborolls

Typical Pedon

Subwell loam, in an area of Subwell-Peerless loams, 0 to 4 percent slopes; in an area of rangeland, 1,300 feet south and 200 feet west of the northeast corner of sec. 9, T. 15 N., R. 48 E.

A—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 10 percent pebbles; mildly alkaline; clear smooth boundary.

Bw1—3 to 8 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; 10 percent pebbles; mildly alkaline; clear smooth boundary.

Bw2—8 to 16 inches; yellowish brown (10YR 5/4) gravelly loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; 20 percent pebbles; mildly alkaline; clear smooth boundary.

2Bk—16 to 28 inches; light gray (2.5Y 7/2) very gravelly sandy loam, light yellowish brown (2.5Y 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; 55 percent pebbles; many prominent lime coatings on surface of pebbles; gradual wavy boundary.

2C—28 to 60 inches; light brownish gray (2.5Y 6/2) very gravelly sandy loam, light yellowish brown (2.5Y 6/4) moist; single grain; loose, nonsticky and nonplastic; 50 percent pebbles; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to 2Bk horizon: 10 to 20 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 7.4 to 7.8

Bw1 horizon

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 20 percent pebbles

Reaction: pH 7.4 to 8.4

Bw2 horizon

Value: 5 or 6 dry; 4 moist

Chroma: 3 or 4

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 20 percent pebbles

Reaction: pH 7.4 to 8.4

2Bk horizon

Hue: 2.5Y or 10YR

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Sandy loam or loam

Clay content: 10 to 27 percent
 Content of rock fragments: 35 to 60 percent—0 to 5 percent cobbles, 35 to 55 percent pebbles
 Electrical conductivity: Less than 4 mmhos/cm
 Calcium carbonate equivalent: 15 to 30 percent
 Reaction: pH 7.9 to 9.0

2C horizon

Hue: 2.5Y or 10YR
 Value: 6 or 7 dry; 4 to 6 moist
 Chroma: 2 to 4
 Texture: Sandy loam, loamy sand, or coarse sandy loam
 Clay content: 5 to 18 percent
 Content of rock fragments: 40 to 60 percent—0 to 5 percent cobbles, 40 to 55 percent pebbles
 Electrical conductivity: Less than 4 mmhos/cm
 Calcium carbonate equivalent: 8 to 15 percent
 Reaction: pH 7.9 to 9.0

116—Subwell-Bigsheep complex, 4 to 15 percent slopes**Composition**

Subwell and similar soils: 50 percent
 Bigsheep and similar soils: 30 percent
 Inclusions: 20 percent

Setting**Landform:**

- Subwell—Alluvial fans
- Bigsheep—Hills

Position on landform:

- Subwell—Foot slopes
- Bigsheep—Back slopes and shoulders

Slope:

- Subwell—4 to 8 percent
- Bigsheep—4 to 15 percent

Component Description**Subwell**

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

Bigsheep

Surface layer texture: Very gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabba and similar soils
- Cambert and similar soils
- Cherry and similar soils
- Peerless and similar soils
- Soils on steep terrace edges

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

117—Subwell-Cambert, calcareous-Bigsheep, bedrock substratum, complex, 2 to 8 percent slopes**Composition**

Subwell and similar soils: 40 percent
 Cambert and similar soils: 25 percent
 Bigsheep and similar soils: 20 percent
 Inclusions: 15 percent

Setting**Landform:**

- Subwell—Alluvial fans
- Cambert—Sedimentary plains
- Bigsheep—Sedimentary plains

Position on landform:

- Subwell—Foot slopes
- Cambert—Back slopes
- Bigsheep—Shoulders and summits

Slope:

- Subwell—2 to 8 percent
- Cambert—2 to 8 percent
- Bigsheep—2 to 8 percent

Component Description**Subwell**

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.1 inches

Cambert

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.9 inches

Bigsheep

Surface layer texture: Very gravelly loam
Depth class: Deep (40 to 60 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cabba and similar soils
- Cherry and similar soils
- Peerless and similar soils
- Bigsheep and similar soils
- Soils that have a gravelly surface layer

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

118—Subwell-Peerless loams, 0 to 4 percent slopes

Composition

Subwell and similar soils: 50 percent
 Peerless and similar soils: 30 percent

Inclusions: 20 percent

Setting

Landform:

- Subwell—Stream terraces
- Peerless—Stream terraces

Slope:

- Subwell—0 to 4 percent
- Peerless—0 to 4 percent

Component Description

Subwell

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.3 inches

Peerless

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Bigsheep and similar soils
- Soils that have a gravelly surface layer
- Cambert and similar soils
- Shambo and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Tally Series

Depth class: Very deep
Drainage class: Well drained

Landform: Sedimentary plains, hills, alluvial fans

Parent material: Alluvium or eolian material

Slope range: 2 to 15 percent

Taxonomic Class: Coarse-loamy, mixed Typic
Haploborolls

Typical Pedon

Tally fine sandy loam, 2 to 8 percent slopes, in an area of rangeland, 200 feet north and 1,100 feet east of the southwest corner of sec. 7, T. 16 N., R. 47 E.

A—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many fine and common very fine roots; mildly alkaline; clear smooth boundary.

Bw1—7 to 15 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; mildly alkaline; gradual smooth boundary.

Bw2—15 to 24 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk—24 to 39 inches; pale brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common soft masses of lime; violently effervescent; moderately alkaline; diffuse smooth boundary.

BC—39 to 60 inches; pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; loose, nonsticky and nonplastic; few very fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 8 and 24 inches

Mollic epipedon thickness: 7 to 16 inches

Depth to Bk horizon: 15 to 35 inches

A horizon

Hue: 2.5Y to 7.5YR

Value: 3 to 5 dry; 2 to 4 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.8

Bw1 horizon

Hue: 7.5YR to 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 8.4

Bw2 horizon

Hue: 7.5YR to 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 2.5Y to 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loamy fine sand, loamy sand, fine sand, fine sandy loam, or sandy loam

Clay content: 5 to 18 percent

Calcium carbonate equivalent: 5 to 15 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

BC horizon

Hue: 2.5Y to 7.5YR

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loamy fine sand, loamy sand, fine sand, fine sandy loam, or sandy loam

Clay content: 5 to 18 percent

Calcium carbonate equivalent: 5 to 15 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

119—Tally fine sandy loam, 2 to 8 percent slopes

Composition

Tally and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 2 to 8 percent

Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cambert and similar soils
- Dast and similar soils
- Shambo and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

120—Tally-Hedstrom fine sandy loams, 2 to 8 percent slopes

Composition

Tally and similar soils: 50 percent
Hedstrom and similar soils: 35 percent
Inclusions: 15 percent

Setting

Landform:

- Tally—Sedimentary plains and alluvial fans
- Hedstrom—Alluvial fans

Position on landform:

- Tally—Back slopes
- Hedstrom—Foot slopes

Slope:

- Tally—2 to 8 percent
- Hedstrom—2 to 8 percent

Component Description

Tally

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.7 inches

Hedstrom

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.1 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Subwell and similar soils
- Wabek and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

121—Tally-Wabek-Hedstrom complex, 4 to 25 percent slopes

Composition

Tally and similar soils: 30 percent
Wabek and similar soils: 30 percent
Hedstrom and similar soils: 25 percent
Inclusions: 15 percent

Setting

Landform:

- Tally—Hills
- Wabek—Relict stream terraces
- Hedstrom—Alluvial fans

Position on landform:

- Tally—Back slopes
- Wabek—Shoulders and summits
- Hedstrom—Toe slopes

Slope:

- Tally—4 to 15 percent
- Wabek—4 to 25 percent
- Hedstrom—4 to 8 percent

Component Description

Tally

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.9 inches

Wabek

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.1 inches

Hedstrom

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Dast and similar soils
- Farnuf and similar soils
- Bigsheep and similar soils
- Subwell and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Tinsley Series

Depth class: Very deep

Drainage class: Excessively drained

Landform: Relict stream terraces

Parent material: Alluvium

Slope range: 4 to 45 percent

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Ustorthents

Typical Pedon

Tinsley very gravelly sandy loam, in an area of Tinsley-Delpoint-Cabbart complex, 8 to 45 percent slopes; in an area of rangeland, 2,000 feet east and 2,500 feet south of the northwest corner of sec. 26, T. 12 N., R. 51 E.

A—0 to 3 inches; brown (10YR 4/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine roots; 10 percent cobbles, 45 percent pebbles; neutral; clear smooth boundary.

C1—3 to 11 inches; brown (10YR 5/3) extremely gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; soft, very friable, nonsticky and nonplastic; many very fine roots; 10 percent cobbles, 55 percent pebbles; neutral; clear smooth boundary.

C2—11 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common very fine roots in the upper 13 inches and few very fine roots below that depth; 10 percent cobbles, 50 percent pebbles; very slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 12 and 35 inches, frozen from November through March

Note: Some pedons have a thin, dark surface layer less than 4 inches thick. These pedons do not meet the requirements for a mollic epipedon when mixed to a depth of 7 inches.

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 4

Clay content: 5 to 15 percent

Content of rock fragments: 15 to 60 percent—0 to 10 percent stones and cobbles, 15 to 50 percent pebbles

Reaction: pH 6.6 to 7.8

C horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—5 to 25 percent stones and cobbles, 30 to 55 percent pebbles

Reaction: pH 6.6 to 8.4

122—Tinsley-Delpoint-Cabbart complex, 8 to 45 percent slopes

Composition

Tinsley and similar soils: 40 percent
 Delpoint and similar soils: 25 percent
 Cabbart and similar soils: 20 percent
 Inclusions: 15 percent

Setting

Landform:

- Tinsley—Hills
- Delpoint—Hills
- Cabbart—Hills

Position on landform:

- Tinsley—Shoulders and summits
- Delpoint—Back slopes
- Cabbart—Back slopes and shoulders

Slope:

- Tinsley—8 to 45 percent
- Delpoint—8 to 45 percent
- Cabbart—8 to 45 percent

Component Description

Tinsley

Surface layer texture: Very gravelly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.1 inches

Delpoint

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

Cabbart

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Abor and similar soils
- Bigsheep and similar soils
- Degrand and similar soils
- Lihen and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Twilight Series

Depth class: Moderately deep

Drainage class: Well drained

Landform: Sedimentary plains, hills

Parent material: Semiconsolidated, sandy sedimentary beds

Slope range: 2 to 25 percent

Taxonomic Class: Coarse-loamy, mixed Borollic Camborthids

Typical Pedon

Twilight fine sandy loam, in an area of Chinook-Twilight-Blackhall fine sandy loams, 8 to 15 percent slopes; in an area of rangeland, 1,900 feet north and 450 feet west of the southeast corner of sec. 6, T. 10 N., R. 55 E.

A—0 to 3 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Bw—3 to 11 inches; grayish brown (10YR 5/2) fine sandy loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; violently effervescent; mildly alkaline; gradual smooth boundary.

Bk—11 to 17 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine

and few fine roots; violently effervescent; many fine soft masses of lime; moderately alkaline; gradual smooth boundary.

BC—17 to 31 inches; light brownish gray (2.5Y 6/2) fine sandy loam, brown (10YR 5/3) moist; massive; loose, nonsticky and nonplastic; common very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—31 to 60 inches; light brownish gray (2.5Y 6/2), semiconsolidated, sandy sedimentary beds that crush to loamy fine sand, brown (10YR 5/3) moist; soft, very friable, nonsticky and nonplastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Moisture control section: Between the depths of 8 and 24 inches

Depth to bedrock: 20 to 40 inches

Depth to Bk horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 moist; 4 or 5 dry

Chroma: 2 or 3

Clay content: 5 to 18 percent

Reaction: pH 6.6 to 7.8

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 moist; 5 or 6 dry

Chroma: 2 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 1 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

BC horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 moist; 5 to 7 dry

Chroma: 1 to 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Reaction: pH 7.4 to 8.4

Typic Ustifluvents

Depth class: Very deep

Drainage class: Well drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Typical Pedon

Typic Ustifluvents in an area of rangeland, 2,400 feet west and 1,200 feet north of the southeast corner of sec. 28, T. 15 N., R. 49 E.

A—0 to 3 inches; pale brown (10YR 6/3) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate medium platy structure; hard, firm, slightly sticky and plastic; many very fine roots; strongly effervescent; abrupt smooth boundary.

C1—3 to 8 inches; pale brown (10YR 6/3) silt loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; many very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C2—8 to 20 inches; pale brown (10YR 6/3) silty clay, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C3—20 to 35 inches; pale brown (10YR 6/3) loam that has thin strata of fine sandy loam, light yellowish brown (2.5Y 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C4—35 to 60 inches; pale brown (10YR 6/3) loam, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Texture of the surface layer: Fine sandy loam to silty clay loam

Texture of the fine-earth fraction of the underlying material: Fine sandy loam to silty clay

Clay content: 15 to 45 percent

Content of rock fragments: 0 to 50 percent

Note: The thickness and sequence of the individual layers are extremely variable.

Ustic Torrifluvents

Depth class: Very deep

Drainage class: Well drained to somewhat excessively drained

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 4 percent

Typical Pedon

Ustic Torrifluvents in an area of rangeland, 1,200 feet

north and 1,400 feet east of the southwest corner of sec. 15, T. 10 N., R. 54 E.

A—0 to 3 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak thin and medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

C1—3 to 19 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—19 to 30 inches; pale brown (10YR 6/3) silty clay that has thin strata of silt loam and clay loam, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; common very fine roots; few very fine pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—30 to 60 inches; pale brown (10YR 6/3) loam that has thin strata of loamy sand, gravelly loamy sand, and silty clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots and pores; strongly effervescent; moderately alkaline.

Range in Characteristics

Texture of the fine-earth fraction of the surface layer and underlying material: Loamy sand to silty clay

Content of rock fragments: 0 to 50 percent in the underlying material

Note: The thickness and sequence of the individual layers are extremely variable.

123—Ustic Torrifluents, 0 to 4 percent slopes, occasionally flooded

Composition

Ustic Torrifluents and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Flood plains

Slope: 0 to 4 percent

Component Description

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as

horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Soils that are salt affected
- Poorly drained, ponded soils
- Soils on steep terrace edges

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Ustic Torriorthents

Depth class: Very deep and moderately deep

Drainage class: Well drained

Landform: Hills

Parent material: Semiconsolidated, loamy sedimentary beds

Slope range: 2 to 35 percent

Typical Pedon

Ustic Torriorthents in an area of rangeland, 700 feet north and 1,500 feet west of the southeast corner of sec. 18, T. 14 N., R. 45 E.

A—0 to 4 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—4 to 9 inches; light olive brown (2.5Y 5/4) silt loam, olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—9 to 21 inches; pale yellow (2.5Y 7/4) silt loam, light yellowish brown (2.5Y 6/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; violently effervescent; strongly alkaline; clear wavy boundary.

C3—21 to 60 inches; light yellowish brown (2.5Y 6/4) silt loam that has very thin strata of very fine sandy loam and silty clay loam, olive brown (2.5Y 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil phases: Nonsaline and saline

Depth to semiconsolidated, loamy sedimentary beds:

Highly variable from a depth of 20 to more than 60 inches

Texture: Very fine sandy loam, loam, or silt loam; ranges to silty clay loam throughout the profile

Electrical conductivity: 2 to 8 mmhos/cm throughout

Saline phase

Electrical conductivity: 8 to 30 mmhos/cm

Sodium adsorption ratio: 15 to 30 throughout

Reaction: Strongly alkaline or very strongly alkaline in the underlying material

Ustic Torriorthents, Shallow

Depth class: Shallow

Drainage class: Well drained

Landform: Hills

Parent material: Semiconsolidated sedimentary beds

Slope range: 2 to 25 percent

Typical Pedon

Ustic Torriorthents, shallow, in an area of rangeland, 1,500 feet south and 200 feet west of the northeast corner of sec. 9, T. 11 N., R. 49 E.

A—0 to 5 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong fine granular structure; hard, firm, sticky and plastic; few very fine roots; mildly alkaline; clear smooth boundary.

C1—5 to 15 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; slightly effervescent; strongly alkaline; gradual smooth boundary.

C2—15 to 60 inches; light gray (10YR 7/2), semiconsolidated sedimentary beds that crush to loam, grayish brown (10YR 5/2) moist; soft, very friable, slightly sticky and slightly plastic; slightly effervescent; moderately alkaline.

Range in Characteristics

Depth to calcareous, semiconsolidated sedimentary beds: 10 to 20 inches

Underlying material

Texture: Very fine sandy loam, loam, silt loam, or silty clay loam

Clay content: 18 to 40 percent

Electrical conductivity: 4 to 8 mmhos/cm

Reaction: pH 7.9 to 9.0

124—Ustic Torriorthents, shallow-Borollic Natrargids complex, 2 to 25 percent slopes, gullied**Composition**

Ustic Torriorthents and similar soils: 45 percent

Borollic Natrargids and similar soils: 35 percent

Inclusions: 20 percent

Setting

Landform:

• Ustic Torriorthents—Hills

• Borollic Natrargids—Sedimentary plains and alluvial fans

Position on landform:

• Ustic Torriorthents—Back slopes and shoulders

• Borollic Natrargids—Foot slopes and toe slopes

Slope:

• Ustic Torriorthents—2 to 25 percent

• Borollic Natrargids—2 to 8 percent

Component Description**Ustic Torriorthents**

Dominant parent material: Semiconsolidated sedimentary beds

Flooding: None

Borollic Natrargids

Dominant parent material: Semiconsolidated sedimentary beds

Native plant cover type: Rangeland

Flooding: None

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Neldore and similar soils
- Gerdrum and similar soils
- Cabbart and similar soils
- Kobar and similar soils
- Areas of slick spots

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

125—Ustic Torriorthents, saline-Rock outcrop complex, 8 to 35 percent slopes

Composition

Ustic Torriorthents and similar soils: 70 percent
 Rock outcrop: 20 percent
 Inclusions: 10 percent

Setting

Landform:

- Ustic Torriorthents—Hills
- Rock outcrop—Hills

Position on landform:

- Ustic Torriorthents—Back slopes
- Rock outcrop—Shoulders and summits

Slope: 8 to 35 percent

Component Description

Ustic Torriorthents

Dominant parent material: Semiconsolidated sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Rock outcrop

Definition: Exposures of bare bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Very shallow soils
- Cabbart and similar soils
- Ismay and similar soils
- Glendive and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

126—Ustic Torriorthents-Ustic Torrfluents-Rock outcrop complex, 0 to 35 percent slopes

Composition

Ustic Torriorthents and similar soils: 40 percent

Ustic Torrfluents and similar soils: 35 percent
 Rock outcrop: 15 percent
 Inclusions: 10 percent

Setting

Landform:

- Ustic Torriorthents—Hills
- Ustic Torrfluents—Flood plains
- Rock outcrop—Hills

Position on landform:

- Ustic Torriorthents—Back slopes and shoulders
- Rock outcrop—Shoulders and summits

Slope:

- Ustic Torriorthents—2 to 35 percent
- Ustic Torrfluents—0 to 4 percent

Component Description

Ustic Torriorthents

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Flooding: None

Ustic Torrfluents

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Frequent

Rock outcrop

Definition: Exposures of bare bedrock

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Poorly drained, ponded soils
- Cambeth and similar soils
- Lonna and similar soils
- Soils that are salt affected

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Vanda Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 0 to 4 percent

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents

Typical Pedon

Vanda silty clay, in an area of Marvan-Vanda silty clays, 0 to 4 percent slopes; in an area of rangeland, 100 feet north and 2,100 feet east of the southwest corner of sec. 15, T. 12 N., R. 51 E.

A—0 to 5 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; weak fine granular structure; ½-inch vesicular crust; very hard, firm, very sticky and very plastic; common very fine roots; slightly effervescent; very strongly alkaline; clear smooth boundary.

C—5 to 16 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; very hard, firm, very sticky and very plastic; common very fine roots; few very fine pores; slightly effervescent; very strongly alkaline; clear smooth boundary.

Cy—16 to 28 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; very hard, firm, very sticky and very plastic; common very fine roots in the upper 4 inches and few very fine roots below that depth; few very fine pores; few fine masses of gypsum; slightly effervescent; very strongly alkaline; clear smooth boundary.

C'—28 to 60 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 5/2) moist; massive; very hard, firm, very sticky and very plastic; few very fine roots and pores; slightly effervescent; very strongly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days when the soil temperature at a depth of 20 inches is 41 degrees or higher

A horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 1 to 3

Clay content: 40 to 60 percent

Hardness: Very hard or extremely hard; massive crusts

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 20 to 30

Reaction: pH 7.9 to 9.6

C horizons

Hue: 5Y to 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay, silty clay, or silty clay loam

Clay content: 35 to 60 percent

Hardness: Very hard or extremely hard

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Reaction: pH 7.9 to 9.6

Vanstel Series

Depth class: Very deep

Drainage class: Well drained

Landform: Sedimentary plains, alluvial fans

Parent material: Alluvium

Slope range: 0 to 8 percent

Taxonomic Class: Fine-silty, mixed Borollic Haplargids

Typical Pedon

Vanstel silt loam, 0 to 2 percent slopes, in an area of rangeland, 2,500 feet south and 1,400 feet west of the northeast corner of sec. 1, T. 12 N., R. 51 E.

A—0 to 4 inches; brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine and few medium roots; mildly alkaline; clear smooth boundary.

Bt—4 to 13 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, very friable, slightly sticky and plastic; many very fine and common fine roots; common very fine pores; few thin clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Btk—13 to 21 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure; hard, friable, slightly sticky and plastic; common very fine and few fine roots; common very fine pores; few thin clay films on faces of peds; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk1—21 to 35 inches; pale brown (10YR 6/3) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky and plastic; common very fine roots and pores; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—35 to 60 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very

fine roots; many very fine pores; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches

Textural control section: Above a depth of 40 inches, 25 to 35 percent clay and less than 15 percent sand coarser than very fine sand

Depth to Bk horizon: 10 to 18 inches

A horizon

Value: 5 or 6 dry

Chroma: 2 or 3

Clay content: 14 to 25 percent

Reaction: pH 6.6 to 7.8

Bt horizon

Value: 5 or 6 dry

Chroma: 2 to 4

Texture: Loam, clay loam, or silty clay loam

Clay content: 25 to 35 percent

Reaction: pH 7.4 to 7.8

Btk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam, silt loam, clay loam, or silty clay loam

Clay content: 18 to 30 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.9 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, silt loam, clay loam, or silty clay loam

Clay content: 18 to 30 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.9 to 8.4

127—Vanstel silt loam, 0 to 2 percent slopes

Composition

Vanstel and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Gerdrum and similar soils
- Lonna and similar soils
- Pinelli and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

128—Vanstel silt loam, 2 to 8 percent slopes

Composition

Vanstel and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans

Slope: 2 to 8 percent

Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Cambeth and similar soils
- Kobar and similar soils
- Lonna and similar soils
- Pinelli and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Wabek Series

Depth class: Very deep

Drainage class: Excessively drained

Landform: Relict stream terraces

Parent material: Alluvium

Slope range: 4 to 45 percent

Taxonomic Class: Sandy-skeletal, mixed Entic Haploborolls

Typical Pedon

Wabek gravelly sandy loam, 4 to 45 percent slopes, in an area of rangeland, 1,600 feet north and 400 feet west of the southeast corner of sec. 30, T. 15 N., R. 48 E.

A—0 to 4 inches; dark brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky and weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine and very fine roots; few medium and coarse roots; 25 percent pebbles; neutral; clear smooth boundary.

2C—4 to 11 inches; dark brown (10YR 4/3) very gravelly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; many fine and very fine roots; few medium and coarse roots; 55 percent pebbles; mildly alkaline; clear smooth boundary.

2Ck—11 to 60 inches; light brownish gray (10YR 6/2) very gravelly loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few fine, very fine, and medium roots; 55 percent pebbles; many distinct lime coatings on the lower surface of coarse fragments; strongly effervescent; mildly alkaline.

Range in Characteristics

Moisture control section: Between the depths of 12 and 35 inches

Mollic epipedon thickness: 7 to 14 inches

A horizon

Value: 2 or 3 moist; 3 to 5 dry

Chroma: 2 or 3

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 45 percent pebbles

Reaction: pH 6.6 to 7.8

2C horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 moist; 4 or 5 dry

Chroma: 3 or 4

Texture: Sand or loamy sand

Clay content: 2 to 10 percent

Content of rock fragments: 35 to 60 percent pebbles

Reaction: pH 7.4 to 8.4

2Ck horizon

Hue: 10YR or 2.5Y

Value: 3 to 6 moist; 4 to 7 dry

Chroma: 2 to 4

Texture: Sand or loamy sand

Clay content: 0 to 3 percent

Calcium carbonate equivalent: 5 to 10 percent

Content of rock fragments: 35 to 60 percent pebbles

Reaction: pH 7.4 to 9.0

129—Wabek gravelly sandy loam, 4 to 45 percent slopes**Composition**

Wabek and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Relict stream terraces

Slope: 4 to 45 percent

Component Description

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabba and similar soils
- Subwell and similar soils
- Tally and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

130—Wabek-Cambert, calcareous, complex, 8 to 45 percent slopes

Composition

Wabek and similar soils: 50 percent
Cambert and similar soils: 25 percent
Inclusions: 25 percent

Setting

Landform:

- Wabek—Relict stream terraces
- Cambert—Hills

Position on landform:

- Wabek—Shoulders and summits
- Cambert—Back slopes and shoulders

Slope:

- Wabek—8 to 45 percent
- Cambert—15 to 25 percent

Component Description

Wabek

Surface layer texture: Very gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

Cambert

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabba and similar soils
- Dast and similar soils
- Subwell and similar soils
- Areas of rock outcrop
- Soils that have a gravelly surface layer

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

W—Water

Description

Open areas of fresh water

Weingart Series

Depth class: Moderately deep

Drainage class: Well drained

Landform: Sedimentary plains

Parent material: Semiconsolidated shale residuum

Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic Borollic Natrargids

Typical Pedon

Weingart clay loam, in an area of Abor-Weingart-Neldore complex, 2 to 15 percent slopes; in an area of rangeland, 900 feet south and 2,200 feet west of the northeast corner of sec. 34, T. 13 N., R. 51 E.

E—0 to 3 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate fine granular structure; hard, friable, slightly sticky and plastic; many very fine and common fine roots; mildly alkaline; clear smooth boundary.

Btn—3 to 11 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; moderate medium columnar structure parting to moderate medium

subangular blocky; hard, friable, sticky and plastic; common very fine and few fine roots; common very fine pores; few thin clay films on faces of peds; slightly effervescent; strongly alkaline; gradual smooth boundary.

Bk—11 to 17 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine and few fine roots; common very fine pores; common very fine masses of lime; strongly effervescent; strongly alkaline; clear smooth boundary.

Bky—17 to 27 inches; grayish brown (2.5Y 5/2) clay, olive brown (2.5Y 4/4) moist; massive; very hard, friable, sticky and plastic; few very fine roots; common very fine pores; common fine masses of lime; few masses of gypsum; violently effervescent; strongly alkaline; gradual smooth boundary.

BC—27 to 35 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and plastic; few very fine roots and pores; violently effervescent; strongly alkaline; gradual smooth boundary.

Cr—35 to 60 inches; light brownish gray (2.5Y 6/2), semiconsolidated shale, grayish brown (2.5Y 5/2) moist; very hard, very firm, sticky and plastic; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature is 41 degrees or higher

Depth to Bk horizon: 7 to 16 inches

Depth to gypsum and other salts: 10 to 24 inches

Depth to bedrock: 20 to 40 inches

E horizon

Hue: 10YR or 2.5Y

Value: 5 to 7 dry; 3 to 6 moist

Chroma: 2 or 3

Clay content: 27 to 40 percent

Content of rock fragments: 0 to 10 percent—0 to 10 percent stones and cobbles, 0 to 5 percent hard shale, 0 to 5 percent soft shale

Reaction: pH 5.6 to 7.8

Btn horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Content of rock fragments: 0 to 10 percent—0 to 5

percent hard shale, 0 to 5 percent soft shale

Electrical conductivity: 2 to 8 mmhos/cm

Sodium adsorption ratio: 10 to 30

Note: When the sodium adsorption ratio is less than 13, the horizon has more exchangeable magnesium plus sodium than calcium plus exchange acidity.

Reaction: pH 6.5 to 9.6

Bk horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay, clay, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent hard shale, 0 to 5 percent soft shale

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Content of lime: Few to common masses

Content of gypsum: 0 to 1 percent (occurring as few or common seams)

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.8 to 9.6

Bky horizon

Hue: 2.5Y or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 to 4

Texture: Clay, silty clay, clay loam, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent hard shale, 0 to 5 percent soft shale

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Content of gypsum: 1 to 5 percent

Reaction: pH 7.8 to 9.6

BC horizon

Hue: 10YR to 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 to 4

Texture: Clay, silty clay, clay loam, or silty clay loam

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent hard shale, 0 to 5 percent soft shale

Electrical conductivity: 4 to 16 mmhos/cm

Sodium adsorption ratio: 13 to 30

Content of gypsum: 1 to 5 percent

Reaction: pH 7.8 to 9.6

Cr horizon

Reaction: pH 7.8 or more

Yamac Series*Depth class:* Very deep*Drainage class:* Well drained*Landform:* Sedimentary plains, hills, alluvial fans*Parent material:* Alluvium*Slope range:* 0 to 15 percent**Taxonomic Class:** Fine-loamy, mixed Borollic
Camborthids**Typical Pedon**

Yamac loam, 0 to 2 percent slopes, in an area of rangeland, 2,100 feet east and 2,300 feet south of the northwest corner of sec. 36, T. 11 N., R. 49 E.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine and many very fine roots; few fine and common very fine pores; mildly alkaline; clear smooth boundary.**Bw**—4 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium prismatic structure; soft, very friable, slightly sticky and slightly plastic; few fine and common very fine roots and pores; slightly effervescent; moderately alkaline; clear smooth boundary.**Bk1**—11 to 14 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; few fine and common very fine pores; common very fine masses of lime; moderately alkaline; gradual smooth boundary.**Bk2**—14 to 23 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots and pores; disseminated lime; strongly effervescent; moderately alkaline; gradual smooth boundary.**BC**—23 to 60 inches; light yellowish brown (2.5Y 6/4) loam that has few very thin strata of fine sandy loam, olive brown (2.5Y 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; strongly effervescent; moderately alkaline.**Range in Characteristics***Soil temperature:* 42 to 47 degrees F*Moisture control section:* Between the depths of 4 and 12 inches*Depth to Bk horizon:* 10 to 20 inches*A horizon*

Hue: 10YR to 5Y

Value: 5 or 6 dry; 3 to 5 moist

Chroma: 2 to 4

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles

Effervescence: None to strong

Reaction: pH 6.6 to 8.4

Note: When mixed to a depth of 7 inches, this horizon does not meet the requirements for a mollic epipedon.

Bw horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or silt loam

Note: 15 to 35 percent of the sand is fine or coarser.

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles

Effervescence: None to strong

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR to 5Y

Value: 5 to 8 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or silt loam

Note: 15 to 35 percent of the sand is fine or coarser.

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles, 0 to 10 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm

Calcium carbonate equivalent: 5 to 15 percent

Effervescence: Strong or violent

Reaction: pH 7.9 to 8.4

BC horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 to 6 moist

Chroma: 2 to 4

Texture: Loam, clay loam, or silt loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles, 0 to 20 percent pebbles

Electrical conductivity: 0 to 4 mmhos/cm

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

131—Yamac loam, 0 to 2 percent slopes**Composition**

Yamac and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 0 to 2 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Busby and similar soils
- Kobar and similar soils
- Kremlin and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

132—Yamac loam, 2 to 8 percent slopes**Composition**

Yamac and similar soils: 85 percent
 Inclusions: 15 percent

Setting

Landform: Sedimentary plains and alluvial fans
Slope: 2 to 8 percent

Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Busby and similar soils
- Cabbart and similar soils
- Delpoint and similar soils
- Kobar and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

133—Yamac-Busby complex, 2 to 8 percent slopes**Composition**

Yamac and similar soils: 50 percent
 Busby and similar soils: 40 percent
 Inclusions: 10 percent

Setting

Landform:

- Yamac—Sedimentary plains and alluvial fans
- Busby—Sedimentary plains and alluvial fans

Position on landform:

- Yamac—Toe slopes
- Busby—Foot slopes

Slope:

- Yamac—2 to 8 percent
- Busby—2 to 8 percent

Component Description**Yamac**

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Busby

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Kremlin and similar soils
- Yetull and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

134—Yamac-Busby complex, 8 to 15 percent slopes

Composition

Yamac and similar soils: 45 percent

Busby and similar soils: 35 percent

Inclusions: 20 percent

Setting

Landform:

- Yamac—Hills
- Busby—Hills

Position on landform:

- Yamac—Foot slopes
- Busby—Back slopes

Slope:

- Yamac—8 to 15 percent
- Busby—8 to 15 percent

Component Description

Yamac

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.7 inches

Busby

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or eolian material

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Twilight and similar soils
- Yetull and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

135—Yamac-Busby-Blackhall complex, 8 to 25 percent slopes

Composition

Yamac and similar soils: 45 percent

Busby and similar soils: 25 percent

Blackhall and similar soils: 20 percent

Inclusions: 10 percent

Setting

Landform:

- Yamac—Hills
- Busby—Hills
- Blackhall—Hills

Position on landform:

- Yamac—Foot slopes and toe slopes
- Busby—Back slopes and foot slopes
- Blackhall—Shoulders and summits

Slope:

- Yamac—8 to 15 percent

- Busby—8 to 25 percent
- Blackhall—8 to 25 percent

Component Description

Yamac

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Busby

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.3 inches

Blackhall

Surface layer texture: Fine sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, sandy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.5 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Delpoint and similar soils
- Twilight and similar soils
- Yetull and similar soils
- Areas of sandstone rock outcrop

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

136—Yamac-Delpoint loams, 2 to 8 percent slopes

Composition

Yamac and similar soils: 50 percent
 Delpoint and similar soils: 35 percent
 Inclusions: 15 percent

Setting

Landform:

- Yamac—Sedimentary plains and alluvial fans
- Delpoint—Sedimentary plains

Position on landform:

- Yamac—Foot slopes and toe slopes
- Delpoint—Back slopes

Slope:

- Yamac—2 to 8 percent
- Delpoint—2 to 8 percent

Component Description

Yamac

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Delpoint

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Cabbart and similar soils
- Busby and similar soils
- Kremlin and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

137—Yamac-Delpoint-Cabbart complex, 4 to 15 percent slopes

Composition

Yamac and similar soils: 40 percent
 Delpoint and similar soils: 30 percent
 Cabbart and similar soils: 15 percent
 Inclusions: 15 percent

Setting

Landform:

- Yamac—Hills
- Delpoint—Hills
- Cabbart—Hills

Position on landform:

- Yamac—Foot slopes and toe slopes
- Delpoint—Back slopes
- Cabbart—Back slopes and shoulders

Slope:

- Yamac—4 to 15 percent
- Delpoint—4 to 15 percent
- Cabbart—4 to 15 percent

Component Description

Yamac

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Delpoint

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

Cabbart

Surface layer texture: Silt loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.0 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section, Part II of this publication.

Inclusions

- Blackhall and similar soils
- Busby and similar soils
- Kremlin and similar soils
- Yawdim and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Range” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

138—Yamac-Gerdrum complex, 2 to 8 percent slopes

Composition

Yamac and similar soils: 50 percent
 Gerdrum and similar soils: 35 percent
 Inclusions: 15 percent

Setting

Landform:

- Yamac—Sedimentary plains and alluvial fans
- Gerdrum—Sedimentary plains and alluvial fans

Position on landform:

- Yamac—Foot slopes
- Gerdrum—Toe slopes

Slope:

- Yamac—2 to 8 percent
- Gerdrum—2 to 8 percent

Component Description

Yamac

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.7 inches

Gerdrum*Surface layer texture:* Silty clay loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Salt affected:* Saline within a depth of 30 inches*Sodium affected:* Sodic within a depth of 30 inches*Available water capacity:* Mainly 6.2 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Creed and similar soils
- Delpoint and similar soils
- Pinelli and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Yawdim Series*Depth class:* Shallow*Drainage class:* Well drained*Landform:* Hills, sedimentary plains*Parent material:* Semiconsolidated shale residuum*Slope range:* 2 to 70 percent

Taxonomic Class: Clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents

Typical Pedon

Yawdim silty clay loam, in an area of Cambeth, calcareous-Cabbart-Yawdim complex, 4 to 25 percent slopes; in an area of rangeland, 500 feet north and 1,500 feet west of the southeast corner of sec. 16, T. 14 N., R. 51 E.

A—0 to 4 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic;

common fine and very fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

C1—4 to 10 inches; light gray (2.5Y 7/2) silty clay loam, olive (5Y 5/3) moist; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; common fine and very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C2—10 to 14 inches; light gray (2.5Y 7/2) silty clay loam, olive (5Y 5/3) moist; massive; very hard, firm, sticky and plastic; common very fine and few fine roots; 30 percent soft shale fragments; slightly effervescent; mildly alkaline; clear smooth boundary.

Cr1—14 to 44 inches; light gray (5Y 7/2), semiconsolidated shale that crushes to silty clay, olive (5Y 5/4) moist; hard, firm, sticky and plastic; few very fine roots in cracks and along bedding planes in the upper part; mildly alkaline; gradual smooth boundary.

Cr2—44 to 60 inches; light gray (5Y 7/2), semiconsolidated shale that crushes to silty clay, gray (5Y 6/1) moist; hard, firm, sticky and plastic; neutral.

Range in Characteristics

Moisture control section: Between the depths of 4 and 12 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1 or 2

Clay content: 27 to 40 percent

Reaction: pH 6.6 to 7.8

C horizon

Hue: 10YR to 5Y

Value: 4 to 6 moist; 5 to 8 dry

Chroma: 1 to 4

Texture: Silty clay loam, clay loam, or clay

Clay content: 35 to 50 percent

Reaction: pH 7.4 to 8.4

139—Yawdim-Cambeth, calcareous, complex, 2 to 8 percent slopes**Composition**

Yawdim and similar soils: 55 percent
Cambeth and similar soils: 30 percent
Inclusions: 15 percent

Setting

Landform:

- Yawdim—Sedimentary plains
- Cambeth—Sedimentary plains

Position on landform:

- Yawdim—Back slopes and shoulders
- Cambeth—Back slopes and foot slopes

Slope:

- Yawdim—2 to 8 percent
- Cambeth—2 to 8 percent

Component Description

Yawdim

Surface layer texture: Silty clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.4 inches

Cambeth

Surface layer texture: Silt loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Abor and similar soils
- Alona and similar soils
- Cabbart and similar soils
- Lonna and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Yetull Series

Depth class: Very deep

Drainage class: Somewhat excessively drained

Landform: Sedimentary plains, hills, stream terraces

Parent material: Alluvium or eolian material

Slope range: 0 to 35 percent

Taxonomic Class: Mixed, frigid Ustic Torripsamments

Typical Pedon

Yetull loamy fine sand, in an area of Busby-Yetull-Rock outcrop complex, 8 to 25 percent slopes; in an area of rangeland, 1,400 feet north and 100 feet east of the southwest corner of sec. 29, T. 14 N., R. 49 E.

A—0 to 5 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, olive brown (2.5Y 4/4) moist; single grain; soft, loose, nonsticky and nonplastic; many fine and medium roots; slightly effervescent; mildly alkaline; gradual smooth boundary.

C1—5 to 36 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, olive brown (2.5Y 4/4) moist; single grain; soft, loose, nonsticky and nonplastic; common fine roots; slightly effervescent; moderately alkaline; diffuse wavy boundary.

C2—36 to 60 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, olive brown (2.5Y 4/4) moist; single grain; soft, loose, nonsticky and nonplastic; few very fine roots; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between the depths of 12 and 35 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 to 4

Texture: Loamy sand or loamy fine sand

Clay content: 0 to 10 percent

Content of rock fragments: 0 to 60 percent—0 to 5 percent cobbles, 0 to 55 percent pebbles

Reaction: pH 6.6 to 7.8

C1 horizon

Hue: 10YR or 2.5Y

Value: 4 to 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Sand, fine sand, loamy sand, loamy coarse sand, loamy fine sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 1 to 5 percent
 Effervescence: Slight or strong
 Reaction: pH 7.4 to 8.4

C2 horizon

Hue: 10YR or 2.5Y
 Value: 4 to 6 dry; 4 or 5 moist
 Chroma: 2 to 4
 Texture: Sand, fine sand, loamy sand, loamy coarse sand, loamy fine sand, or coarse sand
 Clay content: 0 to 10 percent
 Content of rock fragments: 0 to 15 percent pebbles
 Calcium carbonate equivalent: 1 to 5 percent
 Effervescence: Slight to violent
 Reaction: pH 7.4 to 8.4

140—Yetull-Busby complex, 0 to 2 percent slopes**Composition**

Yetull and similar soils: 50 percent
 Busby and similar soils: 40 percent
 Inclusions: 10 percent

Setting**Landform:**

- Yetull—Stream terraces
- Busby—Stream terraces

Slope:

- Yetull—0 to 2 percent
- Busby—0 to 2 percent

Component Description**Yetull**

Surface layer texture: Loamy fine sand
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.7 inches

Busby

Surface layer texture: Fine sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or eolian material
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.4 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Busby soils that have a surface layer of loam
- Yamac and similar soils
- Areas of blowouts

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Zatoville Series

Depth class: Very deep

Drainage class: Somewhat poorly drained

Landform: Sedimentary plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Taxonomic Class: Fine, montmorillonitic, frigid Cambic Gypsiorthids

Typical Pedon

Zatoville silty clay loam, loamy substratum, 0 to 2 percent slopes, in an area of pasture, 500 feet north and 660 feet west of the southeast corner of sec. 15, T. 12 N., R. 51 E.

Ap—0 to 6 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; common very fine roots and pores; strongly alkaline; clear smooth boundary.

Bw—6 to 15 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; common very fine roots and pores; strongly alkaline; gradual smooth boundary.

Bk—15 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; common very fine roots and pores; few fine soft masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Byz—25 to 48 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and pores; common fine masses of gypsum and other salts; strongly

effervescent; strongly alkaline; gradual smooth boundary.

BC—48 to 60 inches; light yellowish brown (10YR 6/2) loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots and pores; strongly effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between the depths of 4 and 12 inches, dry in all parts between 40 and 50 percent of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees or higher

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 27 to 40 percent

Electrical conductivity: 0 to 4 mmhos/cm

Reaction: pH 7.4 to 9.0

Bw horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silty clay loam, silty clay, or clay loam

Clay content: 33 to 45 percent

Electrical conductivity: 4 to 8 mmhos/cm

Reaction: pH 7.4 to 9.0

Bk horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silty clay loam, silty clay, or clay loam

Clay content: 35 to 45 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity: 4 to 8 mmhos/cm

Sodium adsorption ratio: 1 to 13

Reaction: pH 7.9 to 9.0

Byz horizon

Hue: 10YR to 5Y

Value: 5 to 7 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silty clay loam, loam, or clay loam

Clay content: 25 to 40 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 8 to 30

Content of gypsum: 10 to 20 percent

Reaction: pH 7.9 to 9.0

BC horizon

Hue: 10YR to 5Y or neutral

Value: 4 to 7 dry; 3 to 5 moist

Chroma: 0 to 2

Texture: Silty clay loam, loam, or clay loam

Clay content: 25 to 40 percent

Electrical conductivity: 8 to 16 mmhos/cm

Sodium adsorption ratio: 8 to 30

Content of gypsum: 1 to 5 percent

Reaction: pH 7.9 to 9.0

141—Zatoville silty clay loam, loamy substratum, 0 to 2 percent slopes

Composition

Zatoville and similar soils: 85 percent

Inclusions: 15 percent

Setting

Landform: Sedimentary plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Salt affected: Saline within a depth of 30 inches

Sodium affected: Sodic within a depth of 30 inches

Available water capacity: Mainly 7.9 inches

A typical soil description with range in characteristics is included, in alphabetical order, in this section.

Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section, Part II of this publication.

Inclusions

- Gerdrum and similar soils
- Poorly drained, ponded soils
- Kobar and similar soils
- Spinekop and similar soils
- Vanda and similar soils

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- "Range" section
- "Agronomy" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

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Glossary

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

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hill slopes.

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.

Argillite. Weakly metamorphosed mudstone or shale.

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

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low 0 to 3.75

Low 3.75 to 5.0

Moderate 5.0 to 7.5

High More than 7.5

Avalanche chute. The track or path formed by an avalanche.

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hill slopes. Back slopes in profile are commonly steep and linear and descend to a foot slope. In terms of gradational process, back slopes are erosional forms produced mainly by mass wasting and running water.

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.

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

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

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

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material,

and designed to make the soil suitable for tillage and to prevent accelerated erosion.

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

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board one foot wide, one foot long, and one inch thick before finishing.

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

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

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

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

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, a felled tree generally is reeled in while one end is lifted or the entire log is suspended.

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

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

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

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

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

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.

Cirque. A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.

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.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting.

Reproduction is achieved artificially or by natural seeding from adjacent stands.

- Climax 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.
- Closed depression.** A low area completely surrounded by higher ground and having no natural outlet.
- Coarse textured soil.** Sand or loamy sand.
- Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
- Cobbly soil material.** Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.
- Codominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.
- Colluvium.** Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
- Commercial forest.** Forest land capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.
- Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
- Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.
- Concretions.** 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. Calcium carbonate and iron oxide are common compounds in concretions.
- Conglomerate.** A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.
- Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than

offset the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

- Conservation tillage.** Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion; in areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.
- 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.
- Consolidated sandstone.** Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.
- Consolidated shale.** Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.
- 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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

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

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

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

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

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

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

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

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

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.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rock.

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

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

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

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 a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have an 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 a drainage system is installed. 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 a drainage system is installed. 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. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

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

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

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

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 human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

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

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term is more often applied to cliffs resulting from differential erosion.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between the individuals. A range of 20 years is allowed.

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.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

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

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

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.

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

bulk density and the highest water content at saturation of all organic soil material.

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

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. A firebreak also serves as a line from which to work and to facilitate the movement of fire fighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

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

Foothills. A region of relatively low, rounded hills at the base of a mountain range.

Foot slope. The geomorphic component that forms the inner, gently inclined surface at the base of a hill slope. The surface profile is dominantly concave. In terms of gradational processes, a foot slope is a transition zone between an upslope site of erosion (back slope) and a downslope site of deposition (toe slope).

Forb. Any herbaceous plant not a grass or a sedge.

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

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

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

When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

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

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

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

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

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

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

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

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 the material below the water table.

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

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. An aggregation of all land areas potentially capable of producing similar plant communities at climax.

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

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

Head out. To form a flower head.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

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

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

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions

of the major horizons. 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.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but 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.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

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

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

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

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

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	Very low
0.2 to 0.4	Low
0.4 to 0.75	Moderately low
0.75 to 1.25	Moderate
1.25 to 1.75	Moderately high
1.75 to 2.5	High
More than 2.5	Very high

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:

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

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It

is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low-residue crops. Crops such as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Mean annual increment (MAI). The average annual increase in volume of a tree during the entire life of the tree.

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.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Miscellaneous water. A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. 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 limited summit area and generally having steep sides (slopes greater than 25 percent) and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are primarily formed by deep-seated earth movements or volcanic action and secondarily by differential erosion.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

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.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through 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

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

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.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

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.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. 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.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but

unmetamorphosed sandstone consisting chiefly of quartz grains.

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.

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 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 degrees of acidity or alkalinity, expressed as pH values, are:

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

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata mainly red in color and composed largely of sandstone and shale.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material

that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

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.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

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 the growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	More than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

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.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer 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.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of

soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transition zone from the back slope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level

is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

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 or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine-textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level.....	0 to 2 percent
Gently sloping.....	2 to 4 percent
Moderately sloping.....	4 to 8 percent
Strongly sloping.....	8 to 15 percent
Moderately steep.....	15 to 25 percent
Steep.....	25 to 45 percent
Very steep.....	More than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 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.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight.....	Less than 13:1
Moderate.....	13-30:1
Strong.....	More than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand.....	2.0 to 1.0
Coarse sand.....	1.0 to 0.5
Medium sand.....	0.5 to 0.25
Fine sand.....	0.25 to 0.10
Very fine sand.....	0.10 to 0.05
Silt.....	0.05 to 0.002
Clay.....	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of

hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing 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 grain* (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 or loosen a layer that is restrictive to roots.

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.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It

commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

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."

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances. It commonly is a massive arcuate ridge or complex of ridges underlain by till and other types of drift.

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). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

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. Toe slopes are commonly gentle and linear in profile.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded

glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Waterspreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The action of uprooting and tipping over trees by the wind.

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