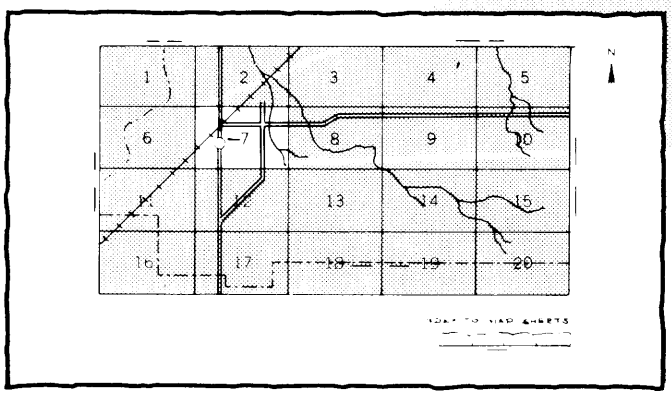
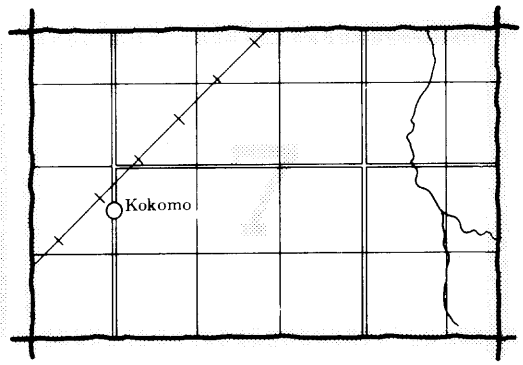
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

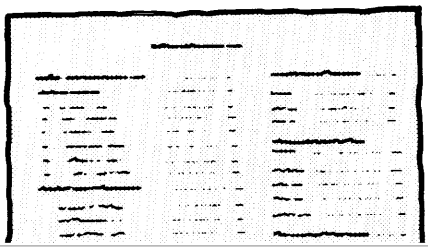




2. Note the number of the map sheet and turn to that sheet.

THIS SOIL SURVEY

5. Turn to "Index to Soil Mapping Units" which lists the name of each mapping unit and the page where that mapping unit is described.



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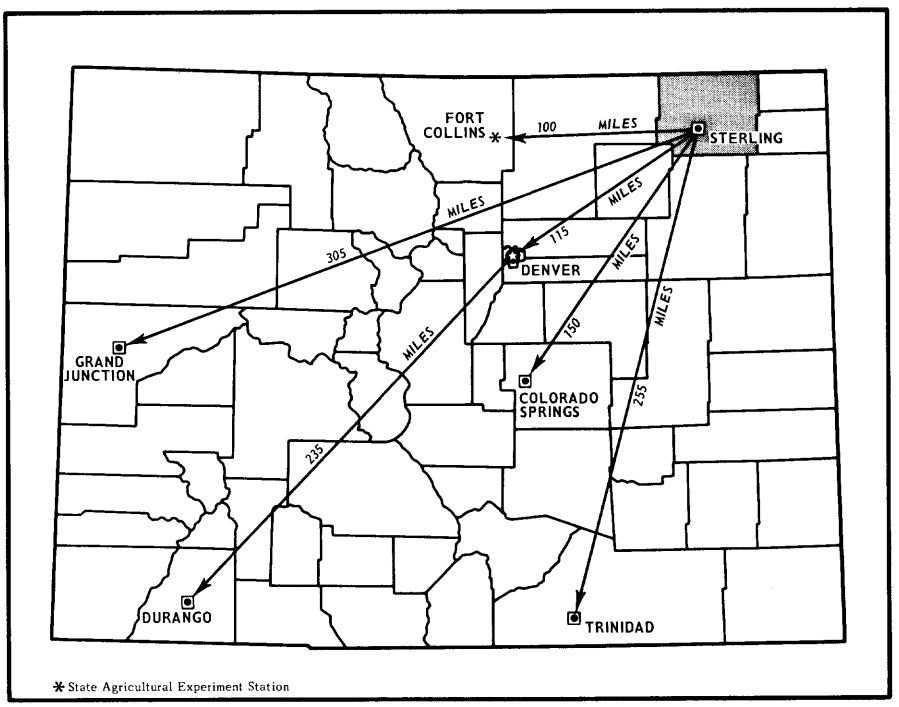
Foreword

The Soil Survey of Logan County contains much information useful in any



Location of Logan County in Colorado.

SOIL SURVEY OF LOGAN COUNTY, COLORADO

By Alan E. Amen, David L. Anderson, Terry J. Hughes, and Thomas J. Weber,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in
cooperation with Colorado Agricultural Experiment Station

LOGAN COUNTY is located in the high plains of northeastern Colorado. (See facing page.) It is rectangular in outline, 48 miles long and 30 miles wide, with an area of 1,849 square miles, or 1,183,360 acres. It is bordered on the north by the State of Nebraska. Elevations range from 3,600 feet to approximately 4,100 feet. The South Platte River crosses the county in a northeasterly direction. Major tributaries are Pawnee Creek, Lewis Creek, and Cedar Creek entering the river from the north.

The population of the county is approximately 21,500. Sterling is the county seat and principal city with a population of about 13,500.

The county is a diversified agricultural area with irrigated and nonirrigated cropland and rangeland. Livestock raising, cattlefeeding, meatpacking, and sugar beet processing are all important to the economy.

General Nature of the County

This section gives general information concerning the county. It discusses history of settlement, physiography, drainage and relief, climate, natural resources, water supply, agriculture and industry.

History of Settlement

On February 28, 1887, Logan County was created from the northeast corner of Old Weld County. It was named

this industry soon became the mainstay of the area's agricultural economy.

The sugar industry also served as a powerful catalyst in drawing large numbers of laborers from other states as well as foreign countries. Emigrants from Italy, Japan, and Mexico, along with a relatively large number of German colonists from the Lower Volga region in Russia, found ample work in the beet fields and later played a prominent role in beet production.

Other irrigated crops that eventually proved successful were corn, alfalfa, beans, barley, and oats. Although irrigation was an important asset to the economic health of Logan County, it also added to the area's agricultural diversification. Such dryland crops as wheat, milo, millet, corn, and grasses became increasingly significant. In fact, dryland wheat comprises the county's largest planted acreage today. Grazing lands and high hay production also helped bolster a burgeoning livestock industry. Although Logan County experienced an oil boom in the late 1940's and early 1950's, it continues to rely on agriculturally related industries.

Sterling, the principal city and county seat, was incorporated in 1884; Fleming, Merino, and Peetz in 1917; Crook in 1918; and Iliff in 1926. Other communities are Atwood, Dailey, Padroni, Proctor, and Willard.

Physiography, Drainage and Relief

Logan County is located near the center of the Great

The South Platte River flows diagonally through the Paralleling the south side of the South Platte River is

inch of snow on the ground, but the number of days varies greatly from year to year.

The average relative humidity in midafternoon in spring is less than 45 percent; during the rest of the year it is about 55 percent. Humidity is higher at night in all seasons, and the average at dawn is about 80 percent. The prevailing direction of the wind is from the northwest. Average windspeed is 10 miles per hour. The highest, 13 miles per hour, is in April.

Some years blizzards with high winds and drifting

Water Supply

The South Platte River is the principal source of surface water in Logan County. Other streams contributing are Lewis Creek, Pawnee Creek and Cedar Creek. The water source of the South Platte River is snowmelt and runoff waters from the foothills and mountains and ground water discharge. The creek water sources are snowmelt and runoff water from the adjacent dissected terraces and ground water discharge. Streamflows are

The drought and depression of the 1890's caused a large number of the homesteaders to leave. Those who stayed discovered that they could raise forage crops to supplement the range, providing a basis for small farms and ranches.

The raising and selling of livestock continued to be the main enterprise until irrigation was introduced and expanded. In the late 1870's the first irrigation canals were constructed, diverting water from the South Platte River to the bottomland and terrace soils nearby. Sugar beets was the first irrigated crop grown in the county. [redacted]

trict. Later, two additional districts were formed in the county, the Padroni Soil Conservation District and the South Platte Soil Conservation District. In 1975, the Peetz and Padroni Soil Conservation Districts were combined to form the Centennial Soil Conservation District.

Sterling is the agricultural center of northeastern Colorado. Logan County is one of the most important agricultural areas on the eastern plains.

Industry

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and their interpretations are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils

persisting after such practices are used. The location of existing transportation systems or other kinds of facilities is not considered.

Major land uses considered are for cultivated cropland, both irrigated and nonirrigated, and grazing. Some minor land uses considered are windbreak plantings, urban uses and wildlife. Cultivated farm crops include those grown extensively by farmers in the survey area. Grazing refers to use of rangeland for livestock. Windbreak plantings include tree and shrub species best adapted in the survey area. Urban uses include residential, commercial, and industrial developments. Wildlife includes rangeland, openland, and wetland wildlife habitat.

potential for urban uses is poor because of wetness and flooding. The potential for development of wetland and openland wildlife habitat is fair. This is an important area for wildlife because of its association with the South

The minor soils are the Nunn clay loam saline and the Mosher clay soils on similar positions. The Nunn clay loam soil in nearly all of this area is used for grazing. A few small areas are cultivated, mainly to square up field

5. Dailey-Julesburg

Deep, nearly level to moderately sloping, somewhat excessively drained and well drained soils forming in noncalcareous eolian sandy materials on uplands

These soils are located on the nearly level to moderately sloping sandy lands that lie between the South Platte River bottomlands and the sandhills on the south side of the river. They extend from below Iliff northeastward to the Sedgwick County line.

This unit occupies about 2 percent of the county, a total of approximately 23,360 acres. About 50 percent is Dailey

This unit is used mainly for nonirrigated cropland and grazing. Some small areas are used for sprinkler irrigated cropland. Wheat and millet are the main nonirrigated crops. Corn, sugar beets and alfalfa are the main irrigated crops. Soil blowing is the primary concern of cropland management. Practices that conserve soil moisture and control soil blowing are essential in cropland areas. These soils are located in a 13 to 15 inch rainfall zone.

The potential for sprinkler irrigated cropland is good where groundwater is available. The potential for urban uses is good. The potential for rangeland wildlife development is fair. In irrigated areas the potential for openland

Sandy Loam to Clay Loam Soils Forming on Unconsolidated Materials on the Uplands

8. Platner-Rago-Rosebud

Deep and moderately deep, nearly level to moderately sloping, well drained soils forming in loamy alluvial and eolian materials on uplands

These nearly level to gently sloping soils are on upland tablelands located in the southeastern and north central part of Logan County. Slopes along intermittent drainageways are steeper than the dominant 0 to 3 percent slopes occurring in the area.

This unit occupies about 23.5 percent of the county, a total of approximately 279,000 acres. About 40 percent of the unit is Platner soils, 30 percent Rago soils, 20 percent Rosebud soils, and the remaining 10 percent soils of minor extent.

The major soils are deep and well drained. Platner soils occur on upland tablelands and hills. They formed in calcareous alluvial and eolian deposits. Rago soils occur on upland tablelands and hills. They formed in calcareous loamy eolian deposits. Rosebud soils occur on upland hills and ridges. They formed in calcareous loamy eolian deposits.

These nearly level to moderately sloping soils are distributed throughout the western and southwestern part of the county. The unit occurs on upland tablelands and ridges and in valleys.

This unit occupies about 9.5 percent of the county, a total of approximately 113,760 acres. About 30 percent of the unit is Weld soils, 30 percent Platner soils, 20 percent Ascalon soils, and the remaining 20 percent soils of minor extent.

The major soils are deep and well drained. Weld soils occur on upland tablelands. They formed in calcareous, loamy eolian deposits. Platner soils occur on upland tablelands and hills. They formed in calcareous alluvial and eolian deposits. Ascalon soils occur on upland ridges and flats and in valleys. They formed in calcareous loamy

This unit is used for nonirrigated cropland and grazing. The principal nonirrigated crops are wheat and millet. The major problems in the area are soil blowing and water erosion. Where the calcareous silty parent material is exposed, soil blowing is more severe.

The potential for irrigated cropland is limited by slope and lack of underground water. With intensive management, these soils will yield favorably under nonirrigated urban uses is good in most places with the exception of seeped areas. The potential for openland and rangeland wildlife is good in irrigated areas and poor to good in nonirrigated.

Deep, Moderately Deep and Shallow Soils Underlain by Consolidated Sediments on the Uplands

The Ustic Torriorthents are steep, shallow, well drained soils forming in calcareous loamy alluvium derived from siltstone and calcareous sandstone. Badland consists of steep and very steep barren land dissected by many intermittent drainageways that have entrenched into the soft shale and siltstone.

The minor soils in this unit are small isolated areas of Keota and Mitchell soils, Argiustolls, and Rock outcrop.

This unit is used entirely for grazing and wildlife habitat. The potential for other uses is poor. The unit is barren or nearly barren and is too steep or inaccessible

15. Stoneham-Cushman-Shingle

Deep to shallow, gently sloping to strongly sloping, well drained soils formed in calcareous loamy materials underlain by shale; on uplands

These gently sloping to strongly sloping soils are located in the western part of the county. This unit is made up of ridges and hills and is divided by intermittent drainageways.

This unit occupies about 9.0 percent of the county, a total of approximately 104,870 acres. About 50 percent is Stoneham soils, 25 percent Cushman soils, 15 percent

Dix soils are deep, somewhat excessively drained soils

Some small scattered areas are used for irrigated

The potential for wildlife habitat varies in the survey area. The Alda-Loveland-Fluvaquents, Nunn-Satanta-Haverson, and Mosher-Lebsack units and the seeped parts of Wages-Satanta-Norka unit have a good potential for wetland wildlife habitat. In general, irrigated cropland in all units has a good potential for openland wildlife habitat. Most nonirrigated cropland in the Haxtun-Julesburg, Platner-Rago-Rosebud, Wages-Satanta-Norka and Rosebud-Escabosa-Canyon units has a fair to good potential for openland wildlife.

Where moisture is more limiting as in the Manter-Ascalon-Vona, Weld-Platner-Ascalon, and Stoneham-Cushman-Shingle units, wildlife habitat potential is fair to poor. Rangeland wildlife habitat potential is fair in the Valent, Ustic Torriorthents-Badland, Mitchell-Keota, Stoneham-Cushman-Shingle, and Dix-Eckley-Chappell units. All provide large expansive grazing areas. The Ustic Torriorthents-Badland and Dix-Eckley-Chappell

detailed soil map at the back of this publication are phases of soil series.

Soils that have profiles that are almost alike make up a *soil series.* Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. All the soils in the United States having the same series name have essentially the same properties that affect their use and their response to management practices.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect the use of the soils. On the basis of such differences, a soil series is divided into phases. The name of

Soil Descriptions

1—Albinas loam, 0 to 3 percent slopes. This is a deep, well drained soil of upland flood plains, alluvial fans and

fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are especially effective on ran-

Efficient use of irrigation water and fertility main- 3—**Alda loam.** This is a deep, somewhat poorly drained

ican plum, purple willow, common chokecherry and redosier dogwood.

This is an important soil for wildlife because of its in-

brown, gravelly sandy clay loam about 17 inches thick. The substratum is light brown gravelly coarse loamy sand and coarse sand to 60 inches or more.

Permeability is moderate. The effective rooting depth

Supplemental irrigation is essential to establish and insure survival of plantings. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine and Siberian elm. Shrubs best adapted are skunkbush sumac and lilac.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing wildlife areas for nesting and escape cover around field edges. For pheasants the inclusion of undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged on grasslands by livestock water developments and fencing of the type to permit unrestricted antelope movement.

These soils are well suited to the construction of homesites and other urban developments. Minor limitations can be easily modified. Effective seals are required to overcome excessive seepage if these soils are used for sewage lagoons or landfills. Capability subclass IVe nonirrigated, IVe irrigated.

5—Altvan-Eckley sandy loams, 5 to 9 percent slopes. These moderately sloping soils are on upland ridges and side slopes in the northern part of the county. The

Permeability is moderate. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is medium, and the erosion hazard is high.

These soils are used for grazing and irrigated cropland. Some small areas are used for nonirrigated cropland but are commonly severely eroded and best seeded to grass. Corn, alfalfa, sugar beets, and wheat are the main crops grown on irrigated cropland.

In irrigated areas, intensive management is needed to prevent soil loss and maintain productivity. Contour furrow and contour ditch are the best methods of irrigation. Land leveling or smoothing is needed in most areas to obtain better distribution of water. Before attempting to level or smooth these soils, care must be taken to determine the maximum depth of cuts because of the depth to sand and gravel. Irrigation water management is important in obtaining efficient use of water. To control soil loss, alfalfa, small grains and other close sown crops can be irrigated by contour ditches. Row crops are best planted in the contour. Incorporating crop residues improves soil tilth, increases water infiltration, and helps control soil loss. Applications of manure and commercial fertilizers containing nitrogen and phosphorus are needed to maintain soil fertility. Frequent irrigations with small amounts of water are required to reduce soil loss and ob-

Cropland areas and the location of this mapping unit to croplands makes it valuable as escape cover areas for openland wildlife, especially pheasants.

These soils are well suited for use as homesites and other urban developments with only minor soil limitations that can be easily modified. Excessive seepage below the subsoil is the primary limiting soil feature. Sealing is needed in sewage lagoons or landfills. Capability subclass VIe nonirrigated, IVe irrigated.

6—Aquolls. Aquolls consists of deep, somewhat poorly drained to poorly drained dark colored salt affected soils

eastern redcedar. Shrubs best suited are American plum, purple willow, common chokecherry and redosier dogwood.

These are important soils for wildlife because of their association with irrigated cropland. They offer protection and nesting cover for such wildlife as pheasants, waterfowl, and deer. Wildlife values can be enhanced on this soil by tree and shrub plantings and by providing undisturbed nesting cover consisting of grasses and legumes. In the presence of a water supply, waterfowl can be attracted by development of shallow water areas

establishing tree and shrub plantings. Special care consisting of continued cultivation for vegetation control and selection of adapted plants is needed to ensure establishment and survival of plantings. Trees best suited and

Urban uses and windbreak plantings require special onsite investigations. Capability subclass VIs nonirrigated.

9. Arvada silt loam. This is a deep, well drained soil

Typically the surface layer is grayish brown fine sandy loam about 7 inches thick. The subsoil is brown sandy clay loam about 16 inches thick and is calcareous in the lower part. The substratum is very pale brown, calcareous sandy loam about 21 inches thick over very pale brown, calcareous loamy sand that extends to depths of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, the water erosion hazard is slight, and the soil blowing hazard is moderate.

This soil is used mainly for nonirrigated and irrigated

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing wildlife areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged on grasslands by good livestock grazing management, livestock water developments and types of fencing to permit unrestricted antelope movement.

needed to reduce soil blowing during periods when soil is not protected by growing crops and to improve soil tilth. Applications of manure and commercial fertilizer containing nitrogen and phosphorus are needed in maintaining soil fertility.

Rangeland vegetation of this soil consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the most important practices needed to maintain quantity and quality of desirable vegetation on rangeland. Range seed-

sandy loam about 21 inches thick over very pale brown, calcareous loamy sand that extends to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow. The erosion hazard is moderate.

This soil is used mainly for nonirrigated and irrigated cropland. The remaining acreage is used for grazing. Wheat is the principal crop grown in nonirrigated cropland areas. In irrigated cropland areas alfalfa, corn

dark grayish brown, calcareous gravelly loam that is about 2 inches thick and 15 percent calcareous sandstone fragments. It overlies light gray, calcareous loam that is about 6 inches thick and about 25 percent calcareous sandstone fragments. At a depth of about 11 inches is calcareous sandstone.

Permeability is moderate. Effective rooting depth is 6 to 20 inches. Available water capacity is low. Surface runoff is moderate to rapid, and the erosion hazard is high.

These soils are used almost entirely for grazing. Some small localized areas are used for nonirrigated cropland. These areas include odd field corners. Croplands are best reseeded to grass.

The rangeland vegetation of the Bayard soil consists of sand reedgrass, little bluestem, needleandthread

streams. The average annual precipitation ranges from 17 to 19 inches. Slopes are nearly level.

Included in this unit are small areas of Satanta loam and Haverson loam.

Typically the surface layer is a dark grayish brown loam about 10 inches thick. The subsoil layer is grayish brown and gray loam and silt loam about 11 inches thick. The substratum is light gray, calcareous silt loam about 9 inches thick over light gray, calcareous very fine sandy loam that extends to 60 inches or more.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is slow, and the wind and water erosion hazard is slight.

This soil is

sides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged on grasslands by livestock water developments and types of fencing to permit unrestricted antelope movement.

The inherent low strength is the primary limiting soil feature for homesites or other urban developments. Minor engineering measures are needed to offset this limiting soil feature. Capability subclass IIc nonirrigated, I irrigated.

17—Canyon gravelly loam, 1 to 25 percent slopes. This is a shallow, well drained soil on upland ridges, knobs and tablelands. It formed in a thin mantle of calcareous, loamy alluvial and eolian material underlain by calcareous sandstone. The average annual precipitation ranges from 15 to 17 inches. Slopes are nearly level to

18—Chappell sandy loam. This is a deep, well drained soil on flood plains and alluvial fans. It formed in calcareous, stratified sandy alluvium deposited by intermittent streams. The average annual precipitation ranges from 15 to 19 inches. Slopes are nearly level to gently sloping.

Included in this unit are small areas of Manter sandy loam and Bankard sand, both having 0 to 3 percent slopes.

Typically the surface layer is dark grayish brown sandy loam about 6 inches thick. The subsoil is dark grayish brown and grayish brown coarse sandy loam about 24 inches thick. The substratum is brown loamy coarse sand about 11 inches thick over pale brown, calcareous gravelly loamy coarse sand that extends to 60 inches.

Permeability is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low or moderate. Surface runoff is slow, the water erosion

water and control of soil loss. Short irrigation runs and frequent light irrigations are needed because of the slow permeability. Incorporating crop residues increases infiltration, reduces soil loss and improves soil tilth. Applications of manure and commercial fertilizers containing [redacted] are important in maintaining soil

design measures such as footing placement within the coarse sand and gravel or backfilling with better soil material are needed to overcome the shrink-swell condition for building sites and roads. Capability subclass IIIs nonirrigated, IIIe irrigated.

31. Dailey loamy sand, 0 to 3 percent slopes. This is

Windbreaks and environmental plantings are difficult to establish on this soil. Soil blowing and low available water capacity are the principal concerns in establishing trees and shrubs. Trees should be planted in shallow furrows, and a vegetative cover maintained between the rows. Supplemental irrigation is needed to insure survival. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine and Siberian elm. Shrubs best suited are skunkbush sumac, lilac and Siberian peashrub.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing wildlife areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged on grasslands by livestock grazing management, livestock water developments, and types of fencing to permit unrestricted antelope movement.

Where this soil is used for homesites and other urban developments, the primary limiting soil features are seepage and soil blowing. Where sewage lagoon systems are considered, special sealing methods are required to overcome excessive seepage. This soil should be protected at all times by utilization of mulches or vegetative cover. Capability subclass VIe nonirrigated, IVe irrigated.

22—Dailey loamy sand, 3 to 9 percent slopes. This is a deep, somewhat excessively drained soil on uplands, convex ridges and hills. It formed in eolian, noncalcareous sands and is dominantly in the sandhill area that parallels the South Platte River on the south. The average annual precipitation ranges from 15 to 19 inches. Slopes are

harvesting row crops and incorporating crop residues during periods when no growing crop is present to protect the soil is needed. Applications of manure and use of crop residues help maintain and improve soil tilth and organic matter content. Applications of commercial fertilizers containing nitrogen and phosphorus are required for high yields of all crops.

Rangeland vegetation of this soil consists mainly of sand bluestem, switchgrass, sand reedgrass, little bluestem, needleandthread, sideoats grama, sand dropseed, sedge, and blue grama. These grasses furnish most of the forage. Sand sagebrush is scattered in the vegetation. Grazing management must be aimed at the maintenance or improvement of range condition through proper grazing use. Without management of grazing, the plant cover loses the tall productive grasses. Deferred grazing is highly effective in management systems for livestock use. Brush management is needed in areas where sand sagebrush forms a dense stand because of continued heavy grazing use. Seeding is essential if severely depleted areas develop. Fencing and livestock watering places aid in obtaining more uniform distribution of grazing. Care must be taken not to locate livestock water developments in places where serious wind erosion can result.

Windbreaks and environmental plantings are difficult to establish on this soil. Soil blowing and low available water capacity are the principal concerns in establishing trees and shrubs. Trees should be planted in shallow furrows, and vegetative cover maintained between the rows. Supplemental irrigation is needed to insure survival. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine and Siberian elm. Shrubs best suited are skunkbush sumac, lilac and Siberian peashrub.

Openland wildlife such as pheasant, cottontail rabbit

Included in this unit are small areas of Haxtun loamy

Windbreaks and environmental plantings are generally

Typically the surface layer is a dark grayish brown sandy loam about 5 inches thick. The subsoil is a dark grayish brown heavy sandy loam and sandy clay loam about 18 inches thick. The substratum is light brownish

methods are required to overcome excessive seepage. Capability subclass VIe nonirrigated.

25—Dix-Eckley complex, 5 to 25 percent slopes. These moderately sloping to moderately steep soils are on

ty, depth to sand and gravel, and slope are the principal concerns in establishing tree and shrub plantings. Special care consisting of summer fallow a year in advance of planting, plantings on the contour, continued cultivation for weed control, and supplemental water is needed to in-

short for the most efficient application of irrigation water. Applications of manure and commercial fertilizers containing nitrogen and phosphorus are needed to maintain soil productivity. Leaving crop residues on the surface protects the soil from blowing during periods when there are no growing crops.

of the county. It formed in calcareous, loamy materials weathered from Brule Siltstone. The average annual

These soils are used mainly for grazing (fig. 8). A few

are subject to frequent flooding during spring and summer months.

These soils are used entirely for limited livestock grazing and wildlife.

Native vegetation consists mainly of scattered stands of grasses such as blue grama, sand reedgrass, and prairie

Fencing is necessary to obtain more uniform distribution of grazing. Brush management is needed when sand sagebrush becomes excessively dense and interferes with forage production.

In irrigated areas the main concerns of management are proper use of irrigation water, soil fertility and soil

These excavations are usually located in areas of soils underlain by gravel at depths of 10 to 40 inches. Included are borrow areas next to roads and major canals that were used as a source of fill materials.

Onsite investigations are required on this unit to determine use and management.

Where pits are abandoned, reshaping the side slopes and backfilling with topsoil will aid in revegetation and control of erosion.

32—**Haverson loam, 0 to 1 percent slopes.** This is a deep, well drained soil on terraces and flood plains. It formed in calcareous, stratified, loamy alluvium derived from sedimentary rocks and deposited by intermittent streams in the western part of the county. The average annual precipitation ranges from 13 to 17 inches. Slopes are nearly level.

Included in this unit are small areas of Glenberg sandy loam having 0 to 3 percent slopes.

Typically the surface layer is grayish brown loam about 4 inches thick. The underlying layer is light brownish gray and light yellowish brown, calcareous loam stratified with thin lenses of fine sandy loam and sandy loam to 60 inches or more.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Organic

most important practices needed to maintain quantity and quality of desirable vegetation. Range seeding will speed the revegetation of areas depleted by heavy grazing, cultivation or other disturbances. Combinations of stockwater development, fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are especially effective on rangeland areas in poor and fair condition.

Windbreaks and environmental plantings are generally well suited on this soil. They are somewhat hard to establish because of limited precipitation. Special care consisting of summer fallow a year prior to planting, supplemental water during plantings and early stages of growth, and continued cultivation for weed control is needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub and American plum.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland

This soil is used for nonirrigated and irrigated cropland and livestock grazing. Wheat is the principal crop grown

livestock water developments and types of fencing permitting unrestricted antelope movement.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by good livestock

Windbreaks and environmental plantings are generally suited to this soil. The saline and somewhat poorly drained conditions and the abundant natural vegetation are principal concerns in establishing tree and shrub plantings. Special care consisting of summer fallow, continued cultivation for weed control and selection of adapted plants is needed to insure establishment and survival of plantings. Trees best suited and having good survival are plains cottonwood, golden willow, Colorado blue

In nonirrigated cropland areas the main concerns of management are conserving soil moisture and protecting soil from blowing. Stubble mulch tillage and incorporating crop residues into the surface layer are needed to protect soil from blowing, improve soil tilth and conserve moisture. Tillage should be kept to a minimum. Planting [illegible] to the prevailing

be easily modified. This soil should be protected from blowing by use of plant residue mulches or vegetation. Capability subclass IIIe nonirrigated, IIIe irrigated.

37—**Haxtun loamy sand, 3 to 5 percent slopes.** This is a deep, well drained soil on upland ridges and hills. It formed in sandy eolian deposits over an older buried loamy soil that formed in mixed calcareous alluvial and

during the growing season is beneficial in maintaining and improving range condition. Fencing is necessary to obtain more uniform distribution of grazing animals. Brush management is needed when sand sagebrush becomes excessively dense and reduces forage production.

Windbreaks and environmental plantings are generally suited to this soil. Soil blowing is the principal concern to establishing trees and shrubs. This hazard can be overcome by cultivating only in the tree row and by leaving a strip of vegetative cover between the rows. Supplemental irrigation is necessary at the time of planting and during

cipal crops grown in nonirrigated cropland areas. Alfalfa, corn and sugar beets are the main crops in irrigated areas.

Main objectives of management in nonirrigated cropland areas are conserving moisture and protecting soil from blowing. Stubble mulch tillage and incorporating crop residues are essential practices to protect soil from blowing, improve soil tilth and conserve moisture. Chiseling or subsoiling breaks up tillage pans and improves water infiltration. Planting crops in alternate strips at right angles to the prevailing wind is also effective in

be easily modified. The soil should be protected from blowing by use of plant residue mulches as a vegetative

golden willow, Colorado blue spruce, Rocky Mountain juniper and eastern redcedar. Shrubs best suited are Amer-

needed in some areas to obtain uniform water distribution. Applications of manure and commercial fertilizers containing phosphorus and nitrogen are needed for soil fertility.

Rangeland vegetation consists mainly of alkali-

Permeability is slow. Effective rooting depth is 60 inches. Available water capacity is high. Surface runoff is slow, and the erosion hazard is slight.

This soil is used mainly for grazing. Some small areas

light brownish gray, calcareous silty clay that is about 29 inches thick and contains visible salts occurring as streaks and seams. The substratum is light brownish gray, calcareous silty clay and clay loam to 60 inches. It also contains visible salts occurring as streaks and seams.

Permeability is slow. Effective rooting depth is 60 inches. Available water capacity is high. Surface runoff is slow. The erosion hazard is slight.

This soil is used almost entirely for grazing. It is not suited for cropland.

The rangeland vegetation of this soil consists mainly of inland saltgrass, alkali sacaton, western wheatgrass and fourwing saltbush. This soil is difficult to revegetate because of the saline condition. It is especially important that livestock grazing management be carefully applied. Periodic planned rest from grazing during the growing season is needed to maintain the key forage species. Chiseling or pitting reduces surface runoff, aids water infiltration, and improves plant cover where it has been depleted and is in poor or fair condition. Management of greasewood or rabbitbrush is needed where these shrubs have increased and now interfere with forage production and grazing distribution.

Windbreak and environmental plantings are generally not suited to this soil.

Rangeland wildlife such as antelope and mule deer can best be encouraged by proper grazing management and installation of watering facilities.

Where this soil is used for homesites and other urban developments, the primary limiting soil features are slow permeability, inherent low strength, and high shrink-swell potential. Intensive and costly compensating measures are needed to minimize this condition. Capability subclass VIs nonirrigated.

43—**Iliff loam.** This is a moderately deep, well drained soil on upland tablelands. It formed in eolian silty material deposited over sandstone. It is dominant in the southeastern part of the county. The average annual precipitation ranges from 17 to 19 inches. Slopes are nearly level to gently sloping.

Included in this unit are small areas of Rago loam, 0 to 1 percent slopes, and Weld loam, 1 to 3 percent slopes.

Typically the surface layer is grayish brown loam about 11 inches thick. The subsoil (fig. 11) is dark grayish brown heavy silty clay loam about 14 inches thick. The substratum is light gray, calcareous silt loam about 12 inches

tices such as stubble mulch tillage and incorporating crop residues are essential to minimize soil erosion, improve water infiltration and soil tilth, and conserve moisture. Chiseling or subsoiling breaks up tillage pans and improves water infiltration. Tillage should be kept to a minimum. Terracing is also beneficial in reducing surface runoff and conserving moisture.

Proper use of irrigation water, slow permeability, and fertility maintenance are the main concerns of management in irrigated areas. Irrigation methods suitable are furrows or borders, depending on the crops. Land leveling and good irrigation water management are needed for uniform application and efficient use of water. Short irrigation runs and frequent light irrigations are needed on this soil because of the slow permeability and depth to bedrock. Incorporating crop residues reduces soil loss and improves soil tilth. Applications of manure and commercial fertilizer consisting of nitrogen and phosphorus are important to maintain fertility.

Rangeland vegetation of this soil consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the most important practices needed to maintain quantity and quality of desirable vegetation on rangeland. Range seeding will speed the revegetation of areas depleted by heavy grazing, cultivation or other disturbances. Combinations of stockwater development, fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are especially effective on rangeland areas in poor and fair condition.

Windbreaks and environmental plantings are generally well suited on this soil. Special care consisting of summer fallow a year prior to planting, supplemental water during planting and early stages of growth, and continued cultivation for weed control is needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub and American plum.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing nesting and escape cover. For pheasants, undisturbed

to bedrock limits shallow excavations, sewage lagoons and dwellings with basements. Special sewage systems must be anticipated. Septic tank absorption fields will not function properly because of the depth to bedrock and slow permeability. Capability subclass IIIs nonirrigated, IIIe irrigated.

44—**Julesburg loamy sand, 0 to 3 percent slopes.** This

improving range condition. Fencing is necessary to obtain more uniform distribution of grazing animals. Brush management is needed when sand sagebrush becomes excessively dense and reduces forage production.

Windbreaks and environmental plantings are generally suited to this soil. Soil blowing is the principal concern to establishing trees and shrubs. This hazard can be over-

Most of the pivotal sprinkler systems are located in areas of this soil. Special care consisting of growing cover crops after row crop harvest and incorporating crop residues during periods when no growing crop is present is needed to protect the soil from blowing. Applications of manure and use of crop residues help maintain and improve soil tilth and organic matter content. Applications of commercial fertilizers containing nitrogen and phosphorus are required for high yields of all crops.

The rangeland vegetation of this soil consists mainly of sand bluestem, sand dropseed, sand reedgrass, little

Typically the surface layer is grayish brown fine sandy loam about 5 inches thick. The subsoil is dark grayish brown, grayish brown, and brown sandy loam about 26 inches thick. The substratum is brown and pale brown, noncalcareous loamy fine sand to 60 inches or more.

Permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, the erosion hazard is slight, and the soil blowing hazard is moderate.

This soil is used for irrigated cropland, nonirrigated cropland and grazing. In irrigated areas, corn, alfalfa and

nesting and escape cover areas. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by water developments and types of fencing to permit unrestricted antelope movement.

This soil is well suited for use as homesites and other urban developments, with only minor limitations that can be easily modified. Where this soil is considered for a sewage lagoon system, special sealing methods are required to overcome the excessive seepage. Capability subclass IIIe nonirrigated, IIe irrigated.

47—**Julesburg fine sandy loam, 3 to 5 percent slopes.** This is a deep, well drained soil on upland convex ridges and hills. It formed in noncalcareous, sandy eolian deposits. The average annual precipitation ranges from 15 to 19 inches. Slopes are gently sloping.

Included in this unit are small areas of Manter sandy loam.

Typically the surface layer is grayish brown fine sandy loam about 5 inches thick. The subsoil is dark grayish brown, grayish brown, and brown sandy loam about 26 inches thick. The substratum is brown and pale brown, noncalcareous loamy fine sand to 60 inches or more.

Permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, the erosion hazard is slight, and the soil blowing hazard is moderate.

This soil is used for nonirrigated cropland and irrigated cropland. The remaining acreage is used for grazing. Wheat and sorghum are the main crops grown in nonirrigated areas. Alfalfa, corn, sugar beets and small grains are the principal crops in irrigated areas.

In irrigated areas the main concerns of management are proper use of irrigation water, soil fertility and control of soil blowing. This soil is suited to contour furrow, contour ditch and sprinkler methods of irrigation. Land leveling between irrigation ditches and irrigation water management are needed to obtain uniform distribution and efficient use of water. Incorporating crop residues is needed to reduce soil blowing during periods when the soil is not protected by growing crops and to improve soil tilth. Applications of manure and commercial fertilizer containing nitrogen and phosphorus are needed in maintaining soil fertility.

Primary objectives of management in nonirrigated cropland areas are protecting soil from blowing and conserving moisture. Stubble mulch tillage and incorporating crop residues are essential practices to protect the soil from blowing and improve soil tilth. Planting crops in al-

establishing trees and shrubs. This hazard can be overcome by cultivating only in the tree row and by leaving a strip of vegetative cover between the rows. Supplemental irrigation is necessary at the time of planting and during dry periods. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac and Siberian peashrub.

The rangeland vegetation of this soil consists of sand bluestem, sand reedgrass, sand dropseed, little bluestem, blue grama, needleandthread, and switchgrass. Sand sagebrush is interspersed with the grasses. To maintain a productive growth of forage plants, proper grazing is essential. Periodic deferment of grazing during the growing season is beneficial in maintaining and improving range condition. Fencing is necessary to obtain more uniform distribution of grazing animals. Brush management is needed when sand sagebrush becomes excessively dense and reduces forage production.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing nesting and escape cover areas. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by water developments and types of fencing to permit unrestricted antelope movement.

This soil is well suited for use as homesites and other urban developments, with only minor limitations that can be easily modified. Where the soil is considered for a sewage lagoon system, special sealing methods are required to overcome the excessive seepage. Capability subclass IIIe nonirrigated, IIIe irrigated.

48—**Julesburg fine sandy loam, 5 to 9 percent slopes.** This is a deep, well drained soil on upland ridges lying commonly in a northwesterly direction. It formed in noncalcareous, sandy eolian deposits. The average annual precipitation ranges from 15 to 19 inches. Slopes are moderately sloping.

Included in this unit are small areas of Julesburg loamy sand and Manter sandy loam.

Typically the surface layer is grayish brown fine sandy loam about 5 inches thick. The subsoil is dark grayish brown, grayish brown, and brown sandy loam about 26 inches thick. The substratum is brown and pale brown, noncalcareous loamy fine sand to 60 inches or more.

Permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is

In irrigated areas the main concerns of management Where used for homesites and other urban develop-

be seeded to rangeland grasses if they become denuded by grazing or by cultivation. Rangeland mechanical treatment is not generally applicable on these soils because of the high erosion hazard of the Eckley soil. Fencing and careful location of livestock watering places improve distribution of grazing use.

Windbreaks and environmental plantings are difficult to establish on these soils. Soil blowing and steepness of slope are the principal concerns to establishing trees and shrubs. These hazards can be overcome by cultivating only in the tree row, by contour planting and by leaving a strip of vegetative cover between the rows. Supplemental irrigation is necessary at the time of planting and during dry periods. Trees best suited and having good survival

essential to protect soil from blowing, improve water infiltration, improve soil tilth, and conserve moisture. Chiseling or subsoiling breaks up tillage pans and improves water infiltration. Tillage should be kept to a minimum. Terracing is also beneficial in reducing runoff and conserving moisture.

Management concerns in irrigated areas are proper use of irrigation water, maintenance of fertility, and control of soil blowing. This soil is well suited to furrow and border irrigation. Land leveling is necessary in most areas to obtain uniform distribution of water. Irrigation water management is needed for efficient use of water and control of soil losses. Incorporating crop residues into the surface soil increases infiltration, reduces soil blowing

Rangeland vegetation of this soil consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the most important practices to maintain quantity and quality of desirable vegetation on rangeland. Range seeding will speed the revegetation of areas depleted by heavy grazing, cultivation or other disturbances. Combinations of stockwater development, fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are especially effective on rangeland areas in poor and fair condition.

Windbreaks and environmental plantings are well suited on this soil. Summer fallow a year prior to planting, supplemental water during planting and early stages of growth, and continued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky

improve water and root penetration. Tillage pans form easily if this soil is tilled when wet. Terracing is also beneficial in reducing runoff and conserving moisture.

Windbreaks and environmental plantings are somewhat difficult to establish on this soil because of limited moisture and soil moisture relationship. Summer fallow a year prior to planting, supplemental water during planting and early stages of growth, and continued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub, and American plum.

Rangeland vegetation of this soil consists mainly of blue grama, western wheatgrass, buffalograss, green needlegrass, alkali sacaton and sedge. Managing rangeland to maintain a balance between livestock and forage production is essential on this soil. Contour furrowing or

needlegrass, alkali sacaton and sedge. Managing rangeland to maintain a balance between livestock and forage production is essential on this soil. Contour furrowing or pitting aids in recovery of depleted vegetation on this soil by decreasing runoff and increasing water infiltration. Areas having dense stands of pricklypear or rabbitbrush can be managed by chemical control of these species.

In nonirrigated cropland areas, management practices such as stubble mulch tillage and incorporating crop residues are needed to protect the surface soil from blowing, improve soil tilth and conserve moisture. Chiseling and subsoiling improve water and root penetration. Tillage pans form easily if this soil is tilled when wet. Terracing is also beneficial in reducing runoff, controlling erosion, and conserving moisture.

Windbreaks and environmental plantings are difficult to establish on this soil because of limited moisture and soil moisture relationship. Summer fallow a year prior to planting, supplemental water during planting and early stages of growth, planting on the contour, and continued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited

Management concerns in irrigated areas are mainly proper use of irrigation water and maintenance of fertility. This soil is well suited to furrow or border irrigation. Land leveling is necessary in some areas to obtain uniform distribution of water. Length of runs should be designed to allow for infiltration of irrigation water because of the slow permeability. Incorporating crop residues in the surface soil increases infiltration and improves soil tilth. Applications of manure and commercial fertilizers containing nitrogen and phosphorus are needed to maintain soil productivity.

Rangeland vegetation consists mainly of alkali sacaton, inland saltgrass, switchgrass, western wheatgrass and sedge. Key forage grasses need to be maintained by proper grazing use and grazing management that includes deferment during the growing season at well-timed intervals. These soils can be seeded to rangeland species or adapted introduced grasses such as tall wheatgrass. Fencing and water developments are effective in obtaining more uniform distribution of grazing.

Windbreaks and environmental plantings are generally

Included are small areas of Hayford silty clay loam, saline and Nunn clay loam, wet.

Typically the surface layer is grayish brown silty clay loam about 9 inches thick. The subsoil is grayish brown, calcareous, salt affected heavy silty clay loam about 25 inches thick. The substratum is light gray, calcareous heavy silty clay loam to 60 inches.

Permeability is slow. Effective rooting depth is 60 inches. Available water capacity is high. Surface runoff is slow, and the erosion hazard is slight.

This soil is used mainly for grazing. Some small areas are used for irrigated cropland. Alfalfa and small grains are the principal crops grown. Crop yields are low and crop selection limited because of the salt condition.

Rangeland vegetation consists mainly of alkali sacaton, inland saltgrass, switchgrass, western wheatgrass, sedge, and rush. Key forage grasses need to be maintained by proper grazing use and grazing management that includes deferment during the growing season at well-timed intervals. These soils can be seeded to rangeland species or permeability. Compensating building designs and measures are needed for dwellings and roads in order to minimize the shrink-swell condition. Capability subclass VIs nonirrigated, IVs irrigated.

57—Lebsack clay loam, wet. This is a deep, somewhat poorly drained soil on terraces, upland flood plains and alluvial fans. It formed in calcareous, clayey alluvium. This soil is affected by wetness caused by seepage from irrigation supply systems. The average annual precipitation ranges from 15 to 17 inches. Slopes are nearly level.

Included in this unit are small areas of Nunn clay loam, wet, and Satanta loam, wet.

Typically the surface layer is grayish brown silty clay loam about 9 inches thick. The subsoil is grayish brown, calcareous heavy silty clay loam about 25 inches thick. The substratum is light gray, calcareous, heavy silty clay loam to 60 inches. Salts is common in the substratum and lower part of the subsoil.

Permeability is slow. Effective rooting depth is 60 inches. Available water capacity is high. Surface runoff is

This is an important soil for wildlife because of its position in relation to irrigation canals and irrigated cropland. Under irrigation, it is important for food production for wildlife such as waterfowl, pheasants and deer, all of which utilize crop residues following harvest. Wildlife values can be enhanced on this soil by wildlife habitat developments such as tree and shrub plantings and by undisturbed nesting cover which consists of grasses and legumes. In the presence of a water supply, waterfowl can be attracted to the area by development of shallow water areas.

Where this soil is used for homesites and other urban

deferment during the growing season at well-timed intervals. The soil can be seeded to rangeland species or adapted introduced grasses such as tall wheatgrass. Fencing and water developments are effective in obtaining more uniform distribution of grazing.

Windbreaks and environmental plantings are well suited to this soil. The high water table and abundant competing vegetation are the principal concerns in establishing tree and shrub plantings. Summer fallow, continued cultivation for weed control and selection of adapted plants are needed to insure establishment and

This soil is used for grazing, nonirrigated and irrigated cropland. Wheat is the principal crop grown in nonirrigated areas. Corn, alfalfa and small grains are the main crops grown in irrigated areas.

In nonirrigated cropland areas the main concerns of management are conserving soil moisture and protecting the soil from blowing. Stubble mulch tillage and incorporating crop residues are needed to protect soil from blowing, improve soil tilth and conserve moisture. Tillage should be kept to a minimum. Planting crops in alternate strips at right angles to the prevailing wind is effective in

Where this soil is used for homesites and other urban developments, the primary limiting soil features are seepage and soil blowing. Sealing methods are required to overcome excessive seepage in sewage lagoon sites. This soil should be protected from soil blowing at all times by utilization of mulches or vegetative cover. Capability subclass IVe nonirrigated, IIIe irrigated.

60—Manter loamy sand, 3 to 9 percent slopes. This is a deep, well drained soil on upland ridges and hills. It formed in calcareous, loamy eolian and alluvial materials. The average annual precipitation ranges from 13 to 19

Supplemental irrigation is necessary at the time of planting and during dry periods. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac and Siberian peashrub.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbit, can be encouraged by water developments and types of fencing to permit unrestricted antelope movement.

Where this soil is used for homesites and other urban developments, the primary limiting soil features are seepage and soil blowing. Sealing methods are required to overcome the excessive seepage in sewage lagoon sites. This soil should be protected from soil blowing at all times by utilization of mulches and vegetative cover. Capability subclass VIe nonirrigated, IVe irrigated.

61—Manter sandy loam, 0 to 3 percent slopes. This is a deep, well drained soil on upland flats, terraces and alluvial fans. It formed in calcareous, loamy eolian and alluvial materials. The average annual precipitation ranges from 12 to 19 inches. Slopes are nearly level to gently

blowing. This soil is suited to furrow, border or sprinkler irrigation methods. Leveling and irrigation water management are necessary to obtain uniform distribution and efficient use of water. Frequent light irrigations are beneficial on this soil because of its moderate available water capacity. Incorporating crop residues is needed to reduce soil blowing during periods when the soil is not protected by growing crops. It also improves soil tilth. Applications of manure and commercial fertilizer containing nitrogen and phosphorus are needed in maintaining soil fertility.

The rangeland vegetation of this soil consists of sand bluestem, sand reedgrass, sand dropseed, little bluestem, blue grama, needleandthread, and switchgrass. Sand sagebrush is interspersed with the grasses. To maintain a productive growth of forage plants, proper grazing use is essential. Periodic deferment of grazing during the growing season is beneficial in maintaining and improving range condition. Fencing is necessary to obtain more uniform distribution of grazing animals. Brush management is needed when sand sagebrush becomes excessively dense and reduces forage production.

Windbreaks and environmental plantings are generally suited to this soil. Soil blowing is the principal concern to establishing trees and shrubs. This hazard can be overcome by cultivating only in the tree row and by leaving a strip of vegetative cover between the rows. Supplemental irrigation is necessary at the time of planting and during dry periods. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa

brown and brown sandy loam about 18 inches thick and is calcareous in the lower part. The substratum is light gray and pale brown, calcareous sandy loam and loamy sand extending to 60 inches or more.

Permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is medium, the erosion hazard is moderate, and the soil blowing hazard is moderate.

This soil is used mainly for nonirrigated and irrigated cropland. Some areas are used for grazing. Wheat is the principal crop in nonirrigated cropland. Alfalfa, corn, and sugar beets are the main crops on irrigated cropland.

Primary objectives of management in nonirrigated cropland areas are protecting soil from blowing and conserving moisture. Stubble mulch tillage and incorporating

strip of vegetative cover between the rows. Supplemental irrigation is necessary at the time of planting and during dry periods. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac and Siberian peashrub.

This soil is well suited for use as homesites and other urban developments, with only minor limitations that can be easily modified. Sealing methods are required to overcome the excessive seepage when the soil is used as a sewage lagoon site. Capability subclass IVe nonirrigated, IIIe irrigated.

63—Manter sandy loam, 5 to 9 percent slopes. This is

The rangeland vegetation of this soil consists mainly of sand bluestem, sand reedgrass, sand dropseed, little bluestem, blue grama, needleandthread, and switchgrass. Sand sagebrush is interspersed with the grasses. To maintain a productive growth of forage plants, proper grazing use is essential. Periodic deferment of grazing during the growing season is beneficial in maintaining and improving range condition. Fencing is necessary to obtain more uniform distribution of grazing animals. Brush management is needed when sand sagebrush becomes excessively dense and reduces forage production.

Windbreaks and environmental plantings are generally suited to this soil. Soil blowing is the principal concern to establishing trees and shrubs. This hazard can be overcome by cultivating only in the tree row and by leaving a strip of vegetative cover between the rows. Supplemental irrigation is necessary at the time of planting and during dry periods. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs best suited are skunkbush sumac, lilac and Siberian peashrub.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by water developments.

Where used for homesites and other urban developments, this soil has only minor limitations that can be easily modified. Sealing methods are required to overcome the excessive seepage when this soil is used for sewage lagoon sites. Capability subclass IVe nonirrigated, IVe irrigated.

64—Manter sandy loam, water table. This is a deep, moderately well drained soil on terraces. It formed in calcareous, loamy alluvial materials. The average annual precipitation ranges from 13 to 15 inches. Slopes are nearly level.

Included in this unit are small areas of Julesburg fine sandy loam, 0 to 3 percent slopes.

Typically the surface layer is a grayish brown sandy loam about 6 inches thick. The subsoil (fig. 13) is dark grayish brown and brown sandy loam about 18 inches thick and is calcareous in the lower part. The substratum is light gray and pale brown, calcareous sandy loam and loamy sand extending to 60 inches. Mottles are common in the substratum below 40 inches.

Permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, the erosion hazard is slight, and the soil blowing hazard is moderate.

This soil is used mainly for irrigated cropland. Some small areas are used for grazing. Corn, alfalfa and sugar beets are the main crops grown.

In irrigated areas the main concerns of management are proper use of irrigation water, soil fertility and soil blowing. This soil is suited to furrow, border or sprinkler irrigation methods. Leveling and good irrigation water management are necessary to obtain uniform distribution and efficient use of water. Frequent light irrigations are most effective on this soil because of the moderate available water capacity. Incorporating crop residues is needed to reduce soil blowing during periods when the soil is not protected by growing crops. It also improves soil tilth. Applications of manure and commercial fertilizer containing nitrogen and phosphorus are needed in maintaining soil fertility.

The rangeland vegetation of this soil consists mainly of sand bluestem, sand reedgrass, sand dropseed, little bluestem, blue grama, needleandthread, and switchgrass. Sand sagebrush is interspersed with the grasses. To maintain a productive growth of forage plants, proper grazing use is essential. Periodic deferment of grazing during the growing season is beneficial in maintaining and improving range condition. Fencing is necessary to obtain more uniform distribution of grazing animals. Brush management is needed when sand sagebrush becomes excessively dense and reduces forage production.

Windbreaks and environmental plantings are generally suited to this soil. Soil blowing is the principal concern in establishing trees and shrubs. This hazard can be overcome by cultivating only in the tree row and by leaving a strip of vegetative cover between the rows. Supplemental irrigation is necessary at the time of planting and during dry periods. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac and Siberian peashrub.

Openland wildlife such as pheasant, cottontail, mourning dove and miscellaneous songbirds are favored on this soil because of its high potential for growing habitat utilized by these kinds of wildlife. Under irrigation, growing a great variety of crops and cover types is possible. Some of the primary needs of openland wildlife populations include tree and shrub plantings and undisturbed nesting cover.

The primary limiting soil features for homesites, other urban developments, and roads are the water table and seepage. Special septic systems are needed to offset the high water table. Compensating engineering measures are required for dwellings with basements in order to overcome the water table condition. Special sealing methods are required to overcome excessive seepage when this soil is used as a sewage lagoon site. Capability subclass IIIe nonirrigated, IIw irrigated.

65—Manter sandy loam, wet. This is a deep, wet soil affected by a slight saline condition. It is on upland flats and ridges and is affected by excessive seepage from irrigation canals. It formed in calareous, loamy eolian and alluvial materials. The average annual precipitation ranges from 13 to 19 inches. Slopes are nearly level to gently sloping.

Included in this unit are small areas of Manter sandy loam, 0 to 3 percent slopes.

Typically the surface layer is a grayish brown sandy loam about 6 inches thick. The subsoil is dark grayish brown and brown sandy loam about 18 inches thick with some visible salts occurring as streaks and seams in the

which utilize crop residues following harvest. Wildlife values can be enhanced on this soil by habitat developments such as tree and shrub plantings and undisturbed nesting cover, which consists of grasses and legumes. In the presence of a water supply, waterfowl can be at-

Windbreaks and environmental plantings are difficult to establish on this soil. Summer fallow a year prior to planting, supplemental water during planting and early stages of growth, and continued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub

These soils are used almost entirely for grazing. Some small isolated cultivated areas have been seeded back to grass.

The rangeland vegetation of both soils consists of blue grama, western wheatgrass, buffalograss, sand dropseed, and winterfat beneath a sparse overstory of fourwing saltbush. Grazing management practices should be aimed at maintaining fourwing saltbush for its value as a source of protein during the winter for livestock or wildlife

The Keota soil is a moderately deep, well drained soil. It formed in calcareous, loamy alluvial and eolian materials derived from weathered Brule Siltstone.

Typically the surface layer is light brownish gray loam about 4 inches thick. The underlying layer is light brownish gray and very pale brown, calcareous loam about 20 inches thick. White siltstone of the Brule Formation is at a depth of about 24 inches.

Permeability is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Sur-

nearly level, lower lying concave areas that receive more surface runoff.

About 10 percent of this unit is Keota loam on narrow gently sloping convex ridges and knobs.

The Mitchell soil is a deep, well drained soil on broad upland flats and fans. It formed in calcareous, loamy alluvial and eolian materials derived from weathered siltstone.

Typically the surface layer is light brownish gray loam about 5 inches thick. The underlying layer is light gray

and early stages of growth, and continued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub and American plum.

These soils produce habitat elements for either rangeland wildlife such as antelope or openland wildlife including pheasants, cottontail and mourning doves. Types of commercial fertilizers containing phosphorus and nitrogen are needed for soil fertility.

Rangeland vegetation consists mainly of alkali sacaton, inland saltgrass, switchgrass, western wheatgrass, sedge, and rush. These key forage grasses need to be maintained by proper grazing use and grazing management that includes deferment during the growing season at well-timed intervals. This soil can be seeded to rangeland species or adapted introduced grasses such as tall wheatgrass. Fencing and water developments are effective in obtaining

Windbreak and environmental plantings are generally not suited to this soil because of the strong saline-alkali condition.

Wildlife is limited on this soil. Some wetland wildlife, especially waterfowl, utilize these areas. The position of this soil in relation to irrigated cropland makes it valuable to both wetland and openland wildlife. Wildlife developments are difficult to establish.

This soil is severely limited for homesites and other urban developments. The limiting soil features are the high water table, high shrink-swell potential, slow permeability and inherent low strength. Intensive compensating measures are needed to minimize these soil conditions. Capability subclass VIIw nonirrigated.

74—Norka loam, 0 to 1 percent slopes. This is a deep, well-drained soil on upland tablelands north of the South

Windbreaks and environmental plantings are generally well suited on this soil. Summer fallow a year prior to planting, supplemental water during planting and early stages of growth, and continued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub and American plum.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub

runoff is slow, the erosion hazard is slight, and the soil blowing hazard is moderate.

These soils are used almost entirely for irrigated and nonirrigated cropland. The remaining small areas are used for grazing. Corn, alfalfa and sugar beets are the main crops grown in irrigated areas. Wheat and grain sorghum are principal crops in nonirrigated areas.

Management concerns in irrigated areas are proper irrigation water use and maintenance of fertility. This soil is well suited to furrow or border irrigation methods. Land leveling is needed in some areas to obtain uniform application of water. Irrigation water management consisting of proper length of run is needed for efficient use of irrigation water and for keeping soil losses to a minimum. Applications of manure and commercial fertilizers containing nitrogen and phosphorus are needed to maintain fertility. Incorporating crop residues into the soil and maintaining organic matter content increase water infiltration and improve soil tilth.

In nonirrigated cropland areas the primary objectives of management are conserving moisture and protecting soil from soil blowing. Management practices such as stubble mulch tillage and incorporating crop residues are essential to protect soil from blowing, improve water infiltration, improve soil tilth, and conserve moisture. Chiseling or subsoiling breaks up tillage pans and improves water infiltration. Tillage should be kept to a minimum. Terracing is also beneficial in reducing runoff and conserving moisture.

Rangeland vegetation of these soils consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by grazing management, water developments and types of fencing to permit unrestricted antelope movement.

Where used for homesites and other urban developments, this soil has only minor limitations that can be easily modified through the use of appropriate design and construction. Capability subclass IIc nonirrigated, IIe irrigated.

76—Nunn loam, 0 to 1 percent slopes. This is a deep, well drained soil on terraces. It formed in calcareous, loamy alluvium. The average annual precipitation ranges from 13 to 19 inches. Slopes are nearly level.

Included in this unit are small areas of Nunn sandy loam and Nunn clay loam, water table. The areas with sandy loam surface layers border sandy eolian areas.

Typically the surface layer is grayish brown loam about 6 inches thick. The subsoil is grayish brown heavy clay loam about 20 inches thick over grayish brown, calcareous clay loam about 5 inches thick. The substratum is light gray and light grayish brown loam extending to 60 inches.

Permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is slow, and the erosion hazard is slight.

This soil is used almost entirely for irrigated cropland. Some small isolated areas are used for grazing. Corn, alfalfa, sugar beets and wheat are the main crops grown.

Management concerns in irrigated areas are mainly proper use of irrigation water, slow permeability and maintenance of fertility. This soil is well suited to furrow

suited are skunkbush sumac, lilac, Siberian peashrub and American plum.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife.

Where the soil is used for homesites and other urban developments, the primary limiting soil features are high shrink-swell potential and slow permeability. Special sewage systems must be anticipated. Septic tank absorption fields will not function properly because of the slow permeability. Compensating engineering designs and measures such as backfilling with materials with low shrink-swell potential and offsetting structural construction are needed to minimize the shrink-swell potential. Capability subclass IIIc nonirrigated, IIe irrigated.

permeability and slope. Incorporating crop residues into the surface soil increases infiltration, reduces soil loss and improves soil tilth. Applications of manure and commercial fertilizers containing nitrogen and phosphorus are important in maintaining soil productivity.

Rangeland vegetation of this soil consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the most important practices to maintain quantity and quality of desirable rangeland vegetation. Range seeding will speed the revegetation of areas depleted by heavy grazing, cultivation or other disturbances. Combinations of stockwater development, fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are especially effective on range areas in poor and fair condition.

Windbreaks and environmental plantings are suited on this soil. Summer fallow a year prior to planting, supple-

Typically the surface layer is a grayish brown loam about 6 inches thick. The subsoil is grayish brown heavy clay loam about 20 inches thick over grayish brown, calcareous clay loam about 5 inches thick. The substratum is light gray and light grayish brown loam extending to 60 inches.

Permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Surf

sewage systems must be anticipated. Septic tank absorption fields will not function properly because of the slow permeability. Compensating engineering designs and measures such as backfilling with materials with low shrink-swell and offsetting structural construction are needed to minimize the high shrink-swell potential. Capability subclass IIIe nonirrigated.

areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by water development and fencing with types of fencing that per-

Rangeland vegetation of this soil consists mainly of blue grama, western wheatgrass, buffalograss, green needlegrass, alkali sacaton, and sedge. Managing rangeland to maintain a balance between livestock and forage production is highly essential. Contour furrowing or pitting aids in recovery of depleted vegetation by reducing runoff and increasing water infiltration. Areas having

This soil is used mainly for grazing. Some areas are used for nonirrigated cropland, with wheat as the main crop. This soil is best suited for grazing because of the slow permeability and moderate erosion hazard.

In nonirrigated cropland areas the main objectives of management are conserving moisture and protecting the

Typically the surface layer is grayish brown heavy clay loam about 10 inches thick. The subsoil is grayish brown heavy clay loam about 13 inches thick over grayish brown calcareous clay loam about 13 inches thick. The substratum is light gray and light grayish brown clay loam

where the soil is used for homesites or urban developments. Special sewage systems must be anticipated. Septic tank absorption fields will not function properly

ing and watering developments are effective in obtaining more uniform distribution of grazing.

Windbreaks and environmental plantings are generally

In irrigated areas the main concerns of management are proper use of irrigation water, soil fertility and control of erosion. This soil is suited to contour furrow, con-

and types of fencing to permit unrestricted antelope movement.

This soil is well suited for homesites and other urban

tinued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub and American plum.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing areas for nesting and escape cover. For pheasant, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by grazing management, water developments and types of fencing to permit unrestricted antelope movement.

This soil is well suited for homesites and other urban developments, with only minor limitations that can be easily modified. Capability subclass VIe nonirrigated, IVe irrigated.

86—Peetz gravelly sandy loam, 5 to 25 percent slopes. This is a deep, well drained soil on upland ridges and knobs. It formed in calcareous, gravelly alluvium. The average annual precipitation ranges from 15 to 19 inches.

plantings. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine and Siberian elm. Shrubs best adapted are skunkbush sumac and lilac.

Wildlife such as mule deer, antelope and cottontail rabbit inhabit areas of this soil. The relief and vegetative growth, especially the few shrubs and trees occurring in the draws, provide food and cover. Wildlife can be encouraged by proper grazing management and installation of watering facilities.

The soil is suited for homesites and other urban developments, with only minor limitations that can be easily modified, except where slopes are greater than 15 percent. In areas with slopes greater than 15 percent, intensive compensating measures are needed. Capability subclass VIe nonirrigated.

87—Platner sandy loam, 0 to 3 percent slopes. This is a deep, well drained soil on upland flats. It formed in mixed calcareous alluvial and eolian deposits. The average annual precipitation ranges from 13 to 19 inches. Slopes are nearly level to gently sloping.

Included in this unit are small areas of Haxtun sandy loam, 0 to 1 percent slopes, in concave depressional areas and Ascalon fine sandy loam, 0 to 3 percent slopes.

Typically the surface layer is grayish brown fine sandy loam about 7 inches thick. The subsoil is grayish brown and light brownish gray heavy clay loam about 14 inches

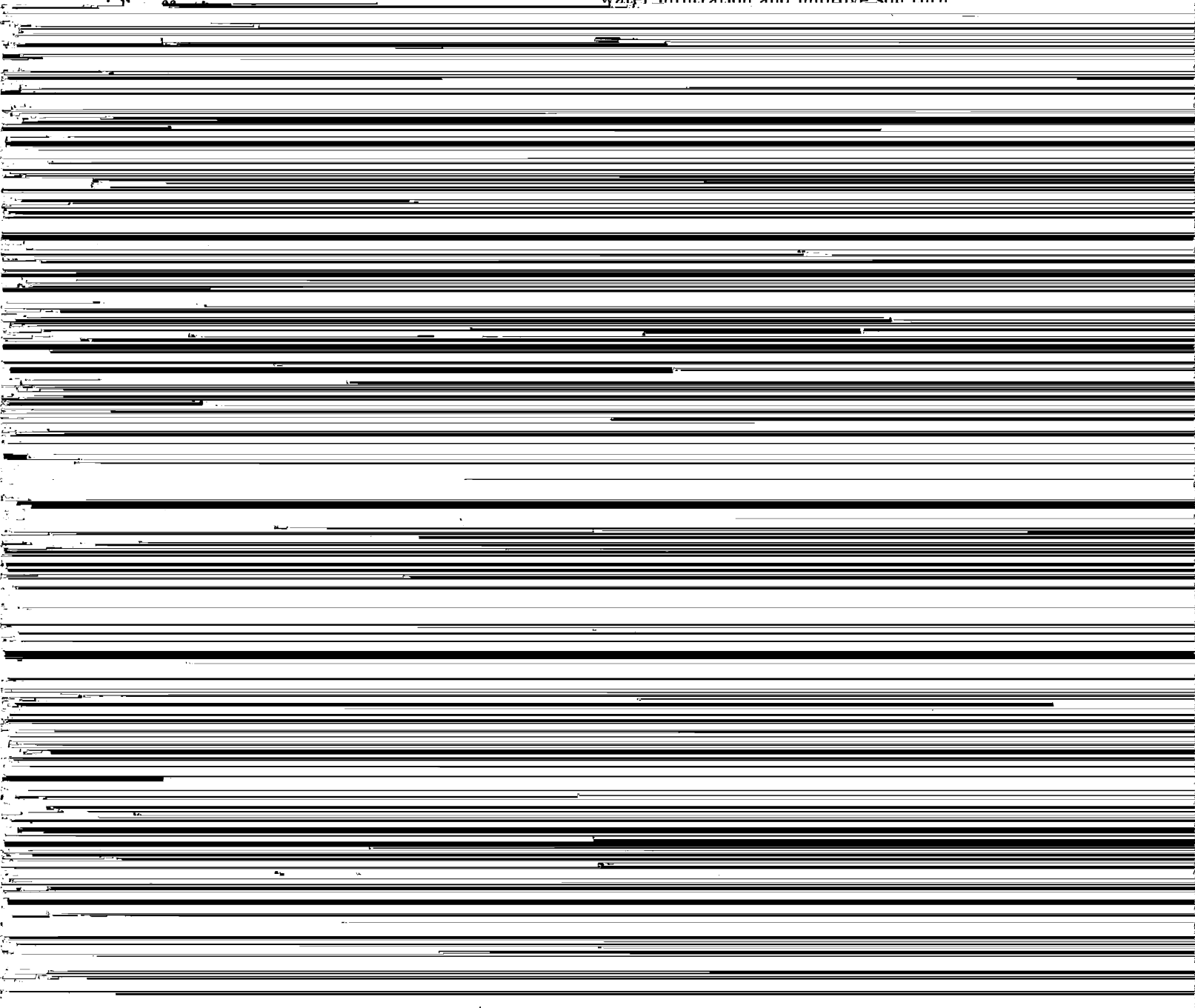
uniform distribution and efficient use of water. Careful design of the irrigation system is needed because of the slow permeability. Incorporating crop residues is needed to reduce soil blowing during periods when the soil is not protected by growing crops. It also improves soil tilth. Applications of manure and commercial fertilizer containing nitrogen and phosphorus are needed in maintaining soil fertility.

Rangeland vegetation of this soil consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the most important practices to maintain quantity and quality of desirable rangeland vegetation. Range seeding will speed the revegetation of areas depleted by heavy grazing, cultivation or other disturbances. Combinations of stockwater development, fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are

Permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is slow, and the erosion hazard is slight.

Nearly all of this soil is used for irrigated cropland. Corn, alfalfa, sugar beets and small grains are the main crops grown. Some small isolated areas are used for grazing.

Management concerns in irrigated areas are proper irrigation water use and maintenance of fertility. This soil is well suited to furrow and border irrigation methods. Land leveling is needed in some areas to obtain more uniform application of water. Good irrigation water management consisting of proper length of run is needed for efficient use of irrigation water because of the slow permeability. Applications of manure and commercial fertilizers containing nitrogen and phosphorus are needed to maintain fertility. Incorporating crop residues into the soil and maintaining organic matter content increase water infiltration and improve soil tilth.



will not function properly because of the slow permeabili... especially effective on range areas in poor and fair condi...

crop residues improve soil tilth and protect the soil from erosion. Terracing and contour farming are essential to conserve water and control runoff, thus reducing erosion. Tillage pans tend to form easily if this soil is tilled when wet. Chiseling or subsoiling improves water penetration and breaks up tillage pans. Tillage should be kept to a minimum. More intensive use of conservation practices is essential because of slope.

In irrigated areas the primary concerns of management are control of soil erosion, proper use of irrigation water, slow permeability and fertility maintenance. Contour ditch and contour furrow are the best suited methods of irrigation on this soil. Land leveling is needed in most areas to obtain more uniform distribution of irrigation water. More frequent irrigations with smaller amounts of water because of the slow permeability are needed to reduce soil loss. Incorporating crop residues improves water infiltration and soil tilth and helps control soil erosion. Applications of manure and commercial fertilizers containing nitrogen and phosphates are needed to maintain soil fertility.

Rangeland vegetation of this soil consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the most important practices to maintain quantity and quality of desirable rangeland vegetation. Range seeding will speed the revegetation of areas depleted by heavy graz-

potential and slow permeability of the subsoil. The high shrink-swell potential can be overcome with careful design and construction. Septic tank absorption fields will not function properly because of the slow permeability. Capability subclass IIIe nonirrigated, IIIe irrigated.

91—Platner-Rago-Dacono loams. These nearly level to gently sloping soils are on upland tablelands mainly in the northern part of the county. The average annual precipitation ranges from 17 to 19 inches. This unit is about 50 percent Platner loam, 0 to 3 percent slopes, about 30 percent Rago loam, 0 to 1 percent slopes, and 20 percent Dacono loam, 0 to 3 percent slopes. The Platner soil is on gentle slopes, the Rago soil is in nearly level concave swale areas and the Dacono soil is on the gently sloping convex ridges where the underlying gravel is close to the surface.

The Platner soil is a deep, well drained soil. It formed in calcareous, loamy alluvial and eolian materials.

Typically the surface layer is grayish brown loam about 7 inches thick. The subsoil is grayish brown and light brownish gray heavy clay loam (fig. 17) about 14 inches thick and is calcareous in the lower part. The substratum is white and very pale brown, calcareous loam and fine sandy loam about 13 inches thick over brown, calcareous gravelly coarse sandy clay loam that extends to 60 inches or more.

Permeability is slow. Effective rooting depth is 60

Rangeland vegetation of this soil consists mainly of Permeability is slow. Effective rooting depth is 60

slopes, makes up 20 percent. The Renohill soil is on footslopes and at midslope. Shingle soils are on ridge crests.

About 20 percent of this unit is Cushman loam and Stoneham loam.

The Renohill soil is a moderately deep, well drained soil. It formed in calcareous materials weathered from interbedded soft shale and sandstone.

Typically the surface layer is grayish brown loam about 5 inches thick. The subsoil is light olive brown and light yellowish brown heavy clay loam about 15 inches thick and is calcareous in the lower part. The substratum is vel-

Supplemental irrigation is needed to insure survival. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine and Siberian elm. Shrubs best adapted are skunkbush sumac and lilac.

Rangeland wildlife such as antelope, cottontail rabbit and coyote are best adapted on these soils. Proper grazing management is necessary if livestock and wildlife share the range. Watering facilities are also important and are utilized by various species.

In areas considered for homesites and other urban

percent slopes, about 30 percent. The Rosebud soil is at midslope and on footslopes. The Escabosa soil is on crests of ridges.

About 20 percent of this unit consists of Wages loam and sedge. Proper grazing use and planned grazing systems are the most important practices to maintain quantity and quality of desirable rangeland vegetation. Range seeding will speed the revegetation of areas

Typically the surface layer is a grayish brown loam about 5 inches thick. The subsoil is a dark grayish brown loam about 13 inches thick and is calcareous in the lower part. The substratum is a light gray, calcareous loam about 15 inches thick over white cemented calcareous sandstone.

Permeability is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is high. Surface runoff is medium, and the erosion hazard is moderate.

The Escabosa soil is a moderately deep, well drained soil. It formed in calcareous, loamy alluvial and eolian materials underlain by cemented calcareous sandstone.

Typically the surface layer is grayish brown loam about 10 inches thick. The underlying layers are light brownish gray and light gray, calcareous loam about 22 inches thick over white, cemented calcareous sandstone.

Permeability is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate or high. Surface runoff is medium, and the erosion hazard is moderate.

These soils are used mainly for nonirrigated cropland. Some areas are used for nonirrigated crops. Alfalfa and small grains are the principal crops grown in irrigated tribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are especially effective on rangeland areas in poor and fair condition.

Windbreaks and environmental plantings are somewhat difficult to establish on this unit because of slope and soil depth. Summer fallow a year prior to planting, supplemental water during planting and early stages of growth, and continued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub and American plum.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to this soil. In cropland areas favorable habitat can be developed by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in planning for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be en-

The Escabosa soil is a moderately deep, well drained soil. It formed in calcareous loamy alluvial and eolian

Openland wildlife such as pheasant, cottontail rabbit and mourning dove use

ganic matter content increase water infiltration and improve soil tilth.

Rangeland vegetation of this soil consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the most important practices to maintain quantity and quality of desirable rangeland vegetation. Range seeding will speed the revegetation of areas depleted by heavy grazing, cultivation or other disturbances. Combinations of stockwater development, fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that

In irrigated cropland areas corn, alfalfa, sugar beets and small grains are the main crops grown. Wheat and sorghum are the main crops grown in a crop-fallow system in nonirrigated cropland areas because precipitation is limited.

Management concerns in irrigated areas are proper use of irrigation water, maintenance of fertility and control of soil erosion. This soil is well suited to furrow and border irrigation. Land leveling is necessary in most areas to obtain uniform distribution of water. Irrigation water management is needed for efficient use of water and control of soil loss. Incorporating crop residues into the sur-

tions that can be easily modified. Capability subclass IIe irrigated, IIc nonirrigated.

101—Satanta loam, 3 to 5 percent slopes. This is a deep, well drained soil on upland ridges and hills. It formed in calcareous, loamy eolian and alluvial materials. The average annual precipitation ranges from 14 to 19 inches. Slopes are gently sloping to moderately sloping.

Included in this unit are small areas of Wages loam and Ascalon sandy loam.

Typically the surface layer is grayish brown loam about 7 inches thick. The subsoil is a dark grayish brown and grayish brown clay loam and loam about 13 inches thick and is calcareous in the lower part. The substratum is light gray and very pale brown, calcareous loam extending to 60 inches or more.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is medium, and the erosion hazard is moderate.

This soil is used mainly for [illegible]

planting, supplemental water during planting and early stages of growth, and continued cultivation for weed control are needed to insure establishment and survival of plantings. Trees best suited and having best survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac, Siberian peashrub and American plum.

This soil is best suited for openland and rangeland wildlife. In cropland areas, habitat favorable for pheasant, mourning dove, and many nongame species can be developed by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. This is especially true in areas of intensive agriculture. Rangeland wildlife, such as antelope, can be encouraged by development of watering facilities, grazing management, and range seeding where needed.

most important practices to maintain quantity and quality of desirable rangeland vegetation. Range seeding will speed the revegetation of areas depleted by heavy grazing, cultivation or other disturbances. Combinations of stockwater development, fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are

affected by a seeped water table caused by water losses from irrigated land at higher elevations and from irrigation supply systems.

This soil is used mainly for irrigated cropland. Some areas are used for grazing. Corn, alfalfa, sugar beets and small grains are the principal crops grown.

Management concerns in irrigated areas are proper irrigation water use, maintenance of fertility and the high

will require compensating engineering measures such as drainage to minimize the water table. Capability subclass IIIs nonirrigated, IIw irrigated.

104—Shingle loam, 1 to 9 percent slopes. This is a shallow, well drained soil on upland ridges in the

Typically the surface layer is grayish brown sandy loam about 4 inches thick. The subsoil is grayish brown and light brownish gray clay loam about 9 inches thick and is calcareous in the lower part. The substratum layer is a very pale brown calcareous loam that extends to 60

In nonirrigated cropland areas the primary objectives of management are conserving moisture and protecting the soil from erosion. Stubble mulch tillage and incor-

couraged by grazing management, water developments and types of fencing to permit unrestricted antelope movement.

This soil is well suited for homesites and other urban

and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by grazing management, water developments

tion and reduce runoff and are especially effective on rangeland areas in poor and fair condition.

Windbreaks and environmental plantings are difficult

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is rapid, and the erosion hazard is high.

The Shingle soil is a shallow, well drained soil on upland ridges. It formed in calcareous loamy materials weathered from interbedded soft sandstone and shale.

Typically the surface layer is grayish brown loam about 2 inches thick. The underlying layer is light olive brown and light yellowish brown, calcareous clay loam about 8 inches thick. Interbedded soft sandstone and shale is at a depth of about 10 inches.

Permeability is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is low. Surface runoff is rapid, and the erosion hazard is high.

These soils are used entirely for grazing. They are not suited for cropland because of the high erosion hazard.

Rangeland vegetation of the Thedalund and Shingle soils consists of a sparse stand of blue grama, western wheatgrass, alkali sacaton, sedge, sideoats grama, winterfat and fourwing saltbush. Rangeland vegetation of the Kim soil consists of blue grama, western wheatgrass, needleandthread, sideoats grama, little bluestem, squirreltail and sedge. Careful attention to proper grazing use is needed to prevent depletion on this unit because it is difficult to revegetate. Water developments or other

Typically the surface layer is a grayish brown loam about 5 inches thick. The subsoil is grayish brown and pale brown loam about 9 inches thick and is calcareous in the lower part. The substratum layer is light gray and light yellowish very fine sandy loam extending to 60 inches or more.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is medium, the erosion hazard is moderate, and the soil blowing hazard is moderate.

The Norka soil is a deep, well drained soil. It formed in calcareous, loamy eolian deposits.

Typically the surface layer is a grayish brown loam about 4 inches thick. The subsoil is dark grayish brown and light brownish gray clay loam 11 inches thick and is calcareous in the lower part. The substratum is very pale brown, calcareous silt loam and loam extending to 60 inches or more.

Permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is medium, the erosion hazard is moderate, and the soil blowing hazard is moderate.

These soils are used mainly for nonirrigated cropland. The remaining acreage is used for grazing. Wheat and grain sorghum are the principal crops, grown in a crop-fallow system.

Openland wildlife such as pheasant, cottontail rabbit and mourning dove are suited to these soils. In cropland areas favorable habitat can be developed by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by water developments, proper grazing management, and types of fencing to permit unrestricted antelope movement.

Where used for homesites and other urban developments, these soils have only minor limitations that can be easily modified through the use of appropriate construction designs. Capability subclass IIIe nonirrigated.

111—Ulysses-Norka-Colby loams, 5 to 9 percent slopes. These soils are on moderately sloping upland ridges and hills in the south central part of the county. The average precipitation ranges from 15 to 19 inches. Ulysses loam, 5 to 9 percent slopes, makes up about 50 percent of this unit, Norka loam, 5 to 9 percent slopes, about 25 percent, and Colby loam, 5 to 9 percent slopes, about 20 percent. The Ulysses soil is at midslope. The Norka soil is on the less sloping footslopes, and the Colby soil is on ridge crests.

Included with this unit are small areas of Colby loam, 9 to 12 percent slopes. Also included are severely eroded areas occurring mainly on slope crests.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is rapid, the erosion hazard is high, and the soil blowing hazard is moderate.

These soils are used for nonirrigated cropland and grazing. Wheat is the principal crop grown in a crop-fallow system.

In nonirrigated cropland areas intensive management is needed to control soil erosion and soil blowing, conserve moisture and maintain soil productivity. Stubble mulch tillage and incorporating crop residues are essential in improving soil tilth, conserving moisture and protecting the soil from erosion and blowing. Terracing (fig. 22) and contour tillage are essential to reduce runoff, control erosion and conserve moisture. Chiseling or subsoiling is effective in breaking up tillage pans and improves water penetration. Tillage should be kept to a minimum.

Rangeland vegetation on all of these soils consists mainly of plants from both medium and short grass communities, including mainly sideoats grama, little bluestem, western wheatgrass, needleandthread and blue grama. These soils erode easily when the vegetation is overgrazed. Grazing management needed to maintain and improve production and range condition is deferred grazing and proper grazing use. Contour furrowing and pitting reduce runoff and erosion, improve water penetration and speed up recovery of areas in fair and poor condition. Fencing and water developments are effective in obtaining uniform distribution of grazing.

bordering intermittent drainageways, gullies and escarpments located mainly in the western part of the county.

tion because of the rapid permeability. Most areas of this soil, however, are small and are irrigated with the sur-

tected at all times by utilization of mulches and vegetative cover to keep soil blowing to a minimum. Capability subclass IVe irrigated, VIe nonirrigated.

114—Valent sand, 15 to 40 percent slopes. This is a deep, excessively drained soil on upland sandhills. It formed in noncalcareous, eolian sand deposits and is extensive in the sandhill area that parallels the South Platte River on the south. The average annual precipitation ranges from 13 to 19 inches. Slopes are hilly with steep abrupt slopes on the windward side.

Included are small areas of blowouts and very sparsely vegetated steep ridges, and areas of Valent loamy sand, 3 to 15 percent slopes.

Typically the surface layer is grayish brown loamy sand about 3 inches thick. The underlying layers are brown and pale brown loamy sand and fine sand that extends to 60 inches or more.

Permeability is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Surface runoff is slow, the soil blowing hazard is high, and the erosion hazard is slight.

This soil is used principally for grazing. Some small isolated areas are used for irrigated cropland.

Rangeland vegetation on this soil consists mainly of sand bluestem, switchgrass, sand reedgrass, little bluestem, sideoats grama, sedge, needleandthread, sand dropseed and blue grama. These grasses furnish most of the forage. Sand sagebrush is scattered in the vegetation. Grazing management must be aimed at the maintenance or improvement of range condition through proper grazing use. Without management of grazing, the plant cover

Typically the surface layer is grayish brown loamy fine sand about 3 inches thick. The subsoil is brown fine sandy loam about 13 inches thick and is calcareous in the lower part. The substratum is pale brown, calcareous fine sandy loam and loamy sand that extends to 60 inches or more.

117—Vona fine sandy loam, 3 to 9 percent slopes. This is a deep, well drained soil on upland ridges and hills. It formed in calcareous eolian sands and fine sandy loams and is extensive in sandy land areas in the southwestern part of the county. The average annual precipitation

ing dry periods. Trees best suited and having good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive and hackberry. Shrubs best suited are skunkbush sumac, lilac and Siberian peashrub.

Rangeland wildlife, such as antelope, cottontail rabbit and coyote are best adapted on this soil. Proper grazing management is necessary if livestock and wildlife share the range. Watering facilities are also important and are utilized by various wildlife species. The position of this soil in relation to croplands makes it valuable as escape cover areas for openland wildlife, especially pheasants. Where this soil is under irrigation, openland wildlife can be encouraged by providing food and cover through various means of wildlife development.

This soil is well suited for the construction of homesites and other urban developments, with only minor limitations that can be easily modified. Where the soil is considered for a sewage lagoon system, special sealing methods will be required to overcome excessive seepage. Capability subclass VIe nonirrigated, IVe irrigated.

118—Wages loam, 0 to 3 percent slopes. This is a deep, well drained soil on upland flats. It formed in calcareous, loamy alluvial and eolian deposits. The average annual precipitation ranges from 15 to 19 inches. Slopes are nearly level to gently sloping.

In nonirrigated cropland areas the primary objectives of management are conserving moisture and protecting soil from erosion. Management practices such as stubble mulch tillage and incorporating crop residues are essential to protect soil from erosion, improve water infiltration, improve soil tilth, and conserve moisture. Chiseling or subsoiling breaks up tillage pans and improves water infiltration. Tillage should be kept to a minimum. Terracing is also beneficial in reducing runoff and erosion and conserving moisture.

Rangeland vegetation of this soil consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Proper grazing use and planned grazing systems are the most important practices to maintain quantity and quality of desirable rangeland vegetation. Range seeding will speed the revegetation of areas depleted by heavy grazing, cultivation or other disturbances. Combinations of stockwater development, fencing and deferred grazing help improve grazing distribution and maintain range condition. Contour furrowing and pitting are practices that improve water infiltration and reduce runoff and are especially effective on rangeland areas in poor and fair condition.

Windbreak and environmental plantings are well suited on this soil. Summer fallow a year prior to planting, supplemental water during planting and early stages of

Typically the surface layer is grayish brown loam about 4 inches thick. The subsoil is dark grayish brown light clay loam about 10 inches thick and is calcareous in the lower part. The substratum is light gray, calcareous loam and fine sandy loam extending to a depth of 60 inches or more.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Surface runoff is medium, and the erosion hazard is moderate.

This soil is used mainly for irrigated and nonirrigated cropland. The remaining acreage is used for grazing. Al-

areas favorable habitat can be developed by establishing areas for nesting and escape cover. For pheasants, undisturbed nesting cover is vital and should be included in plans for habitat development. Tree and shrub plantings along fence lines, irrigation ditches, roadsides and streambanks also help encourage wildlife. Rangeland wildlife, including antelope and jackrabbits, can be encouraged by water developments, grazing management, and types of fencing to permit unrestricted antelope movement.

Rangeland vegetation consists mainly of blue grama, buffalograss, western wheatgrass, and sedge. Prunus inches. Available water capacity is high. Surface runoff is

Permeability is moderate. Effective rooting depth is 60

lagoon sites. Due to the number of intermittent drainageways, special site selection is required on this unit. Capability subclass VIe nonirrigated.

123—**Wages-Rosebud loams, 3 to 5 percent slopes.** These gently sloping soils are on upland ridges and hills in the northern part of the county. The average annual precipitation ranges from 15 to 19 inches. Wages loam, 3

rigation suited to this soil. Land leveling or smoothing is needed in most areas to obtain better distribution of water. Before attempting to level or smooth these soils, care must be taken in determining maximum depth of cut in areas of the Rosebud soil. Irrigation water management is important in obtaining efficient use of water. To control soil loss, alfalfa, small grains and other close sown

124—Wages-Rosebud loams, 5 to 9 percent slopes. . . care must be taken in determining maximum depth of cut

loamy eolian deposits and is extensive in the western part of the county. The average annual precipitation ranges from 13 to 17 inches. Slopes are nearly level.

Included in this unit are small areas of Rago loam.

Typically the surface layer is grayish brown loam about 7 inches thick. The subsoil is

wildlife, including antelope and jackrabbits, can be encouraged on grasslands by livestock water developments and types of fencing to permit unrestricted antelope movement.

The primary limitations of this soil for homesites and

of desirable rangeland vegetation. Range seeding will In irrigated areas the main concerns of management

swales and old channel areas. The Alda soils are on the raised terraces of the area.

About 10 percent of this unit is Fluvaquentic Haplaquolls, also having 0 to 1 percent slopes.

The Westplain soil is a deep, somewhat poorly drained

to rangeland species or adapted introduced grasses such as tall wheatgrass. Fencing and livestock water developments are effective in obtaining more uniform distribution of grazing.

Windbreak and environmental plantings are generally

and other recreation facilities, and wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land

months. Management concerns for maintaining production and controlling wind and water erosion vary widely throughout the county because of the diversity in farming

wetness and salinity caused by seepage from irrigation canals in upland areas may be reclaimed by open and tile drainage systems or by lining canals. Examples of these soils are Satanta loam, wet, Manter sandy loam, wet, and Argiustolls, wet. A combination of surface and subsurface drainage is often needed for intensive cropping. Tile drains and open "V" shaped drainage ditches are effective in minimizing the seeped condition. Drainage spacing will depend upon soil permeability.

Irrigated pasture crops consist of alfalfa and warm and cool season grasses. Management practices applicable on irrigated pastures include the deferment of grazing until plants have become firmly established and have attained a suitable height and an adequate cover to ensure protection from erosion. Timely application of irrigation water is important to supply water during periods of peak consumptive use. The establishment of irrigated pasture or permanent pasture. Seeding on a well prepared seedbed may require a cover crop before the intended forage grasses can be established. Grazing should be deferred until the grass is well established. Controlled grazing systems must be practiced for stand maintenance and production. Grass production, when properly managed, controls erosion and is usually more profitable than cropland farming on marginal soils.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited

management concerns and productivity of the soils for these crops.

Capability Classes and Subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system (*6*), all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use; they are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

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

Range

THOMAS EAMAN, State range conservationist, Soil Conservation Service, assisted in preparing this section.

About 51 percent of Logan County is rangeland and is used for grazing. Range covers approximately 598,160 acres. Cattle grazing and feeding make up a large part of the agricultural economy in the county. The size of ranches varies with the broad diversity of agriculture found throughout the county.

The relationship of the use of rangeland with cropland is highly significant to the agricultural economy of the county. Cow-calf types of cattle operations are the most common on Logan County ranches. Several ranches follow a practice of pasturing steers on rangeland during the spring and summer months before entering feedlots in the fall. On many ranches the forage produced on rangeland is supplemented by such crops as hay, sugarbeet tops, grain and winter wheat pasture.

The native vegetation in many parts of the survey area has been depleted by continued heavy use. The amount of forage now produced is less than that originally produced. Productivity of the range can be increased by using management practices that are effective for specific kinds of soil and range sites.

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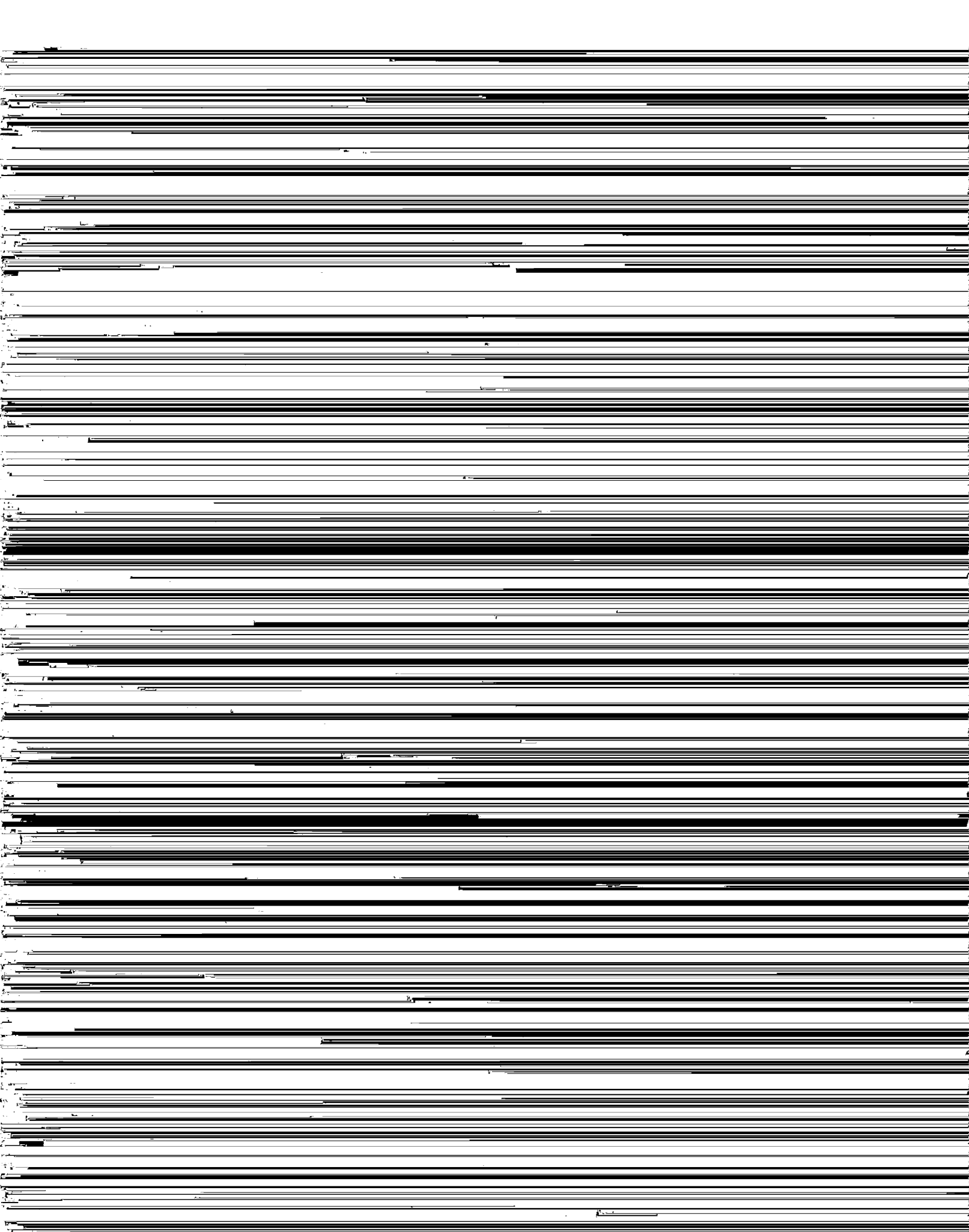


per year or better on commercial stands. Even though the stands are noncommercial, they do provide valuable cover for wildlife and protection for livestock during blizzards.

In the break areas located in the north and northwest parts of the county, scattered stands of Rocky Mountain juniper are found dominantly on the Ustic Torriorthent, Badland and Argiustoll-Rock outcrop complex soil mapping units. In the past, fence posts have been cut from these stands, but currently there are only a few trees of commercial value left. Native shrubs in this area are yellow currant, common chokecherry, squawbush, snowberry, wild plum, and wild rose. These shrubs grow in sheltered areas along intermittent drainageways, break areas, and river bottoms where moisture conditions are favorable.

Windbreaks and Environmental Plantings

SHERMAN FINCH, woodland conservationist, soil conservationist, Soil Conservation Service, assisted in preparing this section.

Windbreaks are established to protect livestock, buildings, and yards from winds and snow. Windbreaks also help protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broad-leaved and coniferous species provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field, the interval depending on erodibility of the soil. They protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. A healthy planting stock of suitable species planted properly on a well-prepared site and maintained in good condition can insure a high degree of plant survival.

Establishing windbreak and environmental plantings in Logan County is not easy because of limited moisture, but can be accomplished by: (1) planting species adapted to the climate and soil conditions; (2) timely cultivation; (3) providing supplemental water during planting and early stages of growth; and (4) carefully selecting and preparing the site.

The species of trees and shrubs adapted to the survey area are limited because of climatic conditions and therefore need to be selected carefully. Timely cultivation is

Locations for windbreak plantings must be selected carefully. For information about specific soils, the reader should refer to mapping unit descriptions. Additional information about planning windbreaks and screens and the planting and care of trees can be obtained from the local office of the Soil Conservation Service or the Colorado State Forest Service.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this section are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil Properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to: (1) select potential residential, commercial, industrial, and recreational uses; (2) make

already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for

bility of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

of soil. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness may be a limitation because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

In the trench type of landfill, ease of excavation also affects the suitability of a soil for this purpose, so the soil must be deep to bedrock and free of large stones and boulders. Where the seasonal water table is high, water

performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information

Soils rated *fair* are loose sandy soils or firm loamy or

Transverse and dimensions are embankments on a corn tion intensity and frequency of flooding is essential in

antelope populations on the remaining grasslands are [illegible]

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture,

Engineering Properties

Table 13 gives estimates of engineering properties and classifications for the maior horizons of each soil in the

based on tests of soils that were sampled in the survey. measurements at representative sites of the nonirrigated

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams

soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell poten-

measurements made in many soil borings and on other observations during the soil mapping. The kind of bedrock and its hardness as related to ease of excavation are also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils

A typical pedon of Albinas loam is located 72 feet west and 240 feet south of the northeast corner of section 28, T.12N., R.51W.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; neutral (pH 7.0); abrupt smooth boundary. (4 to 8 inches thick)

B1—6 to 12 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic parting to moderate subangular blocky structure; hard, friable; very thin patchy clay films on faces of peds; neutral (pH 7.2); clear smooth boundary. (3 to 6 inches thick)

B21t—12 to 18 inches; grayish brown (10YR 5/2) light clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic parting to moderate subangular blocky structure; hard, friable; thin patchy clay films on faces of peds; neutral (pH 7.2); clear smooth boundary. (6 to 10 inches thick)

B22t—18 to 30 inches; grayish brown (10YR 5/2) light clay loam,

A11—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; calcareous; mildly alkaline (pH 7.4); clear smooth boundary. (3 to 5 inches thick)

A12—3 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable; calcareous; mildly alkaline (pH 7.8); clear smooth boundary. (7 to 12 inches thick)

AC—10 to 17 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable; calcareous; moderately alkaline (pH 8.0); clear smooth boundary. (5 to 9 inches thick)

C1ca—17 to 22 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist, with few fine prominent mottles of light olive brown (2.5Y 5/6) moist; massive; hard, friable; calcareous moderately alkaline (pH 8.4); gradual smooth boundary. (5 to 12 inches thick)

C2g—22 to 27 inches; light gray (2.5Y 7/2) fine sandy loam, grayish brown (2.5Y 5/2) moist, with common fine prominent mottles of light olive brown (2.5Y 5/6) and dark brown (7.5YR 4/4) moist; massive; hard, very friable; calcareous; moderately alkaline (pH 8.2); clear smooth boundary. (4 to 8 inches thick)

B22t—13 to 19 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown to dark brown (10YR 3/3) moist; moderate medium prismatic parting to moderate medium subangular blocky structure; hard, friable; thin nearly continuous clay films on faces of peds; neutral (pH 7.2); gradual smooth boundary. (5 to 9 inches thick)

B3—19 to 23 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure; hard, friable; thin, patchy clay films; mildly alkaline (pH 7.6); gradual smooth boundary. (2 to 5 inches thick)

C1ca—23 to 30 inches; light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; massive; hard, friable; 10 percent lime coated gravel; calcareous with lime occurring as concretions and as thin seams and streaks; moderately alkaline (pH 8.2); clear smooth boundary.

IIC2—30 to 60 inches; light brown (7.5YR 6/4) coarse sand and gravel, brown (7.5YR 5/4) moist; massive; soft, very friable; moderately alkaline (pH 8.2).

Thickness of solum ranges from 16 to 30 inches. Depth to coarse sand and gravel ranges from 20 to 40 inches. Coarse fragments range from 0 to 15 percent throughout the solum.

strongly alkaline (pH 9.2); gradual smooth boundary. (3 to 8 inches thick)

C1casa—15 to 20 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable; visible soluble salts; calcareous, lime occurs as thin seams and streaks; very strongly alkaline (pH 9.2); clear smooth boundary. (3 to 6 inches thick)

C2—20 to 60 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable; calcareous; very strongly alkaline (pH 9.2).

The thin A1 horizons may be absent in some pedons. Light colored A2 horizons are commonly present but are absent in some pedons. They may have platy structure. Reaction of the B2t horizon and C horizon ranges from pH 8.8 to 10.0.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 dry, 3 through 5 moist and chroma of 2 or 3. Moist values of 3 extend to depths of less than 5 inches. Texture of the B2t horizon is commonly a silty clay loam or clay.

Ascalon Series

The Ascalon series consists of deep, well drained soil

C2—30 to 44 inches; very pale brown (10YR 7/4) sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; calcareous with visible lime occurring as concretions, in thin seams and streaks; moderately alkaline (pH 8.0); gradual smooth boundary.

C3—44 to 60 inches; very pale brown (10YR 7/4) loamy sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable; strongly calcareous; moderately alkaline (pH 8.0).

Depth to calcareous material ranges from 12 to 30 inches. Thickness of solum ranges from 15 to 40 inches. Coarse fragments range from 0 to 10 percent, but are commonly less than 5 percent.

The A horizon has a value of 4 or 5 dry, 2 or 3 moist and chroma of 2 or 3. Texture of the B2t horizon is commonly sandy clay loam or heavy sandy loam with more than 35 percent sand, fine sand or coarser. Texture of the C horizon is commonly a fine sandy loam but ranges to loam and loamy sand. Unconformable sand and gravelly materials are common in some areas below 40 inches.

Bankard Series

The Bankard series consists of deep, somewhat excessively drained soils that formed in highly stratified,

inches. Haxtun soils have sandy loam B2t horizons overlying dark colored B2tb horizons. Manter soils have sandy loam B2t horizons.

Typical pedon of Bayard loamy sand 155 feet east and 500 feet north of the southwest corner of section 1, T.8N., R.49W.

A1—0 to 12 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; neutral (pH 7.2); clear wavy boundary. (6 to 12 inches thick)

AC—12 to 16 inches; light brownish gray (10YR 6/2) light sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable; calcareous; mildly alkaline (pH 7.8); clear smooth boundary. (4 to 8 inches thick)

Cca—16 to 33 inches; light gray (10YR 7/2) sandy loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; soft, very friable; calcareous; moderately alkaline (pH 8.0); smooth gradual boundary. (12 to 20 inches thick)

C2—33 to 60 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable; calcareous; moderately alkaline (pH 8.0).

Depth to calcareous materials is less than 16 inches. Calcareous sandstone fragments are scattered throughout the profile, ranging from 0 to 15 percent in volume. Horizons of reddish colored gravelly sandy loam weathered from the Ogallala Formation are common below 40 inches.

The A horizon has color values of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. It is commonly a loamy sand ranging to loamy fine sand and sandy loam. The AC and C horizons are somewhat stratified, ranging in texture from loamy fine sand to fine sandy loam. They are dominantly sandy loam.

Bridgeport Series

The Bridgeport series consists of deep, well drained soils that formed in calcareous loamy alluvium. Bridgeport soils have slopes of 0 to 2 percent and are on terraces and flood plains. Average annual precipitation ranges from 17 to 19 inches and mean annual temperature is about 48 degrees F.

Bridgeport soils are similar to the Haverson and Satanta soils. They are near the Satanta soils. Haverson soils lack dark colored A horizons that extend to 10 inches or more. Satanta soils have B2t horizons.

A typical pedon of Bridgeport loam is located 180 feet east and 75 feet north of the southwest corner of section 23, T.11N. and R.48W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium and fine subangular blocky structure; slightly hard, friable; calcareous; mildly alkaline (pH 7.4); clear smooth boundary. (6 to 12 inches thick)

B2—10 to 17 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; slightly hard, friable; very thin patchy clay films on faces of peds; calcareous; moderately alkaline (pH 8.0); gradual smooth boundary. (6 to 12 inches thick)

B3ca—17 to 21 inches; gray (10YR 6/1) silt loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure; slightly hard, friable; calcareous; moderately alkaline (pH 8.4); gradual smooth boundary. (3 to 5 inches thick)

C1ca—21 to 30 inches; light gray (10YR 7/1) silt loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable; calcareous; moderately alkaline (pH 8.4); gradual smooth boundary. (8 to 14 inches thick)

C2—30 to 60 inches; light gray (10YR 7/2) very fine sandy loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, very friable; calcareous; moderately alkaline (pH 8.4).

This soil is commonly calcareous to the surface, but some pedons are leached to 8 inches.

The A horizon has 10YR hue, value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 through 3. It is a loam or light clay loam. Texture of the B2 horizon is loam or silt loam. The C horizon is a loam, silt loam or very fine sandy loam but may be stratified with fine sandy loams.

Canyon Series

The Canyon series consists of shallow, well drained soils that formed in a thin mantle of calcareous, alluvial and eolian materials underlain by calcareous sandstone. Canyon soils are on upland ridge crests, knobs and tablelands and have slopes of 0 to 25 percent. Average annual precipitation ranges from 15 to 19 inches and the mean annual temperature is about 49 degrees F.

Canyon soils are similar to the Epping and Shingle soils. They are near the Escabosa and Rosebud soils. Epping soils formed in materials weathered from siltstone. Shingle soils have fewer coarse fragments and formed in material weathered from calcareous sandstone. Escabosa soils lack bedrock above 20 inches. Rosebud soils have B2t horizons and lack bedrock above 20 inches.

A typical pedon of Canyon gravelly loam is located 710 feet north and 110 feet east of the west quarter corner of section 15, T.7N., R.49W.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable; 15 percent calcareous sandstone fragments; calcareous; mildly alkaline (pH 7.6); clear smooth boundary. (3 to 5 inches thick)

AC—3 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable; 15 percent calcareous sandstone fragments; calcareous; moderately alkaline (pH 8.0); clear smooth boundary. (2 to 5 inches thick)

C1ca—5 to 11 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; hard, very friable; 25 percent calcareous sandstone fragments; calcareous; moderately alkaline (pH 8.2); clear wavy boundary. (5 to 8 inches thick)

IICr—11 to 30 inches; white (10YR 8/2) calcareous sandstone of the Ogallala Formation, light gray (10YR 7/2) moist.

Depth to bedrock ranges from 6 to 20 inches. Rock fragments range in volume from 5 to 25 percent. The underlying bedrock is calcareous sandstone of the Ogallala Formation, which varies in degree of consolidation.

The A horizon has color value of 4 or 5 dry, 3 or 4 moist,and chroma of 2 or 3. Moist value of 3 extends to depths of 6 inches or less. The A horizon is commonly a gravelly loam but ranges to gravelly fine sandy loam. The C horizon is gravelly loam, gravelly fine sandy loam or gravelly sandy clay loam.

Chappell Series

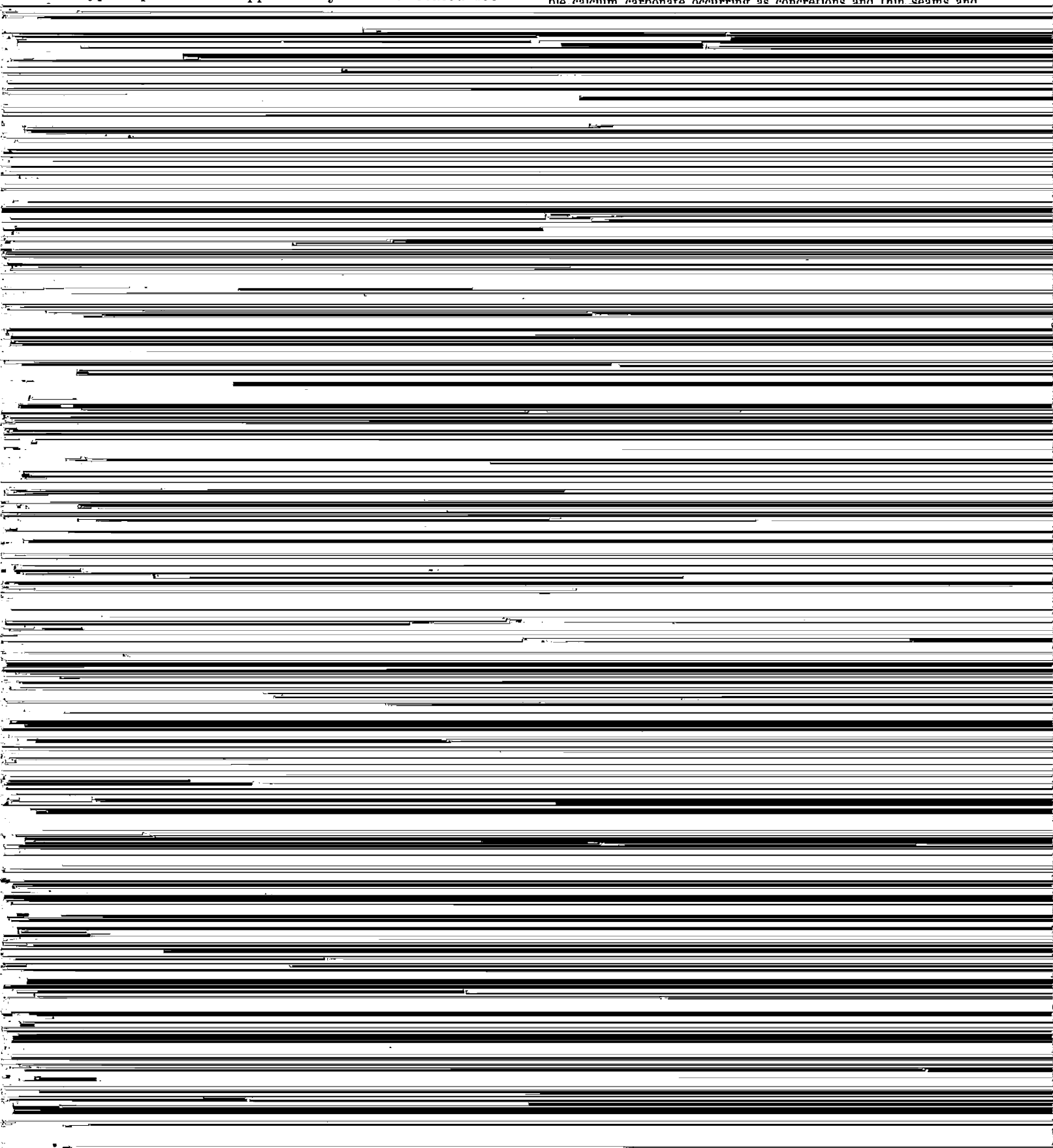
The Chappell series consists of deep, well drained soils that formed in stratified alluvial deposits. Chappell soils have slopes of 0 to 5 percent and are on flood plains and alluvial fans. Average annual precipitation ranges from 15 to 19 percent and the mean annual temperature is about 48 degrees F.

Chappell soils are similar to the Altvan soils. They are near the Altvan, Dix, Eckley and Manter soils. Altvan soils have sandy clay loam and loam B2t horizons. Dix and Eckley soils have coarse sand and gravel at depths of less than 20 inches. Manter soils have B2t horizons.

A typical pedon of Chappell sandy loam is located 135

AC—4 to 10 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak coarse prismatic structure; hard, very friable; calcareous; moderately alkaline (pH 7.9); clear smooth boundary. (4 to 8 inches thick)

C1ca—10 to 19 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; hard, very friable; calcareous with visible calcium carbonate occurring as concretions and thin seams and



Dacono Series

The Dacono series consists of deep, well drained soils formed in calcareous alluvial and eolian materials underlain by sand and gravel. Dacono soils are on upland flats and ridges and have slopes of 0 to 5 percent. Average annual precipitation ranges from 17 to 19 inches and mean annual temperature is about 48 degrees F.

The Dacono soils are similar to the Altvan and Platner soils. They are near the Altvan, Platner and Rago soils. Altvan soils have sandy clay loam B2t horizons. Platner and Rago soils lack sand and gravel at depths above 40 inches.

A typical pedon of Dacono loam is 2,490 feet north and 15 feet west of the southeast corner of section 10, T. 11N., R. 48W.

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; 5 percent gravel; neutral (pH 7.0); clear smooth boundary. (4 to 8 inches thick)

B1—4 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark gray[illegible]

A typical pedon of Dailey loamy sand is located 375 feet east and 10 feet north of the southwest corner of section 21, T.9N., R.48W.

A1—0 to 16 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral (pH 6.8); gradual wavy boundary. (10 to 20 inches thick)

C—16 to 60 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; single grained; loose, dry and moist; neutral (pH 7.0).

The mollic epipedon ranges from 10 to 20 inches thick. It is noncalcareous to a depth of 40 inches or more.

The A horizon has a color value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. The C horizon is commonly a loamy sand but ranges to a sand.

The thick surface phase mapped in this survey is a taxadjunct to the Dailey series. The mollic epipedon is thicker than 20 inches. The underlying layers consist of buried A and B2 horizons and are loamy sand and sandy loam.

Dix Series

The Dix series consists of deep, somewhat excessively drained soils formed in very gravelly alluvial sediments

deposits of the Ogallala Formation. Eckley soils are on upland ridges and knobs and have slopes of 5 to 13 percent. Average annual precipitation ranges from 15 to 19 inches and mean annual temperature is about 49 degrees F.

The Eckley soils are similar to the Altvan soils. They are near the Altvan, Dix and Dacono soils. Altvan and Dacono soils have sand and gravel at depths between 20 and 40 inches. Dix soils have B2 horizons with weak grades of structure.

A typical pedon of Eckley sandy loam is located 1,600 feet west and 15 feet north of the southeast corner of section 11, T.7N., R.51W.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral (pH 7.0); clear smooth boundary. (3 to 5 inches thick)

B1—3 to 6 inches; dark grayish brown (10YR 4/2) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic parting to moderate medium subangular blocky structure; slightly hard, friable; neutral (pH 7.0); clear smooth boundary. (2 to 4 inches thick)

B2t—6 to 15 inches; dark brown (7.5YR 4/2) gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate coarse prismatic parting to moderate coarse subangular blocky structure; hard, firm; thick continuous clay films on face of peds; neutral (pH 7.2); clear wavy boundary. (6 to 10 inches thick)

B2—15 to 20 inches; brown (7.5YR 5/4) gravelly coarse sandy loam, dark

AC1—6 to 13 inches; light brownish gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable; neutral (pH 7.0); gradual smooth boundary. (5 to 8 inches thick)

AC2—13 to 17 inches; light brownish gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable; calcareous; mildly alkaline (pH 7.4); clear smooth boundary. (4 to 8 inches thick)

C1ca—17 to 25 inches; light gray (10YR 7/2) loamy fine sand, grayish brown (10YR 5/2) moist; massive; soft, very friable; calcareous; mildly alkaline (pH 7.4); clear smooth boundary. (7 to 10 inches thick)

C2—25 to 58 inches; light gray (2.5Y 7/2) loamy fine sand, with thin strata of silt loam, grayish brown (2.5Y 5/2) moist, with common medium distinct yellowish brown (10YR 5/8) moist mottles; massive; soft, very friable; calcareous; mildly alkaline (pH 7.4); smooth boundary. (20 to 35 inches thick)

IIC3—58 to 60 inches; brown (10YR 5/3) moist with common medium brown (7.5YR 5/4) moist mottles; mixture of coarse sand and gravel; single grained; loose, dry and moist; neutral (pH 7.2).

Sand and gravel occurs below depths of 40 inches.

The A horizon has a color value of 4 through 6 dry, 3 or 4 moist and chroma of 2 or 3. Moist values of 3 extend to depths of less than 7 inches. The A horizon is commonly a loamy fine sand but ranges to fine sand. The C horizon is a loamy fine sand or fine sand and is stratified.

Epping Series

The Epping series consists of shallow, well drained soils that formed in calcareous materials weathered from Brule

Haxtun Series

The Haxtun series consists of deep, well drained soils that formed in sandy eolian materials overlying an older buried soil that formed in calcareous, loamy eolian and alluvial materials. Haxtun soils are on upland valleys and flats and have slopes of 0 to 5 percent. Average annual precipitation ranges from 13 to 19 inches and the mean annual temperature is about 49 degrees F.

Haxtun soils are similar to the Kuma and Albinas soils. They are near the Julesburg and Dailey soils. Kuma soils have silt loam subsoils. Albinas soils lack B2tb horizons. Julesburg and Dailey soils are sandy throughout and have dark surface layers less than 20 inches thick.

A typical pedon of Haxtun loamy sand is located 240 feet north and 110 feet east of the southwest corner of section 13, T.8N., R.48W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral (pH 7.0); abrupt smooth boundary. (5 to 10 inches thick)

B1—8 to 14 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; hard, very friable; neutral (pH 7.0); clear smooth boundary. (4 to 10

and have slopes of 0 to 1 percent. Average annual precipitation ranges from 13 to 19 inches and the mean annual temperature is about 47 degrees F.

Hayford soils are similar to the Loveland soils. They are near the Loveland, Alda and Nunn soils. Loveland soils lack B2t horizons and have loam and light clay loam underlying layers. Alda soils lack B2t horizons. Nunn soils are well drained and lack sand and gravel at a depth of 20 to 40 inches.

A typical pedon of Hayford silty clay loam is located 1,350 feet north and 820 feet east of the center of section 2, T.8N., R.52W.

Ap—0 to 7 inches; dark gray (10YR 4/1) silty clay loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable; calcareous; moderately alkaline (pH 7.9); abrupt smooth boundary. (6 to 10 inches thick)

B21t—7 to 10 inches; dark gray (10YR 4/1) silty clay loam, very dark brown (10YR 2/2) moist; moderate medium prismatic parting to moderate medium subangular blocky structure; hard, firm; thin continuous clay films on faces of peds and in pores; calcareous; moderately alkaline (pH 7.9); clear smooth boundary. (2 to 8 inches thick)

B22t—10 to 19 inches; gray (10YR 5/1) silty clay, very dark brown (10YR 2/2) moist; strong medium and fine prismatic parting to

Heldt soils are similar to the Manzanola soils. They are near the Renohill, Cushman, Thedalund and Shingle soils. Manzanola soils have B2t horizons with moderate or strong grades of structure. Renohill, Cushman and Thedalund soils have shale at depths of 20 to 40 inches. Shingle soils have shale at less than 20 inches.

A typical pedon of Heldt clay loam is located 120 feet north and 1,485 feet east of the southwest corner of section 31, T.9N., R.53W.

A1—0 to 3 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; weak coarse subangular blocky structure; very hard, firm; neutral (pH 7.2); clear smooth boundary. (3 to 6 inches thick)

B1—3 to 6 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; very hard, firm; few thin clay films on faces of peds; mildly alkaline (pH 7.6); clear smooth boundary. (0 to 6 inches thick)

B2ca—6 to 31 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic parting to moderate medium subangular blocky structure; very hard, firm; few thin continuous clay films on faces of peds; few scattered shale fragments; calcareous; moderately alkaline (pH 8.2); clear smooth boundary. (12 to 30 inches thick)

B3ca—31 to 35 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; very hard, firm; fine, thin continuous clay films on ped faces; fine shale fragments; calcareous with visible calcium carbonate occurring as concretions and in thin seams and streaks; moderately alkaline (pH 8.4); gradual smooth boundary. (3 to 7 inches thick)

C1ca—35 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; massive; very hard, firm; few gypsum crystals; few fine shale fragments; calcareous with visible calcium carbonate occurring as concretions and in thin seams and streaks; strongly alkaline (pH 8.6).

These soils are usually noncalcareous in the upper 4 to 8 inches but some pedons are calcareous throughout. Shale fragments range from 0 to 5 percent.

The A horizon has 2.5Y or 10YR hue, value of 4 through 6 dry, 3 or 4 moist, and chroma of 2 or 3. Moist values of 3 extend to depths of less than 5 inches. The A horizon is a clay loam, clay or silty clay loam. Texture of the B2 horizon is clay loam, silty clay loam or silty clay.

Iliff Series

The Iliff series consists of moderately deep, well drained soils that formed in calcareous, silty eolian materials underlain by calcareous sandstone of the Ogallala Formation. Iliff soils are on upland flats and have slopes of 0 to 3 percent. Average annual precipitation ranges from 17 to 19 inches and the mean annual air temperature is about 47 degrees F.

Iliff soils are similar to the Weld and Platner soils

A12—3 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; slightly hard, friable; neutral (pH 7.0); abrupt smooth boundary. (2 to 4 inches thick)

A2—6 to 8 inches; light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; slightly hard, friable; neutral (pH 7.0); abrupt smooth boundary. (1 to 3 inches thick)

B2t—8 to 15 inches; very dark grayish brown (10YR 3/2) silty clay loam, very dark brown (10YR 2/2) moist; strong medium and fine prismatic structure parting to strong medium and fine angular blocky; hard, firm; continuous thin clay films on faces of peds and in pores; gray, clean silt grain coatings on the prism tops and upper sides; mildly alkaline (pH 7.8); clear smooth boundary. (4 to 12 inches thick)

B3ca—15 to 22 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; hard, friable; thin patchy clay films on faces of peds; calcareous; moderately alkaline (pH 8.0); clear smooth boundary. (4 to 12 inches thick)

C1ca—22 to 29 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable; calcareous; moderately alkaline (pH 8.2); gradual smooth boundary. (4 to 10 inches thick)

C2—29 to 34 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable; calcareous; moderately alkaline (pH 8.2); gradual smooth boundary. (3 to 12 inches thick)

C3r—34 inches; white (10YR 8/1) calcareous sandstone of the Ogallala Formation, light gray (10YR 7/2) moist.

Calcareous materials are at depths of 14 to 21 inches. Depth to calcareous sandstone is commonly 30 to 40 inches but ranges from 20 to 40 inches.

The A horizon has a color value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 through 3. Texture is commonly a loam ranging to very fine sandy loam. The A2 horizon has a value of 6 or 7 dry, 3 through 5 moist, and chroma of 1 or 2. Most cultivated areas have the A1 and A2 horizons tilled together. Texture of the B2t horizon is heavy silty clay loam or clay.

Julesburg Series

The Julesburg series consists of deep, well drained soils that formed in noncalcareous, sandy eolian and alluvial materials. They are on upland ridges, in valleys and on high terraces bordering uplands and have slopes of 0 to 9 percent. Average annual precipitation ranges from 15 to 19 inches, and the mean annual temperature is about 49 degrees F.

Julesburg soils are similar to the Manter soils. They are near the Manter, Dailey, Haxtun and Valent soils. Manter soils are calcareous above a depth of 40 inches and have secondary calcium carbonate accumulations. Dailey soils lack B horizons. Haxtun soils have dark colored buried subsoils. Valent soils lack B horizons and have light colored surface layers.

B2t—10 to 16 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; hard, very friable; thin patchy clay films on faces of peds and in pores; neutral (pH 7.0); gradual smooth boundary. (5 to 10 inches thick)

B3—16 to 31 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure; hard, very friable; very thin patchy clay films on faces of peds and in pores; neutral (pH 7.2); gradual smooth boundary. (4 to 15 inches thick)

C1—31 to 37 inches; brown (10YR 5/3) loamy sand, dark grayish brown (10YR 4/2) moist; massive; hard, very friable; neutral (pH 7.2); gradual smooth boundary. (5 to 18 inches thick)

C2—37 to 46 inches; pale brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; massive; slightly hard, very friable; neutral (pH 7.2); gradual smooth boundary.

C3—46 to 60 inches; light brownish gray (2.5Y 6/2) sand, grayish brown (2.5Y 5/2) moist; single grained; loose, dry and moist; neutral (pH 7.2).

Commonly, this soil is noncalcareous throughout, but some pedons have calcareous material below 40 inches.

The A horizon has color value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. Texture of the A horizon is fine sandy loam or loamy sand. Texture of the B2t horizon is commonly a sandy loam but ranges to fine sandy loam. The C horizon is commonly a sand ranging from fine sand to loamy sand.

Keith Series

The Keith series consists of deep, well drained soils that formed in calcareous, loamy eolian materials. Keith soils are on upland flats and hills and have slopes of 0 to 9 percent. Average annual precipitation ranges from 15 to 19 inches and mean annual temperature is about 48 degrees F.

Keith soils are similar to the Norka and Satanta soils. They are near the Norka, Satanta, Kuma and Rosebud soils. Norka soils have sola less than 15 inches thick. Satanta and Rosebud soils have B2t horizons with more than 15 percent fine sand or coarser. Kuma soils have dark colored surface layers thicker than 20 inches.

A typical pedon of Keith loam is located 520 feet north of the southeast corner of section 36, T.11N., R.54W.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable; neutral (pH 7.0); clear smooth boundary. (4 to 8 inches thick)

B1—6 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; few very thin patchy clay films on faces of peds; slightly hard, very friable; neutral (pH 7.0); clear smooth boundary. (3 to 6 inches thick)

B2t—10 to 18 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure; thin nearly continuous clay films on faces of peds; slightly hard, very friable; neutral (pH 7.2); clear smooth boundary. (7 to 14 inches thick)

B3ca—18 to 25 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; thin patchy clay films on faces of peds; slightly hard, very friable; mildly alkaline (pH 7.6); clear smooth boundary. (2 to 8 inches thick)

C1ca—25 to 37 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; slightly hard, very friable; calcareous with visible secondary calcium carbonate occurring as concretions, in thin seams and streaks; moderately alkaline (pH 8.4); gradual smooth boundary. (8 to 15 inches thick)

C2—37 to 60 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; calcareous with visible calcium carbonate occurring in thin seams and streaks; moderately alkaline (pH 8.2).

Thickness of the solum ranges from 15 to 28 inches. The mollic epipedon ranges from 8 to 20 inches in thickness. Contrasting gravelly sand IIC horizons are common below depths of 48 inches.

The A horizon has color value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 through 3. It is commonly a loam but ranges to a silt loam or fine sandy loam. Texture of the B2t horizons is commonly a loam or clay loam but ranges to silt loam or silty clay loam. The C horizon is a loam, silt loam or fine sandy loam.

Keota Series

The Keota series consists of moderately deep, well drained soils that formed in calcareous, loamy alluvial and eolian materials derived from Brule siltstone. Keota soils are on upland ridges and hills with slopes of 1 to 9 percent. Average annual precipitation ranges from 13 to 17 inches, and mean annual temperature is about 48 degrees F.

The Keota soils are similar to the Epping and Mitchell soils. They are near the Epping and Mitchell soils. Epping soils have bedrock at depths of less than 20 inches. Mitchell soils lack bedrock above 40 inches.

A typical pedon of Keota loam is located 520 feet west and 40 feet north of the southeast corner of section 36, T.11N., R.54W.

A1—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate very fine granular structure; soft, very friable; calcareous; moderately alkaline (pH 8.2); clear smooth boundary. (3 to 6 inches thick)

AC—4 to 10 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse and medium subangular blocky structure; slightly hard, very friable; calcareous; moderately alkaline (pH 8.4); gradual smooth boundary. (4 to 8 inches thick)

C1—10 to 24 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; 10 percent weathered Brule siltstone fragments; calcareous with some visible secondary calcium carbonate occurring as soft concretions; moderately alkaline (pH 8.4); clear smooth boundary. (13 to 26 inches thick)

C2r—24 to 40 inches; Brule siltstone.

These soils are commonly calcareous throughout, but some pedons are leached from 0 to 6 inches. Depth to bedrock ranges from 20 to 40 inches. Weathered Brule siltstone fragments range from 0 to 15 percent by volume throughout the profile.

The A horizon has color value of 4 or 5 dry, 3 or 4 moist and chroma of 2 or 3. Moist values of 3 extend to depths of less than 5 inches. Texture of the underlying layers is commonly loam or silt loam.

Kim Series

The Kim series consists of deep, well drained soils that formed in calcareous, eolian and alluvial material. Kim soils are on uplands, ridges, hills and fans and have slopes of 3 to 9 percent. Average annual precipitation ranges from 13 to 17 inches and the mean annual air temperature is about 47 degrees F.

Kim soils are similar to the Thedalund soils. They are near the Thedalund, Shingle and Stoneham soils. Thedalund soils have bedrock between 20 and 40 inches. Mitchell soils have less than 15 percent fine sand and more coarse silt in their underlying layers. Shingle soils have bedrock above 20 inches. Stoneham soils have B2t horizons.

A typical pedon of Kim loam is located 90 feet east and 525 feet north of the west quarter corner of section 9, T.10N., R.50W.

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; noncalcareous; mildly alkaline (pH 7.4); clear smooth boundary. (3 to 7 inches thick)

AC—4 to 16 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; hard, friable; strongly calcareous; moderately alkaline (pH 8.0); gradual smooth boundary. (4 to 8 inches thick)

C1ca—16 to 25 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; hard, friable; strongly calcareous; moderately alkaline (pH 8.2); gradual smooth boundary. (7 to 20 inches thick)

C2—25 to 60 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable; strongly calcareous; moderately alkaline (pH 8.2).

Depth to soft shale is commonly more than 60 inches, but in places it is 40 to 60 inches. Content of coarse fragments ranges from 0 to 15 percent throughout the profile.

The A horizon has a color value of 3 or 4 moist, 4 or 5 dry and chroma of 2 or 3 moist or dry. Value of 3 moist extends to depths of 6 inches or less. The A horizon is commonly loam but ranges to fine sandy loam. The C horizon is typically a loam, fine sandy loam or sandy loam.

Kuma Series

B3cab—28 to 32 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable; thin patchy clay films on faces of peds; calcareous with visible calcium carbonate occurring in thin seams and streaks; moderately alkaline (pH 8.0); clear smooth boundary. (3 to 9 inches thick)

C1ca—32 to 39 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak coarse blocky structure; hard, very friable; calcareous with visible secondary calcium carbonate occurring in thin seams and streaks; moderately alkaline (pH 8.2); gradual smooth boundary. (6 to 12 inches thick)

C2—39 to 60 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; calcareous; moderately alkaline (pH 8.2).

Depth to the dark colored buried subsoils ranges from 12 to 20 inches. Thickness of the solum ranges from 24 to 40 inches.

The A horizon has color value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. It is loam or silt loam. The B2t and B2tb horizons have a color value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 through 3. Texture of these horizons is silt loam, loam, or silty clay loam with less than 15 percent fine sand or coarser.

Kutch Series

The Kutch series consists of moderately deep, well drained soils formed in calcareous clayey materials weathered from clay shale. Kutch soils are on upland ridges and valley sideslopes. Slopes are 3 to 9 percent.

Depth to calcareous material ranges from 6 to 20 inches. Depth to bedrock ranges from 20 to 40 inches. Shale fragments range from 0 to 5 percent in the C horizon.

The A horizon has a hue of 10YR or 2.5Y, value of 4 or 5 dry, 2 or 3 moist and chroma of 2 or 3. It is a loam or clay loam. The B2t horizon is a clay loam or clay.

Lebsack Series

The Lebsack series consists of deep, moderately well drained soils formed in calcareous alluvium deposited by the South Platte River and tributary streams. Lebsack soils are on terraces and have slopes of 0 to 1 percent. Average annual precipitation ranges from 13 to 19 inches, and mean annual temperature is about 47 degrees F.

The Lebsack soils are similar to the Hayford soils

A12—10 to 13 inches; grayish brown (10YR 5/2) clay loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; hard, friable; calcareous; moderately alkaline (pH 8.0); clear smooth boundary. (3 to 7 inches thick)

AC—13 to 19 inches; gray (10YR 6/1) clay loam, dark gray (10YR 4/1) moist; weak medium prismatic structure; very hard, friable; calcareous with visible calcium carbonate occurring in thin seams and streaks and as small concretions; moderately alkaline (pH 8.3); clear smooth boundary. (4 to 9 inches thick)

C1cag—19 to 25 inches; light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist with few fine distinct mottles of light olive brown (2.5Y 5/6) moist, and yellowish brown (10YR 5/8) moist; weak prismatic structure; very hard, friable; calcareous with visible secondary calcium carbonate occurring in thin seams and streaks and as small concretions; moderately alkaline (pH 8.3); gradual smooth boundary. (5 to 10 inches thick)

IIC2g—25 to 34 inches; light brownish gray (2.5Y 6/2) sandy clay loam

thin seams and streaks; moderately alkaline (pH 8.2); gradual smooth boundary. (6 to 12 inches thick)

C2ca—32 to 60 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; massive; slightly hard, very friable; calcareous with visible secondary calcium carbonate occurring as concretions, and in thin seams and streaks; moderately alkaline (pH 8.2).

Depth to calcareous material ranges from 12 to 20 inches. Depth of solum ranges from 15 to 24 inches. Coarse fragments range from 0 to 10 percent by volume and are mainly 1/4 to 1 inch in diameter. Depth to contrasting sand and gravel layers exceeds 40 inches.

The A horizon has color value of 4 or 5 dry, 2 or 3 moist and chroma

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6 dry, 3 or 4 moist, and chroma of 2 or 3 moist and dry. Value of 3 moist extends to depths of less than 6 inches. Texture of the A horizon is commonly a clay loam ranging to a clay. The B2t horizon is heavy clay loam or clay. The C horizon is clay loam or loam. It is commonly moderately alkaline ranging to strongly alkaline.

Midway Series

The Midway series consists of shallow, well drained soils that formed in calcareous, clayey materials

A11—0 to 2 inches; light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure;

C1ca—21 to 28 inches; light gray (2.5Y 7/2) sandy clay loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable; calcareous

The A horizon has color value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. This horizon is commonly a loam but ranges to silt loam. The B horizon is a silt loam, silty clay loam, loam or clay loam, with less than 15 percent sand coarser than fine sand. The C horizon is a loam, silt loam or fine sandy loam.

Nunn Series

The Nunn series consists of deep, well drained and moderately well drained soils that formed in calcareous alluvium and eolian materials. Nunn soils are on terraces, alluvial fans, upland flood plains and ridges and have slopes of 0 to 9 percent. Average annual precipitation ranges from 13 to 19 inches and the mean annual temperature is about 48 degrees F.

Olney Series

The Olney series consists of deep, well drained soils that formed in calcareous, eolian and alluvial materials. Olney soils are on upland ridges and hills and have slopes of 0 to 9 percent. Average annual precipitation ranges from 13 to 15 inches and mean annual temperature is about 48 degrees F.

Olney soils are similar to the Stoneham, Ascalon, and Cushman soils. They are near the Stoneham, Ascalon, Cushman and Vona soils. Stoneham soils have sola less than 15 inches thick. Ascalon soils have dark surface layers with moist values of 3 extending to 7 inches or more. Cushman soils have bedrock at depths of 20 to 40

Peetz soils are similar to the Dix soils. They are near the Dix, Kim and Wages soils. Dix soils have noncalcareous B2 horizons. Kim soils lack dark surface layers extending to 7 inches or more. Wages soils have loam or clay loam B2t horizons.

A typical pedon of Peetz gravelly sandy loam is located 1,640 feet north of the southeast corner of section 18, T.11N., R.50W.

A1—0 to 3 inches; gray (10YR 5/1) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; 20 percent gravel; calcareous; mildly alkaline (pH 7.4); clear smooth boundary. (2 to 4 inches thick)

AC—3 to 9 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; hard, friable; 30 percent gravel; calcareous; moderately alkaline (pH 8.0); gradual smooth boundary. (4 to 8 inches thick)

C1ca—9 to 15 inches; light gray (10YR 7/2) gravelly coarse sandy loam, grayish brown (10YR 5/2) moist; massive; hard, friable; 40 percent gravel; calcareous with lime coated rounded fragments of sandstone and Brule siltstone; moderately alkaline (pH 8.2); gradual wavy boundary. (4 to 9 inches thick)

C2ca—15 to 28 inches; white (10YR 8/2) very gravelly coarse sandy loam, light brownish gray (2.5Y 6/2) moist; massive; hard, friable; 55 percent gravel; calcareous with lime coating on gravel and fragments of sandstone and rounded Brule siltstone; calcareous; moderately alkaline (pH 8.2); gradual wavy boundary. (4 to 9 inches thick)

C3—28 to 60 inches; pale brown (10YR 6/3) very gravelly coarse sand, brown (10YR 5/3) moist; massive; slightly hard, friable; 55 percent gravel; few cobbles up to 4 inches diameter; Brule siltstone and sandstone cobbles common; calcareous; mildly alkaline (pH 7.8).

This soil is commonly calcareous throughout but some pedons have noncalcareous A1 horizons. Rock fragments range from about 15 percent in the upper part of the profile to 60 percent in the lower part. Rounded cobble-sized fragments of sandstone and Brule siltstone are common.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 through 3.

Platner Series

The Platner series consists of deep, well drained soils formed in calcareous, alluvial and eolian deposits. Platner soils are on upland tablelands, ridges, and hills and have slopes of 0 to 5 percent. Average annual precipitation ranges from 13 to 19 inches and the mean annual temperature is about 49 degrees F.

Platner soils are similar to the Weld soils. They are

A1—5 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; hard, friable; very thin patchy clay films on faces of peds; bleached sand grains on soil peds; neutral (pH 7.0); abrupt smooth boundary. (0 to 3 inches thick)

B21t—7 to 15 inches; grayish brown (10YR 5/2) heavy clay loam, very dark grayish brown (10YR 3/2) moist; strong medium and fine prismatic parting to strong fine angular blocky structure; extremely hard, firm, sticky and plastic; moderately thick continuous clay films on faces of peds; 5 percent fine gravel; neutral (pH 7.2); clear smooth boundary. (5 to 9 inches thick)

B22t—15 to 18 inches; light brownish gray (10YR 6/2) heavy clay loam, brown (10YR 4/3) moist; moderate medium prismatic parting to moderate medium angular blocky structure; hard, firm, sticky, plastic; moderately thick continuous clay films on faces of peds; mildly alkaline (pH 7.3); clear smooth boundary. (3 to 8 inches thick)

B3ca—18 to 21 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak medium prismatic structure; hard, friable; thin patchy clay films on faces of peds; calcareous with calcium carbonate occurring as concretions and in seams and streaks; moderately alkaline (pH 7.9); clear smooth boundary. (2 to 7 inches thick)

C1ca—21 to 26 inches; white (10YR 8/2) loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; hard, very friable; 5 percent gravel; calcareous with visible calcium carbonate occurring as concretions, and in seams and streaks; moderately alkaline (pH 8.2); gradual wavy boundary. (5 to 12 inches thick)

C2—26 to 34 inches; very pale brown (10YR 7/3) fine sandy loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable; 5 percent fine gravel; calcareous with some visible calcium carbonate occurring in seams and streaks; moderately alkaline (pH 8.2); gradual wavy boundary. (8 to 20 inches thick)

C3—34 to 60 inches; brown (7.5YR 5/4) moist, gravelly sandy clay loam; massive; very hard, firm; calcareous with visible calcium carbonate occurring in seams up to 1/4 inch in thickness; moderately alkaline (pH 8.2).

Depth to calcareous material ranges from 8 to 24 inches. Solum ranges from 15 to 30 inches thick. Coarse fragments range from 0 to 15 percent by volume. These soils may have thin A2 horizons. Below 40 inches coarser textured or more gravelly materials commonly occur.

The A horizon has a color value of 4 or 5 dry, 2 or 3 moist and chroma of 2 or 3. Texture is loam or fine sandy loam. Texture of the B2t horizon is clay loam or clay. The C horizon is a loam, sandy loam or sandy clay loam and may be gravelly.

Rago Series

The Rago series consists of moderately deep, well drained soils that formed in eolian and alluvial materials of two ages. Rago soils are in upland swales, depressions and drainageways and have slopes of 0 to 3 percent. Average annual precipitation ranges from 13 to 19 inches and the mean annual temperature is about 48 degrees F.

Rago soils are similar to the Kuma soils. They are near

B2t—8 to 14 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic parting to moderate medium subangular blocky structure; hard, fri

B2t—5 to 11 inches; light olive brown (2.5Y 5/4) heavy clay loam, dark grayish brown (2.5Y 4/2) moist; strong medium prismatic parting to strong medium and fine subangular blocky structure; very hard

ble calcium carbonate occurring as concretions and thin seams and streaks; moderately alkaline (pH 8.2); clear smooth boundary. (0 to 12 inches thick)

C3r—33 to 60 inches; white (10YR 8/2) weakly consolidated calcareous sandstone of the Ogallala Formation, light gray (10YR 7/2) moist.

The thickness of the solum ranges from 12 to 24 inches. Up to 10 percent fragments of sandstone and fine gravel are scattered throughout the profile. Depth to the calcareous sandstone or siltstone ranges from 20 to 40 inches.

The A horizon has a color value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. It is a loam or fine sandy loam. The B2t horizon is a loam or clay loam. The C horizon is commonly a loam ranging to sandy loam.

Satanta Series

The Satanta series consists of deep, well drained soils

Thickness of solum ranges from 15 to 30 inches. The mollic epipedon ranges from 8 to 20 inches in thickness. Content of coarse fragments ranges from 0 to 10 percent. Some pedons have IIC horizons at depths below 40 inches.

The A horizon has 10YR or 2.5Y hue, value of 4 or 5 dry, 2 or 3 moist, and chroma of 2 or 3. It is a loam or fine sandy loam. Texture of the B2t horizon is a loam, clay loam or sandy clay loam.

Shingle Series

The Shingle series consists of shallow, well drained soils that formed in calcareous materials weathered from interbedded soft shale and sandstone. Shingle soils are on upland ridges and hills and have slopes of 1 to 9 percent. Average annual precipitation ranges from 13 to 17 inches and the mean annual temperature is about 48 degrees F.

Shingle soils are similar to the Epping and Canyon

A typical pedon of Stoneham loam is located 30 feet north and 195 feet east of the south quarter corner of section 22, T.10N., R.54W.

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish

C2r—31 inches; pale yellow (5Y 7/3) interbedded soft calcareous shale and soft sandstone; pale olive (5Y 6/3) moist.

Commonly, these soils are calcareous throughout but are leached 1 to 4 inches in some pedons. Depth to bedrock ranges from 20 to 40 inches.

lesburg soils have dark surface layers and sandy loam B2t horizons.

A typical pedon of Valent loamy sand is located 50 feet west and 310 feet south of the northwest corner of section 2, T.7N., R.52W.

A1—0 to 3 inches; grayish brown (10YR 5/2) loamy sand, very dark

C2—28 to 60 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; massive; soft, very friable; calcareous; moderately alkaline (pH 8.2).

Depth to calcareous material ranges from 8 to 24 inches. Thickness of the solum ranges from 15 to 24 inches.

The A horizon has a color value of 5 or 6 dry, 3 or 4 moist and chroma of 2 or 3. Moist values of 3 extend to a depth of 6 inches or less. The A

Weld Series

The Weld series consists of deep, well drained soils that formed in calcareous, eolian loamy materials. Weld soils are on upland tablelands and have slopes of 0 to 3 percent. Average annual precipitation ranges from 13 to 17 inches and the mean annual temperature is about 47 degrees F.

Weld soils are similar to the Platner and Iliff soils. They are near the Rago and Platner soils. Platner soils have B2t horizons with more than 15 percent fine sand or coarser. Rago soils have dark colored surface layers extending below 20 inches and buried subsoils. Iliff soils have bedrock at depths of less than 40 inches.

A typical pedon of Weld loam is located 60 feet west and 130 feet south of the east quarter corner of section 7, T.8N., R.53W.

A11—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral (pH 7.0); clear smooth boundary. (3 to 6 inches thick)

A12—4 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; hard, friable; neutral (pH 7.0); clear smooth boundary. (2 to 3 inches thick)

B21t—7 to 10 inches; grayish brown (10YR 52) heavy silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic parting to moderate medium subangular blocky structure; hard, firm; common thin clay films on faces of peds, and in root channels and pores; mildly alkaline (pH 7.2); clear smooth boundary. (3 to 8 inches thick)

B22t—10 to 16 inches; brown (10YR 5/3) heavy silty clay loam, dark brown (10YR 3/3) moist; strong medium and fine prismatic parting to strong fine angular blocky structure; very hard, firm; continuous thin clay films on faces of peds, in root channels and pores; mildly

underlain by mottled sand and gravel and deposited by the South Platte River. Westplain soils are on bottomlands and concave parts of low terraces. Slopes are 0 to 3 percent. Average annual precipitation ranges from 13 to 19 inches, and the mean annual temperature is about 47 degrees F.

Westplain soils are near the Alda and Hayford soils. The Alda soils have mottled sand and gravel at depths of 20 to 40 inches. The Hayford soils have B2t horizons and mottled sand and gravel at depths of 20 to 40 inches.

A typical pedon of Westplain silty clay loam is located 70 feet north and 1,495 feet east of the west quarter corner of section 7, T.10N., R.48W.

A11—0 to 8 inches; dark gray (10YR 4/1) heavy silty clay loam, black (10YR 2/1) moist; moderate medium granular structure; slightly hard, friable, sticky, plastic; calcareous; moderately alkaline (pH 8.0); gradual wavy boundary. (6 to 10 inches thick)

A12—8 to 14 inches; dark gray (10YR 4/1) heavy clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; calcareous; moderately alkaline (pH 8.0); clear wavy boundary. (6 to 10 inches thick)

AC—14 to 17 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 3/3) moist, with common medium distinct strong brown (7.5YR 5/6) mottles; massive; hard, friable; 50 percent gravel; calcareous; moderately alkaline (pH 7.9); abrupt wavy boundary. (0 to 6 inches thick)

IICg—17 to 60 inches; light gray (10YR 7/2) very gravelly sand, light brownish gray (10YR 6/2) moist, with many large prominent strong brown (7.5YR 5/6) mottles; single grained; loose dry and moist; 50 percent gravel; mildly alkaline (pH 7.6).

The mollic epipedon ranges from 7 to 20 inches thick. Depth to the sand and gravel substratum ranges from 14 to 20 inches. These soils are calcareous in the upper part, but the substratum materials are commonly noncalcareous.

The A horizon has a color value of 4 or 5 dry, 2 or 3 moist and chroma

order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great

geologic forces. The characteristics of the soil are determined by the interaction of five factors of soil formation. Each of these factors modifies the effect of the others. The five interacting factors are: (1) the physical and mineralogical composition of the parent material; (2) the climate under which the parent material has accumulated and existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time these forces have acted on the parent material. All five of these factors are important,

The deposits have accumulated chiefly during Pleistocene to Holocene time and commonly consist of

Gravel Deposits of Early Pleistocene and Late Tertiary Ages.—This group of materials includes reddish colored

The uplands in the northern and eastern parts of the county receive 17 to 19 inches of rainfall, and the western uplands and South Platte Valley receive from 13 to 17

Relief

In many areas relief is the most important factor in

soils, such as Iliff, Platner, and Weld, have a clay enrichment and horizons of calcium accumulation. Dailey, Haverson, Keota, and Mitchell lack distinct subsoil horizons.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

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

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregu-

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.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

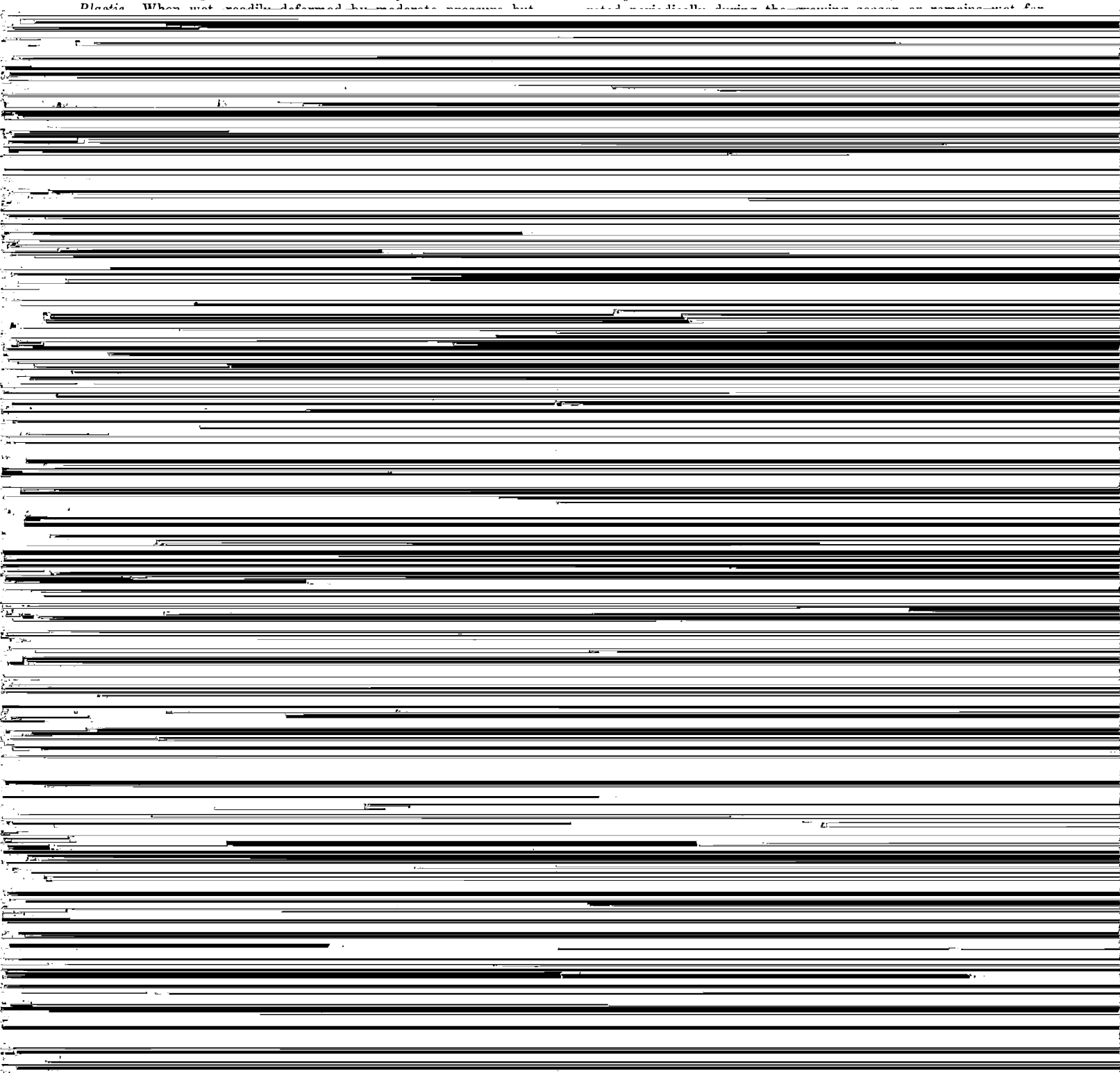
Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is satu-



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 (heavy textured) soil. Sandy clay, silty clay, and clay.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

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. Freezing and thawing of soil moisture. Frost action can damage 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.

mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

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 A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock 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

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.

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. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles.

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. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

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.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Silica-alumina ratio. The molecular ratio of silica to alumina in soil, clay, or any alumino-silicate mineral.

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.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slick spot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

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.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface that 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

Surface soil. 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."

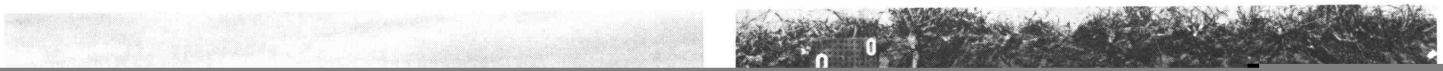
Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams emerging from hills or mountains and spreading sediments onto the lowland as a series of adjacent alluvial fans.

Illustrations



Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[2]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	F	F	F	F	F		In	In	In		In
January----	38.8	10.8	24.8	67	-16	18	.21	.07	.32	1	4.4
February---	44.5	16.5	30.5	73	-11	42	.20	.03	.32	1	3.5
March------	49.4	22.0	35.7	80	-7	89	.61	.14	.98	2	6.2
April------	61.3	32.7	47.0	86	13	236	1.26	.51	1.85	3	3.5
May--------	71.7	43.9	57.8	94	27	552	2.94	1.40	4.19	6	.7
June-------	82.3	53.1	67.7	102	37	831	2.60	1.36	3.60	6	.0
July-------	89.0	58.2	73.6	103	45	1,042	2.63	1.08	3.87	6	.0
August-----	87.6	56.0	71.8	101	43	986	1.66	.43	2.63	4	.0
September--	77.0	45.1	61.1	95	28	633	1.19	.27	1.91	3	.0
October----	66.0	34.0	50.0	87	16	321	.99	.34	1.49	2	2.7
November---	50.3	22.1	36.2	75	0	54	.47	.03	.80	1	4.9

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Minimum temperature[1]		
	24 F. or lower	28 F. or lower	32 F. or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 30	May 09	May 23
2 years in 10 later than--	April 25	May 04	May 19
5 years in 10 later than--	April 15	April 25	May 10
First freezing temperature in fall:			
1 year in 10 earlier than--	October 08	September 23	September 12
2 years in 10 earlier than--	October 13	September 30	September 17
5 years in 10 earlier than--	October 22	October 11	September 27

[1]Recorded in the period 1951-73 at Sterling, Colo.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24 F.	Higher than 28 F.	Higher than 32 F.
	Days	Days	Days
9 years in 10	167	149	121
8 years in 10	175	155	128
5 years in 10	189	168	139
2 years in 10	203	181	151
1 year in 10	211	187	157

[1]Recorded in the period 1951-73 at Sterling, Colo.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Albinas loam, 0 to 3 percent slopes	10,000	0.8
2	Alda sandy loam	1,200	0.1
3	Alda loam	4,200	0.4
4	Altvan-Eckley sandy loams, 3 to 5 percent slopes	5,100	0.4
5	Altvan-Eckley sandy loams, 5 to 9 percent slopes	4,500	0.4
6	Aquolls	6,600	0.6
7	Argiustolls, wet, 2 to 9 percent slopes	1,500	0.1
8	Argiustolls-Rock outcrop complex, 1 to 9 percent slopes	4,100	0.3
9	Arvada silt loam	800	0.1
10	Ascalon fine sandy loam, 0 to 3 percent slopes	8,800	0.7
11	Ascalon fine sandy loam, 3 to 5 percent slopes	15,500	1.3
12	Ascalon fine sandy loam, 5 to 9 percent slopes	5,100	0.4
13	Badland	8,600	0.7
14	Bankard sand	8,900	0.8
15	Bayard-Canyon complex, 1 to 9 percent slopes	3,100	0.3
16	Bridgeport loam	1,700	0.1
17	Canyon gravelly loam, 1 to 25 percent slopes	5,400	0.5

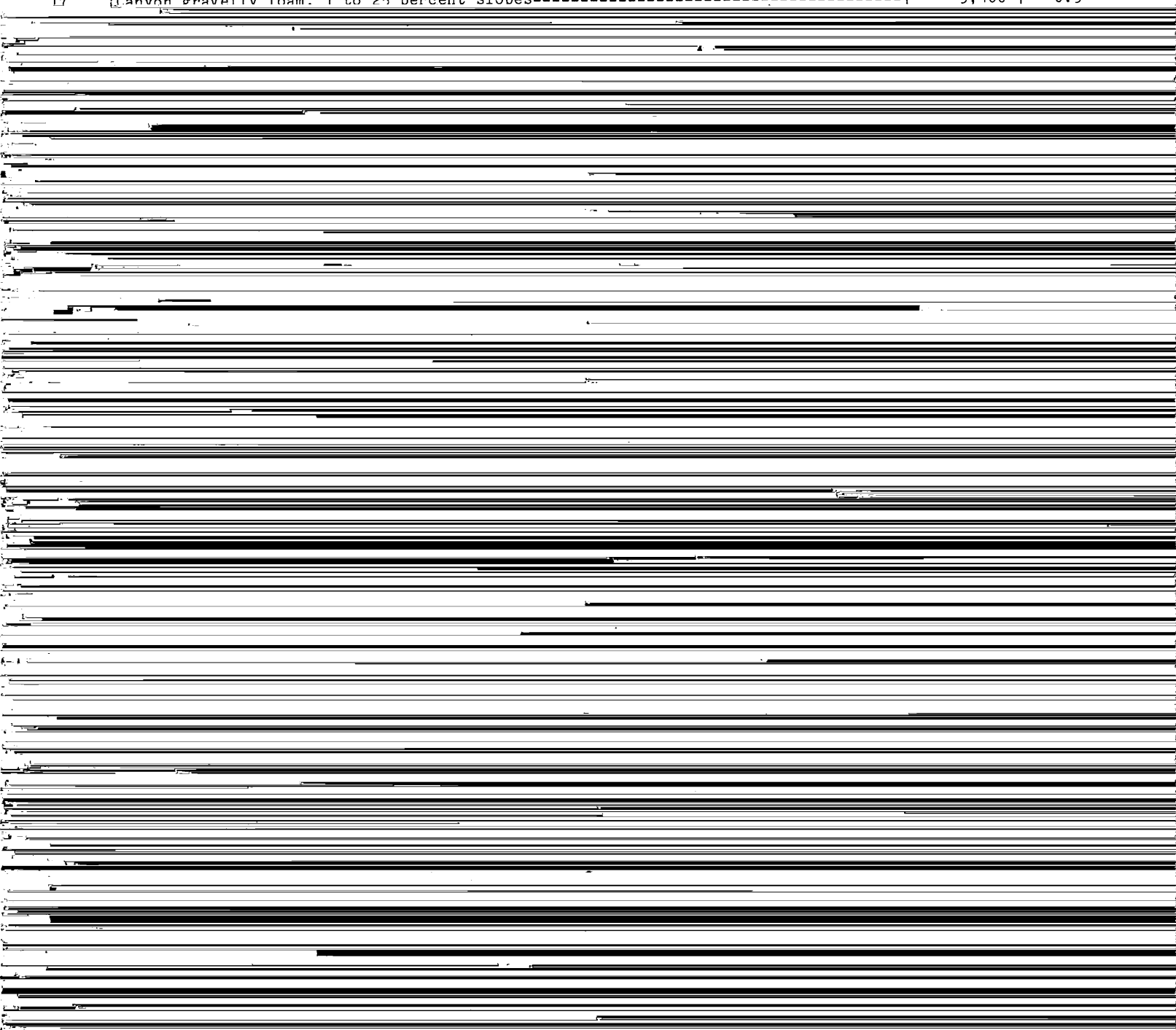


TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
71	Mitchell-Norka loams, 0 to 3 percent slopes	7,600	0.6
72	Mosher loam	3,000	0.3
73	Mosher clay	2,200	0.2
74	Norka loam, 0 to 1 percent slopes	2,600	0.2
75	Norka-Ulysses loams, 1 to 3 percent slopes	17,200	1.5
76	Nunn loam, 0 to 1 percent slopes	2,900	0.2
77	Nunn loam, 1 to 3 percent slopes	15,800	1.3
78	Nunn loam, 3 to 5 percent slopes	1,000	0.1
79	Nunn loam, 5 to 9 percent slopes	2,100	0.2
80	Nunn clay loam, 1 to 3 percent slopes	2,400	0.2
81	Nunn clay loam, 3 to 9 percent slopes	1,100	0.1
82	Nunn clay loam, water table	14,000	1.2
83	Nunn clay loam, wet	6,500	0.6
84	Olney sandy loam, 3 to 5 percent slopes	2,200	0.2
85	Olney sandy loam, 5 to 9 percent slopes	2,700	0.2
86	Peetz gravelly sandy loam, 5 to 25 percent slopes	7,900	0.7
87	Platner sandy loam, 0 to 3 percent slopes	12,000	1.0
88	Platner loam, 0 to 1 percent slopes	1,200	0.1
89	Platner loam, 1 to 3 percent slopes	51,700	4.4
90	Platner loam, 3 to 5 percent slopes	24,700	2.1
91	Platner-Rago-Dacono loams	23,000	1.9
92	Rago loam	68,500	5.8
93	Rago clay loam	1,600	0.1
94	Renohill-Shingle complex, 3 to 9 percent slopes	9,200	0.8
95	Rock outcrop-Argiustolls complex, 9 to 35 percent slopes	4,100	0.3
96	Rosebud-Escabosa loams, 3 to 5 percent slopes	19,400	1.6
97	Rosebud-Escabosa loams, 5 to 9 percent slopes	11,300	1.0
98	Rosebud-Escabosa-Iliff loams, 0 to 3 percent slopes	8,500	0.7
99	Satanta loam, 0 to 1 percent slopes	8,400	0.7
100	Satanta loam, 1 to 3 percent slopes	22,400	1.9
101	Satanta loam, 3 to 5 percent slopes	500	(1)
102	Satanta loam, water table	1,500	0.1
103	Satanta loam, wet	9,200	0.8
104	Shingle loam, 1 to 9 percent slopes	5,400	0.5
105	Stoneham sandy loam, 3 to 9 percent slopes	6,000	0.5
[illegible]	[illegible]	11,700	1.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields in columns N are for nonirrigated soils; those in columns I are for irrigated soils. All yields were estimated for a high level of management in 1974. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Alfalfa hay		Sugar beets		Corn		Corn silage		Wheat		Grain sorghum	
	N	I	N	I	N	I	N	I	N	I	N	I
	Ton	Ton	Ton	Ton	Bu	Bu	Ton	Ton	Bu	Bu	Bu	Bu
Albinas:												
1	---	5.5	---	22	---	125	---	25	35	50	28	---
Alda:												
2	---	5.5	---	20	---	105	---	23	---	45	---	---
3	---	6.0	---	20	---	105	---	22	---	40	---	---
Altvan:												
24	---	4.0	---	13	---	65	---	15	19	32	---	---
25	---	3.5	---	11	---	60	---	13	---	28	---	---

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and	Alfalfa hay	Sugar beets	Corn	Corn silage	Wheat	Grain

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay		Sugar beets		Corn		Corn silage		Wheat		Grain sorghum	
	N	I	N	I	N	I	N	I	N	I	N	I
	Ton	Ton	Ton	Ton	Bu	Bu	Ton	Ton	Bu	Bu	Bu	Bu
Manter:												
59	---	5.0	---	15	---	110	---	18	20	45	20	60
60	---	5.0	---	18	---	130	---	20	---	40	---	---
61	---	5.5	---	19	---	115	---	20	25	55	20	65
62	---	4.5	---	15	---	100	---	15	20	45	15	60
63	---	3.0	---	---	---	60	---	15	17	40	10	40
64	---	6.0	---	19	---	115	---	20	---	55	---	---
65	---	6.0	---	17	---	75	---	18	---	---	---	---
Manzanola:												

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay		Sugar beets		Corn		Corn silage		Wheat		Grain sorghum	
	N	I	N	I	N	I	N	I	N	I	N	I
	Ton	Ton	Ton	Ton	Bu	Bu	Ton	Ton	Bu	Bu	Bu	Bu
Rago:												
93	---	---	---	---	---	---	---	---	20	---	---	---
Renohill:												
[2]94	---	4.0	---	16	---	90	---	15	---	---	---	---
Rosebud:												
[2]96	---	4.0	---	15	---	95	---	16	20	35	---	---
[2]97	---	3.0	---	13	---	75	---	13	18	30	---	---
[2]98	---	5.0	---	18	---	110	---	19	24	45	---	---
Satanta:												
99	---	6.0	---	25	---	175	---	28	30	55	---	---
100	---	5.0	---	22	---	160	---	25	30	50	40	---
101	---	4.0	---	17	---	110	---	18	24	40	32	---
102	---	6.0	---	21	---	150	---	24	---	55	---	---
103	---	5.0	---	16	---	100	---	19	---	45	---	---
Stoneham:												
105, 107	---	3.0	---	---	---	65	---	---	---	---	---	---
106	---	4.0	---	14	---	80	---	15	15	---	12	40
Ulysses:												
[2]110	---	4.5	---	17	---	100	---	17	25	55	38	70
[2]111	---	---	---	---	---	---	---	---	18	---	20	---
Valent:												
113	---	3.5	---	15	---	75	---	14	---	---	---	---
Vona:												
116	---	3.5	---	---	---	80	---	---	---	35	---	---
117	---	4.0	---	15	---	90	---	15	---	40	---	---
Wages:												
118	---	5.5	---	22	20	150	---	23	30	55	38	70
119	---	4.5	---	17	---	105	---	18	24	45	30	60
120	---	3.0	---	13	---	85	---	15	20	35	20	45
[2]121	---	3.0	---	12	---	85	---	---	20	35	20	45
[2]123	---	4.5	---	17	---	105	---	18	24	45	30	60
[2]124	---	3.0	---	12	---	85	---	---	20	35	20	45
Weld:												
125	---	6.0	---	24	---	155	---	24	25	65	30	60
126	---	5.5	---	22	---	140	---	22	25	60	30	55
Westplain:												
127	---	5.0	---	16	---	90	---	15	---	---	---	---
[2]128	---	5.0	---	17	---	95	---	19	---	---	---	---

[1]Yields are for areas protected from flooding.
[2]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION

[illegible] not in range sites; such soils can be used for grazing if grass cover is established

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Argiustolls:					
18:					
Rock outcrop part.					
Arvada:					
9	Salt flats	Favorable	1,500	Gardner saltbush	30
		Normal	1,200	Western wheatgrass	20
		Unfavorable	1,000	Alkali sacaton	10
				Greasewood	10
				Inland saltgrass	10
				Bottlebrush squirreltail	5
				Winterfat	5
Ascalon:					
10, 11, 12	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Buffalograss	5
		Unfavorable	1,400	Sedge	5
				Western wheatgrass	20
Bankard:					
14	Sandy bottomland	Favorable	3,000	Sand reedgrass	25
		Normal	2,500	Blue grama	10
		Unfavorable	2,000	Needleandthread	10
				Western wheatgrass	5
				Sand dropseed	5
				Switchgrass	15
				Sand bluestem	5
				Sand sagebrush	5
				Sedge	5
Bayard:					
15:					
Bayard part	Sandy plains	Favorable	2,000	Sand reedgrass	20
		Normal	1,800	Needleandthread	5
		Unfavorable	1,500	Blue grama	25
				Switchgrass	10
				Sand dropseed	5
				Sand bluestem	8
				Sand sagebrush	5
				Little bluestem	15
Canyon part	Limestone breaks	Favorable	1,250	Little bluestem	25
		Normal	1,000	Sideoats grama	15
		Unfavorable	625	Blue grama	15
				Sedge	8
				Needleandthread	5
				Red threeawn	5
				Sand reedgrass	5
Bridgeport:					
16	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Buffalograss	5
		Unfavorable	1,400	Sedge	5
				Western wheatgrass	20
Canyon:					
17	Limestone breaks	Favorable	1,250	Little bluestem	25
		Normal	1,000	Sideoats grama	15
		Unfavorable	625	Blue grama	15
				Sedge	8
				Needleandthread	5
				Red threeawn	5
				Sand reedgrass	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Chappell:					
18	Sandy plains	Favorable	2,000	Sand reedgrass	20
		Normal	1,800	Needleandthread	5
		Unfavorable	1,500	Blue grama	25
				Little bluestem	15
				Sand dropseed	5
				Switchgrass	10
				Sand sagebrush	5
				Sand bluestem	8
Colby:					
19	Loamy slopes	Favorable	1,600	Little bluestem	5
		Normal	1,100	Sideoats grama	10
		Unfavorable	800	Blue grama	45
				Western wheatgrass	10
				Needleandthread	5
				Squirreltail	5
				Sedge	5
Dacono:					
20	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Western wheatgrass	20
		Unfavorable	1,400	Buffalograss	5
				Sedge	5
Dailey:					
21, 22	Deep sand	Favorable	2,500	Sand reedgrass	20
		Normal	2,000	Blue grama	15
		Unfavorable	1,500	Sand sagebrush	10
				Sand bluestem	10
				Sand dropseed	5
				Sedge	5
				Little bluestem	5
				Switchgrass	5
				Sideoats grama	5
				Needleandthread	5
23	Deep sand	Favorable	2,500	Sand reedgrass	20
		Normal	2,000	Switchgrass	5
		Unfavorable	1,500	Sand bluestem	10
				Little bluestem	5
				Blue grama	15
				Sedge	5
				Sand sagebrush	10
				Needleandthread	5
				Sand dropseed	5
				Sideoats grama	5
Dix:					
[1]24:					
Dix part	Gravel breaks	Favorable	1,400	Blue grama	30
		Normal	900	Sideoats grama	10
		Unfavorable	600	Little bluestem	10
				Buffalograss	5
				Sedge	5
Altvan part	Loamy plains	Favorable	2,500	Western wheatgrass	20
		Normal	2,000	Blue grama	55
		Unfavorable	1,250	Sedge	5
				Buffalograss	5
[1]25:					
Dix part	Gravel breaks	Favorable	1,400	Blue grama	30
		Normal	900	Sideoats grama	10
		Unfavorable	600	Little bluestem	10
				Buffalograss	5
				Sedge	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

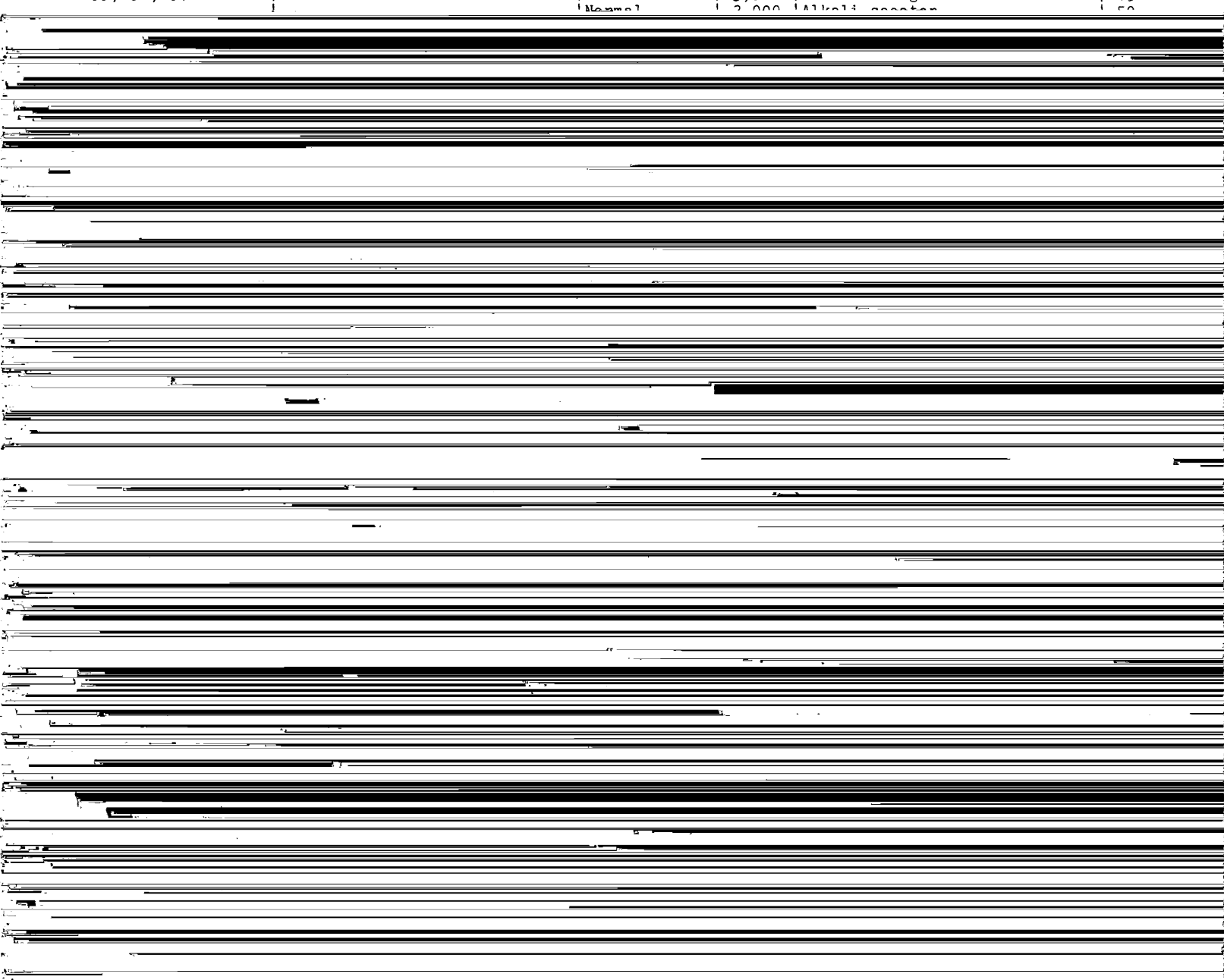
Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Dix: [1]25:					
Eckley part-----	Gravel breaks-----------	Favorable	1,400	Blue grama----------	30
		Normal	900	Sideoats grama	10

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Haxtun: 36, 37, 38	Sandy plains	Favorable	2,000	Sand reedgrass	20
		Normal	1,800	Little bluestem	15
		Unfavorable	1,500	Switchgrass	10
				Blue grama	25
				Sand bluestem	8
				Sand sagebrush	5
				Needleandthread	5
				Sand dropseed	5
Hayford: 39, 40	Salt meadow	Favorable	3,500	Inland saltgrass	15
		Normal	3,000	Alkali sacaton	50

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Kim:					
51	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Western wheatgrass	20
		Unfavorable	1,400	Buffalograss	5
				Sedge	5
Kuma:					
52	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Buffalograss	5
		Unfavorable	1,400	Western wheatgrass	20
				Sedge	5
Kutch:					
53, 54	Clayey plains	Favorable	1,200	Western wheatgrass	30
		Normal	900	Green needlegrass	7
		Unfavorable	600	Blue grama	30
				Alkali sacaton	5
				Sedge	5
				Buffalograss	10
Lebsack:					
55, 56, 57	Salt meadow	Favorable	3,500	Inland saltgrass	15
		Normal	3,000	Alkali sacaton	50



RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Mosher:					
73	Salt flat	Favorable	1,500	Inland saltgrass	20
		Normal	1,200	Alkali sacaton	50
		Unfavorable	1,000	Western wheatgrass	10

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Platner:					
[1]91:					
Rago part	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Western wheatgrass	20
		Unfavorable	1,400	Buffalograss	5
				Sedge	5
Rago part	Loamy plains	Favorable	2,000	Blue grama	55

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Rosebud:					
[1]97:					
Rosebud part----	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Western wheatgrass----------	20
		Unfavorable	1,400	Buffalograss----------	5
				Sedge----------	5
Escabosa part---	Limestone breaks----------	Favorable	1,250	Sideoats grama----------	15
		Normal	1,000	Little bluestem----------	25
		Unfavorable	625	Blue grama----------	15
				Sedge----------	8
				Needleandthread----------	5
				Sand reedgrass----------	5
				Red threeawn----------	5
[1]98:					
Rosebud part----	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Western wheatgrass----------	20
		Unfavorable	1,400	Buffalograss----------	5
				Sedge----------	8
Escabosa part---	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Western wheatgrass----------	20
		Unfavorable	1,400	Sedge----------	5
				Buffalograss----------	5
Iliff part------	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Western wheatgrass----------	20
		Unfavorable	1,400	Buffalograss----------	10
				Sedge----------	5
Satanta:					
99, 100, 101------	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Western wheatgrass----------	10
		Unfavorable	1,400	Buffalograss----------	5
				Sedge----------	5
102, 103----------	Salt meadow----------	Favorable	3,500	Inland saltgrass----------	15
		Normal	3,000	Alkali sacaton----------	50
		Unfavorable	2,500	Sedge----------	10
				Switchgrass----------	15
				Western wheatgrass----------	5
				Rush----------	5
Shingle:					
104----------	Shaly plains----------	Favorable	1,200	Alkali sacaton----------	30
		Normal	900	Blue grama----------	10
		Unfavorable	450	Western wheatgrass----------	10
				Fourwing saltbush----------	5
				Winterfat----------	5
				Sedge----------	5
				Sideoats grama----------	15
Stoneham:					
105----------	Loamy slopes----------	Favorable	1,600	Blue grama----------	45
		Normal	1,200	Western wheatgrass----------	10
		Unfavorable	900	Sideoats grama----------	10
				Sedge----------	5
				Little bluestem----------	5
				Needleandthread----------	5
				Squirreltail----------	5
106, 107----------	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Buffalograss----------	5
		Unfavorable	1,400	Western wheatgrass----------	20
				Sedge----------	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Stoneham:					
[1]108:					
Stoneham part---	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Buffalograss----------	5
		Unfavorable	1,400	Western wheatgrass----------	20
				Sedge----------	5
Cushman part----	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Buffalograss----------	5
		Unfavorable	1,400	Sedge----------	5
				Western wheatgrass----------	20
Thedalund:					
[1]109:					
Thedalund part--	Shaly plains----------	Favorable	900	Blue grama----------	25
		Normal	550	Sideoats grama----------	5
		Unfavorable	300	Alkali sacaton----------	30
				Western wheatgrass----------	10
				Winterfat----------	5
				Sedge----------	5
				Fourwing saltbush----------	5
Kim part--------	Loamy slopes----------	Favorable	1,600	Blue grama----------	45
		Normal	1,100	Western wheatgrass----------	10
		Unfavorable	800	Needleandthread----------	5
				Sideoats grama----------	10
				Little bluestem----------	5
				Squirreltail----------	5
				Sedge----------	5
Shingle part----	Shaly plains----------	Favorable	900	Alkali sacaton----------	30
		Normal	550	Blue grama----------	25
		Unfavorable	300	Western wheatgrass----------	10
				Fourwing saltbush----------	5
				Winterfat----------	5
				Sedge----------	5
				Sideoats grama----------	15
Ulysses:					
[1]110:					
Ulysses part----	Loamy plains----------	Favorable	2,000	Western wheatgrass----------	20
		Normal	1,800	Sedge----------	5
		Unfavorable	1,400	Blue grama----------	55
				Buffalograss----------	5
Norka part------	Loamy plains----------	Favorable	2,000	Blue grama----------	55
		Normal	1,800	Western wheatgrass----------	20
		Unfavorable	1,400	Buffalograss----------	5
				Sedge----------	5
[1]111:					
Ulysses part-----	Loamy slopes----------	Favorable	2,400	Little bluestem----------	5
		Normal	1,800	Western wheatgrass----------	10
		Unfavorable	1,000	Sideoats grama----------	10
				Blue grama----------	45
				Squirreltail----------	5
				Sedge----------	5
				Needleandthread----------	5
Norka part------	Loamy slopes----------	Favorable	2,000	Blue grama----------	45
		Normal	1,700	Western wheatgrass----------	10
		Unfavorable	1,400	Little bluestem----------	5
				Sedge----------	5
				Sideoats grama----------	10
				Squirreltail----------	5
				Needleandthread----------	5

See footnotes at end of table.

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Ulysses: [1]111:					
Colby part	Loamy slopes	Favorable	2,400	Little bluestem	5
		Normal	1,800	Sideoats grama	10
		Unfavorable	800	Blue grama	45
				Western wheatgrass	10
				Needleandthread	5
				Squirreltail	5
				Sedge	5
Ustic Torriorthents:					
112	Loamy slopes	Favorable	2,400	Little bluestem	5
		Normal	1,800	Western wheatgrass	10
		Unfavorable	800	Sideoats grama	10

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Wages:					
[1]121:					
Wages part	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Buffalograss	5
		Unfavorable	1,400	Sedge	5
				Western wheatgrass	20
Altvan part	Loamy plains	Favorable	2,000	Western wheatgrass	20
		Normal	1,800	Sedge	5
		Unfavorable	1,400	Blue grama	55
				Buffalograss	5
[1]122:					
Wages part	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Buffalograss	5
		Unfavorable	1,400	Sedge	5
				Western wheatgrass	20
Manter part	Sandy plains	Favorable	2,000	Blue grama	25
		Normal	1,800	Sand reedgrass	20
		Unfavorable	1,500	Little bluestem	15
				Switchgrass	10
				Sand bluestem	8
				Sand dropseed	5
				Needleandthread	5
				Sand sagebrush	5
[1]123:					
Wages part	Loamy plains	Favorable	2,000	Blue grama	55
		Normal	1,800	Buffalograss	5
		Unfavorable	1,400	Sedge	5
				Western wheatgrass	20
Rosebud part	Loamy plains	Favorable	2,750	Blue grama	55
		Normal	2,000	Western wheatgrass	20
		Unfavorable	1,250	Buffalograss	5
				Sedge	5
[1]124:					
Wages part	Loamy plains	Favorable	2,000	Blue grama	55

TABLE 6.--RANGE PRODUCTIVITY AND CHARACTERIZING POTENTIAL VEGETATION--Continued

Soil name and map symbol	Range site name	Total production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Westplain:					
[1]128:					
Westplain part--	Salt meadow	Favorable	3,500	Inland saltgrass	15
		Normal	3,000	Alkali sacaton	50
		Unfavorable	2,500	Sedge	10
				Switchgrass	15
				Western wheatgrass	5
				Rush	5
Alda part	Salt meadow	Favorable	3,500	Inland saltgrass	15
		Normal	3,000	Alkali sacaton	50
		Unfavorable	2,500	Sedge	10
				Switchgrass	15
				Western wheatgrass	5
				Rush	5

TABLE 7.--BUILDING SITE DEVELOPMENT

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and	Shallow	Dwellings without	Dwellings with	Small commercial	Local roads

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Badland: 13.					
Bankard: 14	Severe: cutbanks cave, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Bayard: [1]15:					
Bayard part	Slight	Slight	Slight	Moderate: slope.	Slight.
Canyon part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
Bridgeport: 16	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.
Canyon: 17	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Chappell: 18	Severe: cutbanks cave, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
Colby: 19	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
Dacono: 20	Severe: cutbanks cave.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Severe: shrink-swell, low strength.
Dailey: 21	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
22	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
23	Moderate: too sandy.	Slight	Slight	Slight	Slight.
Dix: [1]24:					
Dix part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Altvan part	Severe: cutbanks cave.	Moderate: low strength, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: shrink-swell, slope, frost action.
[1]25:					
Dix part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Eckley part	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.

See footnotes at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Els:					

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Julesburg:					
45, 47, 48	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.
49:					
Julesburg part	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.
Eckley part	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Keith:					
50	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, frost action, low strength.
Kim:					
51	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Moderate: low strength.
Kuma:					
52	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, frost action.
Kutch:					
53, 54	Severe: too clayey, depth to rock.	Severe: shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Lebsack:					
55, 56, 57	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Loveland:					
58	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, frost action, floods.
Manter:					
59, 61	Slight	Slight	Slight	Slight	Moderate: low strength, frost action.
60, 62, 63	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.
64	Moderate: wetness, cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: low strength, frost action.
65	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, low strength, frost action.
Manzanola:					
66	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Severe: shrink-swell.	Moderate: shrink-swell, low strength.	Severe: shrink-swell, low strength.

See footnotes at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Midway: 67	Severe: too clayey, depth to rock.	Severe: shrink-swell, low strength, depth to rock.	Severe: shrink-swell, low strength, depth to rock.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength.
Mitchell: 68	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
[1]69: Mitchell part	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
Keota part	Severe: depth to rock.	Moderate: low strength.	Severe: depth to rock.	Moderate: low strength.	Moderate: low strength, depth to rock.
[1]70: Mitchell part	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.
Keota part	Severe:	Moderate:	Severe:	Moderate:	Moderate:

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

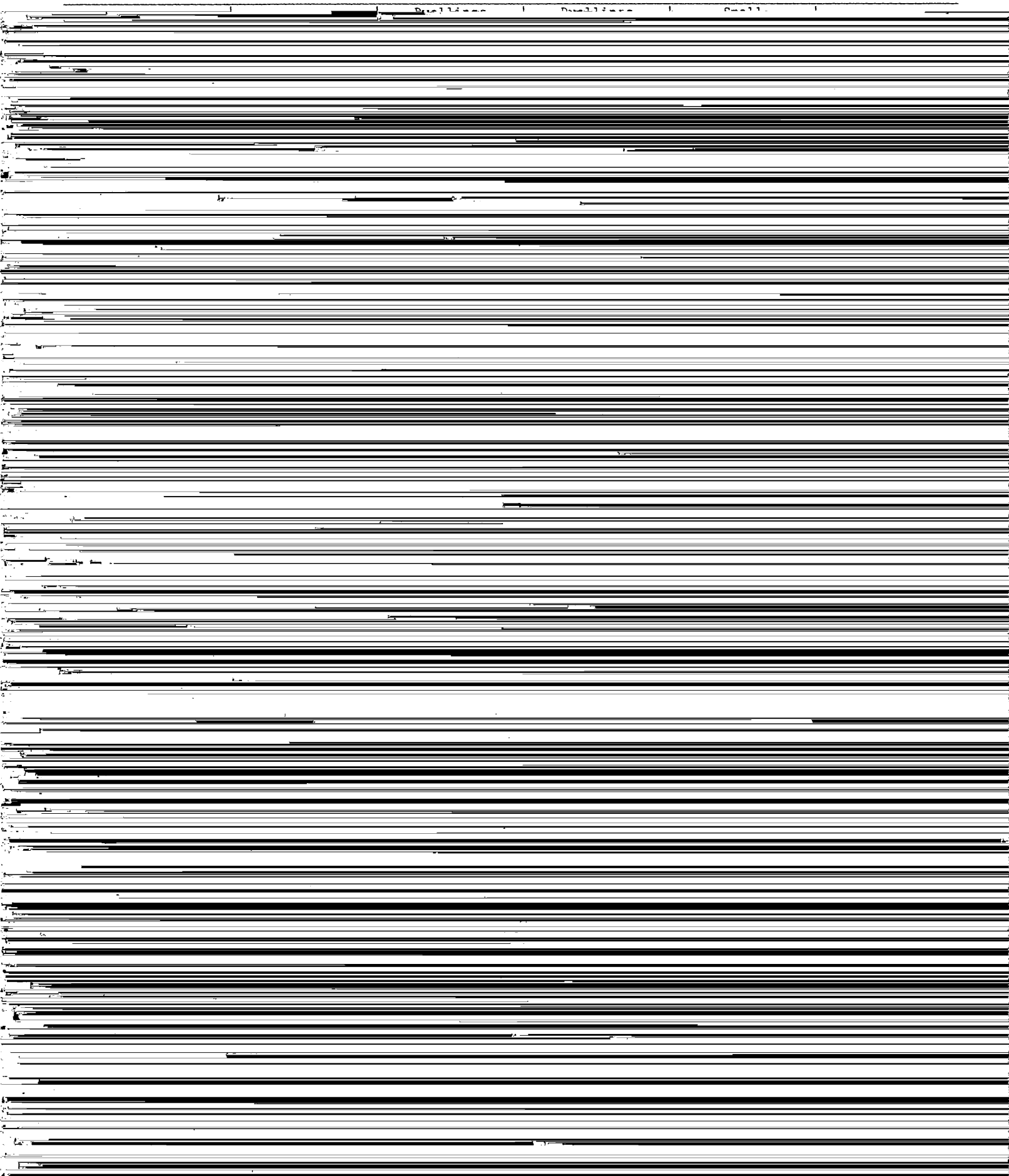


TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Rosebud:					
[1]98:					
Rosebud part	Severe: depth to rock.	Moderate: shrink-swell, depth to rock, low strength.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock, low strength.	Moderate: shrink-swell, frost action, low strength.
Escabosa part	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action, low strength.
Iliff part	Severe: depth to rock.	Moderate: shrink-swell, low strength, depth to rock.	Severe: depth to rock, shrink-swell.	Moderate: shrink-swell, low strength, depth to rock.	Severe: shrink-swell, low strength.
Satanta:					
99, 100, 101	Slight	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, low strength.
102	Moderate: wetness.	Moderate: wetness.	Moderate: shrink-swell, wetness.	Moderate: wetness.	Moderate: frost action, low strength, shrink-swell.
103	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action, low strength.
Shingle:					
104	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Stoneham:					
105, 106, 107	Slight	Slight	Moderate: shrink-swell.	Moderate: slope.	Moderate: low strength, shrink-swell.
[1]108:					
Stoneham part	Slight	Slight	Moderate: shrink-swell.	Moderate: slope.	Moderate: low strength, shrink-swell.
Cushman part	Severe: depth to rock.	Moderate: low strength, depth to rock.	Severe: depth to rock.	Moderate: slope, low strength, depth to rock.	Moderate: low strength, shrink-swell.
Thedalund:					
[1]109:					
Thedalund part	Severe: depth to rock, slope.	Moderate: low strength, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: low strength, slope.
Kim part	Moderate: slope.	Moderate: low strength, slope.	Moderate: low strength, slope.	Severe: slope.	Moderate: low strength, slope.
Shingle part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Ulysses:					
[1]110:					
Ulysses part	Slight	Moderate: low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength.	Moderate: low strength, shrink-swell.

See footnotes at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Ulysses: Norka part	Slight	Moderate: low strength.	Moderate: low strength, shrink-swell.	Moderate: low strength, slope.	Moderate: low strength, frost action, shrink-swell.
[1]111: Ulysses part	Slight	Moderate: low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength.	Moderate: low strength, shrink-swell.
Norka part	Slight	Moderate: low strength.	Moderate: low strength, shrink-swell.	Moderate: low strength, slope.	Moderate: low strength, frost action, shrink-swell.
Colby part	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Ustic Torriorthents: 112	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Valent: 113	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
114	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
115	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Vona: 116, 117	Slight	Slight	Slight	Moderate:	Moderate:

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Wages:					
[1]123, [1]124:					
Wages part	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength, frost action, shrink-swell.
Rosebud part	Severe: depth to rock.	Moderate: shrink-swell, depth to rock, low strength.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Moderate: shrink-swell, frost action, low strength.
Weld:					
125, 126	Slight	Moderate: low strength	Severe: shrink-swell	Moderate: low strength	Severe: low strength

TABLE 8.--SANITARY FACILITIES

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Albinas:					
1	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Alda:					
2	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Good.
3	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Good.
Altvan:					
4:					
Altvan part	Moderate:[2] percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Fokley part	Slight	Severe:	Severe:	Severe:	Fair:

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Bayard:					
[1]15:					
Bayard part	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Canyon part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Bridgeport:					
16	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Canyon:					
17	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
Chappell:					
18	Severe: floods.	Severe: seepage, floods.	Severe: seepage, floods.	Severe: seepage, floods.	Fair: small stones, area reclaim.
Colby:					
19	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
Dacono:					
20	Severe:[2] percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
Dailey:					
21, 22	Slight	Severe: seepage.	Severe: too sandy, seepage.	Severe: seepage.	Poor: seepage, too sandy.
23	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
Dix:					
[1]24:					
Dix part	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: slope, too sandy, small stones.
Altvan part	Moderate:[2] slope, percs slowly.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
[1]25:					
Dix part	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: slope, too sandy, small stones.
Eckley part	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones.
Els:					
26	Severe: wetness, floods.	Severe: seepage, wetness, floods.	Severe: seepage, wetness, floods.	Severe: seepage, wetness, floods.	Poor: too sandy.
Epping:					
27	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Fluvaquentic Haplaquolls: 28	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Fluvaquents: 29	Severe: wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Severe: wetness, floods.	Poor: wetness, too sandy.
Glenberg: 30	Severe: floods.	Severe: floods, seepage.	Severe: seepage, floods.	Severe: seepage, floods.	Good.
Gravel pits: 31.					
Haverson: 32, 33	Moderate: floods, percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
34, 35	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Haxtun: 36	Slight	Moderate: seepage.	Slight	Slight	Good.
37	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
38	Slight	Moderate: seepage.	Slight	Slight	Good.
Hayford: 39, 40	Severe: percs slowly, wetness.	Severe: wetness, floods, seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: too clayey.
Heldt: 41, 42	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
Iliff: 43	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: too clayey, thin layer, area reclaim.
Julesburg: 44, 45, 46, 47, 48	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
[1]49: Julesburg part	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Eckley part	Slight	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Keith: 50	Slight	Moderate: seepage.	Slight	Slight	Good.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Kim:					

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1]70:					
Mitchell part----	Slight----------	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
Keota part-------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight----------	Fair: thin layer, slope, area reclaim.
[1]71:					
Mitchell part----	Slight----------	Moderate: seepage.	Slight----------	Slight----------	Good.
Norka part-------	Moderate: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Good.
Mosher:					
72, 73-----------	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: too clayey, seepage, wetness.	Severe: seepage.	Poor: too clayey.
Norka:					
74-----------	Moderate: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Good.
[1]75:					
Norka part-------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
Ulysses part-----	Slight----------	Moderate: seepage.	Slight----------	Slight----------	Good.
Nunn:					
76-----------	Severe: percs slowly.	Slight----------	Slight----------	Slight----------	Fair: too clayey.
77, 78, 80, 81-----	Severe: percs slowly.	Moderate: slope.	Slight----------	Slight----------	Fair: too clayey.
79-----------	Severe: percs slowly.	Severe: slope.	Slight----------	Slight----------	Fair: too clayey.
82-----------	Severe: percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
83-----------	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Olney:					
84-----------	Slight----------	Severe: seepage	Severe: seepage	Severe: seepage	Good.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1]91:					
Platner part	Severe:[2] percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
Rago part	Severe: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: too clayey.
Dacono part	Severe:[2] percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, small stones.
Rago:					
92, 93	Severe: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: too clayey.
Renohill:					
[1]94:					
Renohill part	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: too clayey, thin layer, area reclaim.
Shingle part	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Rock outcrop:					
[1]95:					
Rock outcrop part.					
Argiustolls part	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, area reclaim.
Rosebud:					
[1]96:					
Rosebud part	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Slight	Fair: thin layer, area reclaim.
Escabosa part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, area reclaim.
[1]97:					
Rosebud part	Severe: depth to rock.	Severe: depth to rock, slope.	Moderate: depth to rock.	Slight	Fair: thin layer, area reclaim.
Escabosa part	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, area reclaim.
[1]98:					
Rosebud part	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Slight	Fair: thin layer, area reclaim.
Escabosa part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, area reclaim.
Iliff part	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: too clayey, thin layer, area reclaim.
Satanta:					
99	Slight	Moderate: seepage.	Slight	Slight	Good.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and	Septic tank absorption	Sewage lagoon	Trench sanitary	Area sanitary	Daily cover

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Valent:					
113	Slight	Severe: seepage.	Severe: too sandy, seepage.	Severe: seepage.	Poor: too sandy.
114	Severe:	Severe:	Severe:	Severe:	Poor:

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Westplain:					
127	Severe: wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: wetness.
[1]128:					
Westplain part	Severe: wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: wetness.
Alda part	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Fair: too sandy.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

[2]Rate slight if absorption field is placed in underlying sandy or gravelly materials.

TABLE 9.--CONSTRUCTION MATERIALS

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Albinas: 1----------	Fair: low strength.	Unsuited----------	Unsuited----------	Fair: too clayey.
Alda: 2, 3----------	Poor:	Good----------	Good----------	Good.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Canyon: 17	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: area reclaim.
Chappell: 18	Good	Good	Good	Good.
Colby: 19	Fair: low strength.	Unsuited	Unsuited	Fair: slope.
Dacono: 20	Good	Good	Good	Fair: thin layer.
Dailey: 21, 22	Good	Fair: excess fines.	Unsuited	Poor: too sandy.
23	Good	Poor: excess fines.	Unsuited	Poor: too sandy.
Dix: [1]24: Dix part	Fair: slope.	Good	Good	Poor: small stones, area reclaim, slope.
Altvan part	Good	Good	Unsuited	Fair: thin layer, slope, small stones.
[1]25: Dix part	Fair: slope.	Good	Good	Poor: small stones, area reclaim, slope.
Eckley part	Good	Fair: excess fines.	Fair: excess fines.	Fair: slope, small stones.
Els: 26	Fair: wetness, frost action.	Fair: excess fines.	Unsuited	Poor: too sandy.
Epping: 27	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Fluvaquentic Haplaquolls: 28	Poor: wetness.			Poor: wetness.
Fluvaquents: 29	Poor: wetness.			Poor: wetness.
Glenberg: 30	Fair: low strength.	Poor: excess fines.	Unsuited	Good.
Gravel pits: 31.				

See footnotes at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Haverson: 32, 33, 34	Fair: low strength.	Unsuited	Unsuited	Good.
35	Fair:	Unsuited	Unsuited	Fair:

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Lebsack:				
56	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: excess salt, excess sodium, too clayey.
57	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Loveland:				
58	Poor: wetness, frost action.	Good	Good	Fair: too clayey, wetness.
Manter:				
59, 60	Fair: low strength, frost action.	Poor: excess fines.	Unsuited	Fair: too sandy.
61, 62, 63, 64, 65	Fair: low strength, frost action.	Poor: excess fines.	Unsuited	Good.
Manzanola:				
66	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Midway:				
67	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: too clayey, area reclaim.
Mitchell:				
68	Fair: low strength.	Unsuited	Unsuited	Good.
[1]69:				
Mitchell part	Fair: low strength.	Unsuited	Unsuited	Good.
Keota part	Poor: thin layer.	Unsuited	Unsuited	Good.
[1]70:				
Mitchell part	Fair: low strength.	Unsuited	Unsuited	Good.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Norka:				
[1]75:				
Norka part	Fair: low strength, frost action.	Unsuited	Unsuited	Fair: too clayey.
Ulysses part	Fair: low strength.	Unsuited	Unsuited	Good.
Nunn:				
76, 77, 78, 79	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
80, 81	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
82, 83	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Olney:				
84, 85	Fair: low strength.	Unsuited	Unsuited	Fair: too clayey.
Peetz:				
86	Fair: slope.	Good	Good	Poor: slope, small stones.
Platner:				
87, 88, 89, 90	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
[1]91:				
Platner part	Fair:	Unsuited	Unsuited	Fair:

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Rock outcrop:				
195:				
Rock outcrop part.				
Argiustolls part---	Poor: thin layer.			
Rosebud:				
196:				
Rosebud part-------	Poor: thin layer.	Unsuited----------	Unsuited----------	Fair: area reclaim, too clayey.
Escabosa part------	Poor: thin layer.	Unsuited----------	Unsuited----------	Fair: too clayey, area reclaim, small stones.
197:				
Rosebud part-------	Poor: thin layer.	Unsuited----------	Unsuited----------	Fair: area reclaim, too clayey.
Escabosa part------	Poor: thin layer.	Unsuited----------	Unsuited----------	Fair: too clayey, area reclaim, small stones.
198:				

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Thedalund:				
[1]109:				
Thedalund part	Poor: thin layer.	Unsuited	Unsuited	Fair: slope.
Kim part	Fair: low strength.	Unsuited	Unsuited	Fair: slope.
Shingle part	Poor: thin layer.	Unsuited	Unsuited	Poor: area reclaim.
Ulysses:				
[1]110:				
Ulysses part	Fair: low strength.	Unsuited	Unsuited	Fair: too clayey.
Norka part	Fair: low strength, frost action.	Unsuited	Unsuited	Fair: too clayey.
[1]111:				
Ulysses part	Fair: low strength.	Unsuited	Unsuited	Fair: too clayey.
Norka part	Fair: low strength, frost action.	Unsuited	Unsuited	Fair: too clayey.
Colby part	Fair: low strength.	Unsuited	Unsuited	Good.
Ustic Torriorthents:				
112	Poor: slope.			Poor: slope.
Valent:				
113, 115	Good	Fair: excess fines.	Unsuited	Poor: too sandy.
114	Poor: slope.	Fair: excess fines.	Unsuited	Poor: too sandy, slope.
Vona:				
116, 117	Good	Poor: excess fines.	Unsuited	Good.
Wages:				
118, 119, 120	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
[1]121:				
Wages part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Altvan part	Good	Fair: excess fines.	Unsuited	Fair: too clayey.
[1]122:				
Wages part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.

See footnotes at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wages:				
Manter part	Fair: low strength, frost action.	Poor: excess fines.	Unsuited	Good.
[1]123:				
Wages part	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Rosebud part	Poor:	Unsuited	Unsuited	Fair:

TABLE 10.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Features affecting--					
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Albinas:						
1	Seepage	Low strength, piping.	Floods	Floods	Favorable	Favorable.
Alda:						
2	Seepage	Seepage, piping.	Poor outlets, wetness.	Wetness, seepage.	Small stones	Wetness, droughty.
3	Seepage.	Seepage, piping.	Poor outlets, wetness, floods.	Wetness, seepage, floods.	Small stones	Small stones, droughty.
Altvan:						
14:						
Altvan part	Seepage	Seepage, piping.	Slope	Slope, droughty.	Small stones	Droughty.
Eckley part	Seepage	Seepage, piping.	Slope	Droughty, slope.	Small stones	Droughty.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Features affecting-- Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Bayard:						
[1]15:						
Canyon part	Depth to rock, slope.	Thin layer, piping.	Depth to rock, slope.	Rooting depth, slope.	Depth to rock, slope.	Droughty, slope, rooting depth.
Bridgeport:						
16	Seepage	Low strength, piping.	Favorable	Favorable	Favorable	Favorable.
Canyon:						
17	Depth to rock, slope.	Thin layer, piping.	Depth to rock, slope.	Rooting depth, slope.	Depth to rock, slope.	Droughty, slope, rooting depth.
Chappell:						
18	Seepage	Piping, seepage.	Floods	Fast intake, droughty, floods.	Erodes easily, floods.	Erodes easily, droughty.
Colby:						
19	Seepage	Low strength, piping.	Slope	Slope, erodes easily.	Slope	Slope, erodes easily.
Dacono:						
20	Seepage	Seepage, piping.	Slope, percs slowly.	Droughty, slope.	Small stones	Droughty.
Dailey:						
21, 22	Seepage, slope.	Piping, seepage.	Slope, cutbanks cave.	Complex slope, soil blowing, droughty.	Complex slope, too sandy, soil blowing.	Soil blowing, droughty.
23	Seepage	Piping	Cutbanks cave	Droughty, soil blowing.	Too sandy, soil blowing.	Soil blowing, droughty.
Dix:						
[1]24:						
Dix part	Seepage, slope.	Seepage	Slope	Slope, droughty, seepage.	Complex slope, too sandy, small stones.	Droughty, slope.
Altvan part	Seepage, slope.	Seepage, piping.	Slope	Slope, droughty.	Small stones, slope.	Droughty, slope.
[1]25:						
Dix part	Seepage, slope.	Seepage	Slope	Slope, droughty, seepage.	Complex slope, too sandy, small stones.	Droughty, slope.
Eckley part	Seepage, slope.	Seepage, piping.	Slope	Droughty, slope, seepage.	Slope, erodes easily, small stones.	Droughty, erodes easily, slope.
Els:						
26	Seepage	Seepage, piping.	Poor outlets, floods, wetness.	Floods, seepage, wetness.	Too sandy, wetness.	Droughty, wetness.
Epping:						
27	Depth to rock, slope.	Thin layer, piping.	Depth to rock, slope.	Rooting depth, slope.	Depth to rock, erodes easily.	Rooting depth.
Fluvaquentic Haplaquolls:						
28			Floods	Floods, wetness.	Wetness	Wetness.

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Features affecting--					
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Features affecting-- Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Keith:						
50	Seepage	Piping, hard to pack, low strength.	Favorable	Erodes easily, slope.	Erodes easily, slope.	Erodes easily, slope.
Kim:						
51	Seepage, slope.	Piping, low strength.	Slope	Slope	Slope, piping.	Slope.
Kuma:						
52	Seepage	Low strength, piping.	Slope	Slope	Favorable	Favorable.
Kutch:						
53	Depth to rock	Thin layer, low strength, shrink-swell.	Depth to rock, percs slowly, slope.	Rooting depth, percs slowly, slope.	Depth to rock, percs slowly.	Rooting depth, percs slowly.
54	Depth to rock, slope.	Thin layer, low strength, shrink-swell.	Depth to rock, percs slowly, slope.	Rooting depth, percs slowly, slope.	Depth to rock, percs slowly.	Rooting depth, percs slowly, slope.
Lebsack:						
55	Favorable	Compressible, low strength, shrink-swell.	Percs slowly	Percs slowly	Percs slowly	Percs slowly.
56	Favorable	Hard to pack, low strength, shrink-swell.	Excess salt, excess sodium, percs slowly.	Excess salt, excess sodium, percs slowly.	Percs slowly	Percs slowly, excess salt, excess sodium.
57	Favorable	Hard to pack, low strength, shrink-swell.	Percs slowly, wetness, excess salt.	Percs slowly, wetness, excess salt.	Percs slowly	Percs slowly, wetness, excess salt.
Loveland:						
58	Seepage	Shrink-swell, piping, low strength.	Floods, wetness.	Wetness, floods.	Wetness	Wetness.
Manter:						
59	Seepage	Piping, low strength.	Slope	Droughty, soil blowing, slope.	Soil blowing, piping.	Soil blowing, droughty.
60	Seepage, slope.	Piping, low strength.	Slope	Droughty, soil blowing, slope.	Soil blowing, piping.	Soil blowing, slope, droughty.
61, 62	Seepage	Piping, low strength.	Slope	Droughty, slope, erodes easily.	Soil blowing, piping.	Erodes easily, droughty.
63	Seepage, slope.	Piping, low strength.	Slope	Droughty, slope, erodes easily.	Soil blowing, piping.	Erodes easily, slope, droughty.
64, 65	Seepage	Piping, low strength.	Cutbanks cave, wetness.	Wetness, erodes easily, droughty.	Piping, erodes easily.	Erodes easily, wetness.
Manzanola:						
66	Favorable	Low strength, piping, shrink-swell.	Slope, percs slowly.	Percs slowly, slope.	Percs slowly	Percs slowly.
Midway:						
67	Slope	Thin layer	Complex slope	Complex slope	Complex slope	Complex slope

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Features affecting--					
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Mitchell:						
68	Seepage	Piping, low strength.	Slope	Slope, erodes easily.	Erodes easily, piping.	Erodes easily.
[1]69:						
Mitchell part	Seepage	Piping, low strength.	Slope	Slope, erodes easily.	Erodes easily, piping.	Erodes easily.
Keota part	Depth to rock, seepage.	Thin layer, low strength, piping.	Complex slope, depth to rock.	Rooting depth, complex slope.	Depth to rock, complex slope.	Complex slope, erodes easily.
[1]70:						
Mitchell part	Slope, seepage.	Piping, low strength.	Slope	Erodes easily, slope.	Erodes easily, piping.	Erodes easily.
Keota part	Depth to rock, seepage, slope.	Thin layer, low strength, piping.	Complex slope, depth to rock.	Rooting depth, complex slope.	Depth to rock, complex slope.	Complex slope, erodes easily, slope.
[1]71:						
Mitchell part	Seepage	Piping, low strength.	Slope	Slope, erodes easily.	Erodes easily, piping.	Erodes easily.
Norka part	Seepage	Piping, low strength, hard to pack.	Slope	Slope	Piping	Favorable.
Mosher:						
72, 73	Seepage	Low strength, piping.	Wetness	Percs slowly, excess salt, wetness.	Wetness, excess salt.	Excess salt, wetness.
Norka:						
74	Seepage, slope.	Piping, low strength, hard to pack.	Favorable	Favorable	Piping	Favorable.
[1]75:						
Norka part	Seepage	Piping, low strength, hard to pack.	Slope	Slope	Piping	Favorable.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Features affecting-- Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Platner:						
87, 89, 90	Seepage	Low strength, piping.	Slope	Slope, percs slowly.	Complex slope, percs slowly.	Percs slowly, complex slope.
88	Seepage	Low strength, piping.	Percs slowly	Percs slowly	Percs slowly	Percs slowly.
[1]91:						
Platner part	Seepage	Low strength, piping.	Slope, percs slowly.	Slope, percs slowly.	Complex slope, percs slowly.	Percs slowly, complex slope.
Rago part	Seepage	Low strength, piping.	Percs slowly	Percs slowly	Percs slowly	Percs slowly.
Dacono part	Seepage	Seepage, piping.	Slope	Droughty, slope.	Small stones	Droughty.
Rago:						
92, 93	Seepage	Low strength, piping.	Percs slowly	Percs slowly	Percs slowly	Percs slowly.
Renohill:						
[1]94:						
Renohill part	Slope, depth to rock.	Low strength, thin layer, shrink-swell.	Slope, depth to rock, percs slowly.	Slope, rooting depth.	Depth to rock, percs slowly.	Rooting depth, percs slowly, slope.
Shingle part	Slope, depth to rock.	Low strength, thin layer.	Depth to rock, slope.	Slope, rooting depth.	Depth to rock	Rooting depth, slope.
Rock outcrop:						
[1]95:						
Rock outcrop part.						
Argiustolls part	Slope				Slope	Slope.
Rosebud:						
[1]96:						
Rosebud part	Depth to rock	Shrink-swell, low strength, thin layer.	Slope, depth to rock.	Rooting depth, erodes easily, slope.	Depth to rock, erodes easily.	Erodes easily, rooting depth.
Escabosa part	Depth to rock	Thin layer, low strength.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, rooting depth.	Droughty, rooting depth.
[1]97:						
Rosebud part	Depth to rock, slope.	Shrink-swell, low strength, thin layer.	Slope, depth to rock.	Rooting depth, erodes easily, slope.	Depth to rock, erodes easily.	Erodes easily, rooting depth, slope.
Escabosa part	Depth to rock, slope.	Thin layer, low strength.	Depth to rock, slope.	Erodes easily, rooting depth, slope.	Depth to rock, rooting depth.	Erodes easily, rooting depth, slope.
[1]98:						
Rosebud part	Depth to rock	Shrink-swell, low strength, thin layer.	Slope, depth to rock.	Rooting depth, erodes easily, slope.	Depth to rock, erodes easily.	Erodes easily, rooting depth.
Escabosa part	Depth to rock	Thin layer, low strength.	Depth to rock, slope.	Droughty, rooting depth.	Depth to rock, rooting depth.	Droughty, rooting depth.
Iliff part	Depth to rock	Thin layer, low strength, piping.	Percs slowly, depth to rock, slope.	Percs slowly, slope, rooting depth.	Percs slowly	Percs slowly.

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbols	Features affecting--					
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Satanta:						
99	Seepage	Low strength	Favorable	Favorable	Favorable	Favorable

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Features affecting--					
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Valent:						
114, 115	Seepage, slope.	Piping, seepage.	Slope	Slope, soil blowing, droughty.	Slope, soil blowing, piping.	Slope, soil blowing.
Vona:						
116, 117	Seepage, slope.	Piping	Slope	Slope, seepage, erodes easily.	Erodes easily	Slope, erodes easily.
Wages:						
118, 119	Seepage	Piping, low strength.	Slope	Slope	Favorable	Favorable.
120	Seepage, slope.	Piping, low strength.	Slope	Slope	Favorable	Slope.
[1]121:						
Wages part	Seepage, slope.	Piping, low strength.	Slope	Slope	Favorable	Slope.
Altvan part	Seepage, slope.	Seepage, piping.	Slope	Slope, droughty.	Small stones	Droughty, slope.
[1]122:						
Wages part	Seepage	Piping, low strength.	Slope	Slope	Favorable	Favorable.
Manter part	Seepage	Piping, low strength.	Slope	Droughty, slope, erodes easily.	Erodes easily, piping.	Erodes easily.

TABLE 11.--RECREATIONAL DEVELOPMENT

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and	Camp areas	Picnic areas	Playgrounds	Paths and trails

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Bayard:				
15:				
Canyon part	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.
Bridgeport:				
16	Slight	Slight	Slight	Slight.
Canyon:				
17	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: depth to rock, slope, small stones.	Moderate: small stones.
Chappell:				
18	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
Colby:				
19	Moderate:	Moderate:	Severe:	Slight.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Keith: 50	Slight	Slight	Slight	Slight.
Kim: 51	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
Kuma: 52	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Kutch: 53	Moderate:	Moderate:	Moderate:	Moderate:

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Mitchell:				
[1]69:				
Mitchell part	Slight	Slight	Slight	Slight.
Keota part	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, depth to rock.	Moderate: dusty.
[1]70:				
Mitchell part	Slight	Slight	Moderate: slope.	Slight.
Keota part	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
[1]71:				
Mitchell part	Slight	Slight	Slight	Slight.
Norka part	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Mosher:				
72	Severe: floods.	Slight	Moderate: percs slowly.	Slight.
73	Severe: too clayey, floods.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Norka:				
74	Slight	Slight	Slight	Slight.
[1]75:				
Norka part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
Ulysses part	Slight	Slight	Moderate: slope.	Slight.
Nunn:				
76	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
77, 78	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
79	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
80, 82	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: percs slowly, slope, too clayey.	Moderate: too clayey.
81	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
83	Moderate: wetness, percs slowly, too clayey.	Moderate: wetness, too clayey.	Moderate: wetness, percs slowly, too clayey.	Moderate: too clayey, wetness.
Olney:				
84	Slight	Slight	Moderate: slope.	Slight.

See footnotes at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Olney:				
85	Slight	Slight	Severe: slope.	Slight.
Peetz:				
86	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Platner:				
87, 88	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
89, 90	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
[1]91:				
Platner part	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Rago part	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Dacono part	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Rago:				
92	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
93	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: percs slowly, too clayey.	Moderate: too clayey.
Renohill:				
[1]94:				
Renohill part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly, depth to rock.	Slight.
Shingle part	Slight	Slight	Severe: slope, depth to rock.	Slight.
Rock outcrop:				
[1]95:				
Rock outcrop part.				

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Rosebud:				
197:				
Escabosa part	Slight	Slight	Severe: slope.	Slight.
198:				
Rosebud part	Moderate: percs slowly.	Slight	Moderate: percs slowly, depth to rock.	Slight.
Escabosa part	Slight	Slight	Moderate: depth to rock.	Slight.
Iliff part	Moderate: percs slowly.	Slight	Moderate: percs slowly,	Slight.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and	Camp areas	Picnic areas	Playgrounds	Paths and trails

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Wages:				
[1]124:				
Rosebud part	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
Weld:				
125	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
126	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
Westplain:				
127	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
[1]128:				
Westplain part	Severe:	Severe:	Severe:	Severe:

TABLE 12.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Nonirrigated		Irrigated		Nonirrigated				Nirr.	Irr.	Nonirrigated	
	Grain and seed crops	Grasses and legumes	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Openland wildlife	Wetland wildlife	Rangeland wildlife
Albinas:												

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Nonirrigated		Irrigated		Nonirrigated				Nirr.	Irr.	Nonirrigated	
	Grain and seed crops	Grasses and legumes	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wildlife	Open-land wildlife	Wetland wildlife	Rangeland wildlife
Chappell:												
18	Fair	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Colby:												
19	Poor	Fair	---	---	Fair	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
Dacono:												
20	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Dailey:												
21, 22, 23	Poor	Fair	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Dix:												
[1]24:												
Dix part	Poor	Poor	---	---	Fair	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Altvan part	Poor	Fair	---	---	Fair	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
[1]25:												
Dix part	Poor	Poor	---	---	Fair	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Eckley part	Poor	Poor	---	---	Fair	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Els:												
26	Poor	Poor	Poor	Poor	Good	Good	Good	Good	Fair	Poor	Good	Good.
Epping:												
27	Very poor.	Very poor.	---	---	Poor	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Fluvaquentic Haplaquolls:												
28	Poor	Poor	---	---	Good	Good	Good	Good	Fair	---	Good	Good.
Fluvaquents:												
29	Poor	Poor	---	---	Fair	Fair	Good	Good	Poor	---	Good	Fair.
Glenberg:												
30	Fair	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Gravel pits:												
31.												
Haverson:												
32, 33, 34, 35	Fair	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Haxtun:												
36, 37	Fair	Fair	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
38	Good	Good	Good	Good	Fair	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
Hayford:												
39	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Fair	Fair	Fair	Good.
40	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.

See footnotes at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and	Potential for habitat elements							Potential as habitat for--			
	Nonirrigated		Irrigated		Nonirrigated			Nirr.	Irr.	Nonirrigated	
	Grain	Grasses	Grain	Grasses	Wild		Shallow	Open-	Open-	Wetland	Range-

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Nonirrigated		Irrigated		Nonirrigated				Nirr.	Irr.	Nonirrigated	
	Grain and	Grasses and	Grain and	Grasses and	Wild herba-	Shrubs	Wetland	Shallow water	Open-land	Open-land	Wetland wild-	Range-land

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Nonirrigated		Irrigated		Nonirrigated				Nirr.	Irr.	Nonirrigated	
	Grain and seed crops	Grasses and legumes	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Openland wildlife	Wetland wildlife	Rangeland wildlife
Platner: [1]91:												
Rago part-------	Good	Good	Good	Good	Fair	Poor	Poor	Very poor.	Fair	Good	Very poor.	Poor.
Dacono part-----	Good	Good	Good	Good	Fair	Poor	Poor	Very poor.	Fair	Good	Very poor.	Poor.
Rago: 92, 93----------	Good	Good	Good	Good	Fair	Poor	Poor	Very poor.	Fair	Good	Very poor.	Poor.
Renohill: [1]94:												
Renohill part---	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Shingle part----	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.	Poor.
Rock outcrop: [1]95:												
Rock outcrop part.												
Arginstolls part	Poor	Fair	---	---	Fair	Fair	Poor	Very	Fair	---	Very	Fair.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Nonirrigated		Irrigated		Nonirrigated				Nirr.	Irr.	Nonirrigated	
	Grain and seed crops	Grasses and legumes	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Openland wildlife	Wetland wildlife	Rangeland wildlife
Stoneham:												
[1]108:												
Stoneham part---	Poor	Fair	---	---	Fair	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Cushman part----	Poor	Poor	---	---	Fair	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Thedalund:												
[1]109:												
Thedalund part--	Poor	Poor	---	---	Fair	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Kim part--------	Poor	Fair	---	---	Fair	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
Shingle part----	Poor	Poor	---	---	Poor	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Ulysses:												
[1]110:												
Ulysses part----	Fair	Good	Fair	Good	Fair	Poor	Poor	Very poor.	Fair	Fair	Very poor.	Poor.
Norka part------	Fair	Good	Fair	Good	Fair	Poor	Poor	Very poor.	Fair	Fair	Very poor.	Poor.
[1]111:												
Ulysses part----	Fair	Good	Fair	Good	Fair	Poor	Poor	Very poor.	Fair	Fair	Very poor.	Poor.
Norka part------	Fair	Good	Fair	Good	Fair	Poor	Poor	Very	Fair	Fair	Very	Poor.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Nonirrigated		Irrigated		Nonirrigated				Nirr.	Irr.	Nonirrigated	
	Grain and seed crops	Grasses and legumes	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Openland wildlife	Wetland wildlife	Rangeland wildlife
Wages:												
[1]122:												
Manter part-----	Fair	Good	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
[1]123:												
Wages part------	Fair	Good	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Rosebud part----	Fair	Good	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
[1]124:												
Wages part------	Fair	Good	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Rosebud part----	Fair	Good	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Weld:												
125--126	Fair	Good	Good	Good	Fair	Poor	Poor	Very	Fair	Good	Very	Poor

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Albinas:											
1	0-12	Loam	ML	A-4	0	100	95-100	80-100	50-75	20-30	NP-5
	12-29	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	95-100	80-100	40-80	30-40	10-20
	29-60	Loam	CL-ML	A-4	0	100	95-100	60-95	50-75	20-30	5-10
Alda:											
2	0-10	Sandy loam	SM	A-4	0	95-100	95-100	65-75	35-50	15-30	NP-5
	10-34	Fine sandy loam	SM	A-2, A-4	0	95-100	95-100	70-85	30-50	15-20	NP-5
	34-60	Sand and gravel	SP, GP	A-1, A-3	0	30-90	20-85	20-55	0-5	---	NP
3	0-10	Loam	ML	A-4	0	95-100	95-100	85-95	50-75	20-30	NP-5
	10-34	Fine sandy loam	SM	A-2, A-4	0	95-100	95-100	70-85	30-50	15-20	NP-5
	34-60	Sand and gravel	SP, GP	A-1, A-3	0	30-90	20-85	20-55	0-5	---	NP
Altvan:											
[1]4:											
Altvan part	0-8	Sandy loam	SM	A-4	0	90-100	85-100	60-75	35-50	---	NP
	8-23	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	70-80	35-50	15-25
	23-30	Loam	CL-ML	A-4	0	90-100	85-100	60-95	50-65	20-30	5-10
	30-60	Sand and gravel	SP, SP-SM	A-1	0	75-95	70-90	25-35	0-10	---	NP
Eckley part	0-3	Sandy loam	SM	A-2	0	80-90	75-85	50-55	25-30	20-40	NP-10
	3-20	Gravelly sandy clay loam, gravelly loam.	SC	A-2, A-6	0	75-95	50-75	30-65	20-45	25-40	10-20
	20-60	Gravelly sand, gravelly loamy sand.	SM, SP-SM, GP-GM, GM	A-1	0	50-85	40-75	15-45	5-15	---	NP
[1]5:											
Altvan part	0-8	Sandy loam	SM	A-4	0	90-100	85-100	60-75	35-50	---	NP
	8-23	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	70-80	35-50	15-25
	23-30	Loam	CL-ML	A-4	0	90-100	85-100	60-95	50-65	20-30	5-10
	30-60	Sand and gravel	SP, SP-SM	A-1	0	75-95	70-90	25-35	0-10	---	NP
Eckley part	0-3	Sandy loam	SM	A-2	0	80-90	75-85	50-55	25-30	20-40	NP-10
	3-20	Gravelly sandy clay loam, gravelly loam.	SC	A-2, A-6	0	75-95	50-75	30-65	20-45	25-40	10-20
	20-60	Gravelly sand, gravelly loamy sand.	SM, SP-SM, GP-GM, GM	A-1	0	50-85	40-75	15-45	5-15	---	NP
Aquolls:											
6	0-60	Variable	---	---	---	---	---	---	---	---	---
Argiustolls:											
7	0-60	Variable	---	---	---	---	---	---	---	---	---
[1]8:											
Argiustolls part	0-60	Variable	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Arvada:											
9	0-4	Silt loam	CL-ML, ML	A-4	0	90-100	90-100	85-100	75-95	25-35	5-10
	4-11	Clay	CL, CH	A-7	0	80-100	75-100	70-100	65-95	40-65	20-35
	11-60	Clay loam	CL	A-7	0	80-100	75-100	70-100	55-80	40-45	20-25

See footnotes at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
Ascalon:											
10, 11, 12--------	0-7	Fine sandy loam	SM, SM-SC	A-2, A-4	0	95-100	90-100	70-95	25-50	15-25	NP-5
	7-14	Sandy clay loam	SC, CL	A-6, A-4	0	95-100	90-100	80-100	40-55	20-40	10-20
	14-30	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	95-100	95-100	75-95	35-65	20-40	5-15
	30-60	Fine sandy loam, loamy fine sand, sandy loam.	SM	A-2	0	95-100	95-100	70-95	20-35	---	NP
Bankard:											
14----------	0-3	Sand----------	SP-SM, SM	A-2, A-3	0	95-100	80-100	50-75	5-25	---	NP
	3-60	Fine sand, sand, gravelly sand.	SP-SM, SM	A-2, A-3	0-5	70-100	60-100	50-70	5-25	---	NP
Bayard:											
15:											
Bayard part-----	0-12	Loamy sand------	SM	A-2, A-4	0	85-100	85-100	60-80	20-40	---	NP
	12-60	Fine sandy loam	SM, ML	A-4, A-2	0	90-100	80-100	60-85	30-60	---	NP
Canyon part-----	0-5	Gravelly loam---	SM, GM	A-4	0-5	60-80	50-75	45-60	35-50	---	NP
	5-11	Very fine sandy loam, loam, gravelly loam.	ML, SM	A-4	0-5	60-100	50-100	45-95	35-75	---	NP
	11	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Bridgeport:											
16----------	0-10	Loam----------	CL-ML	A-4	0	100	100	95-100	75-100	25-40	5-10
	10-60	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-100	25-40	5-20
Canyon:											
17----------	0-5	Gravelly loam---	SM, GM	A-4	0-5	60-80	50-75	45-60	35-50	---	NP
	5-11	Very fine sandy loam, loam, gravelly loam.	ML, SM	A-4	0-5	60-100	50-100	45-95	35-75	---	NP
	11	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Chappell:											
18----------	0-12	Sandy loam------	SM, ML	A-2, A-4	0	90-100	90-100	60-85	30-55	20-30	NP-5
	12-30	Sandy loam, fine sandy loam, coarse sandy loam.	SM	A-2, A-4	0	90-100	90-100	60-80	30-50	20-30	NP-5
	30-41	Gravelly loamy sand, gravelly sandy loam.	SM	A-2	0	45-65	35-50	5-25	0-20	---	NP
	41-60	Sand and gravel	SP, GP, SP-SM, GP-GM	A-1	0-5	95-100	30-40	5-20	0-10	---	NP
Colby:											
19----------	0-4	Loam----------	CL-ML, CL	A-4, A-6	0	100	100	90-100	85-100	25-40	5-15
	4-60	Silt loam, loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	85-100	25-35	5-15

See footnotes at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Dacono:											
20----------	0-4	Loam----------	ML	A-4	0	85-100	75-100	75-95	70-80	20-40	NP-10
	4-13	Clay loam, clay, gravelly clay loam.	CL	A-6, A-7	0	75-100	60-100	55-95	50-85	35-45	20-30
	13-28	Sandy clay loam, loam.	CL	A-6	0	85-100	75-100	65-95	55-80	25-40	10-20
	28-60	Very gravelly sand.	SP, GP	A-1	0	35-80	5-50	5-40	0-5	---	NP
Dailey:											
21, 22----------	0-16	Loamy sand------	SM, SP-SM	A-2, A-3	0	100	100	80-95	10-30	---	NP
	16-60	Loamy sand, fine sand, sand.	SP-SM, SM, SP	A-2, A-3	0	100	95-100	75-95	0-25	---	NP
23----------	0-24	Loamy sand------	SM	A-2	0	100	100	60-75	20-30	---	NP
	24-37	Loamy sand------	SM	A-2	0	100	100	60-75	20-30	---	NP
	37-60	Sandy loam------	SM	A-2, A-4	0	100	100	65-80	30-40	---	NP
Dix:											
[1]24:											
Dix part--------	0-10	Gravelly sandy loam.	SM	A-1, A-2	0	70-90	40-70	35-50	10-30	---	NP
	10-18	Gravelly loamy coarse sand, loamy sand.	SM	A-1, A-2	0	80-90	30-40	30-40	10-20	---	NP
	18-60	Sand and gravel	SP, GP	A-1	0-5	45-85	30-50	25-35	0-5	---	NP
Altvan part-----	0-8	Sandy loam------	SM	A-4	0	90-100	85-100	60-95	35-50	---	NP
	8-23	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	70-80	35-50	15-25
	23-30	Loam----------	ML, CL	A-4	0	90-100	85-100	60-95	45-65	15-30	5-10
	30-60	Sand and gravel	SP, SP-SM	A-1	0	75-95	70-90	25-35	0-10	---	NP
[1]25:											
Dix part--------	0-10	Gravelly sandy loam.	SM	A-1, A-2	0	70-90	40-70	35-50	5-15	---	NP
	10-18	Gravelly loamy coarse sand, loamy sand.	SM	A-1, A-2	0	80-90	30-40	30-40	10-20	---	NP
	18-60	Sand and gravel	SP, GP	A-1	0-5	45-85	30-50	25-35	0-5	---	NP
Eckley part-----	0-3	Sandy loam------	SM	A-2	0	80-90	75-85	50-55	25-30	20-40	NP-10
	3-20	Gravelly sandy clay loam, gravelly loam.	SC	A-2, A-6	0	75-95	50-75	30-65	20-45	25-40	10-20
	20-60	Gravelly sand, gravelly loamy sand.	SM, SP-SM, GP-GM, GM	A-1	0	50-85	40-75	15-45	5-15	---	NP
Els:											
26----------	0-6	Loamy sand------	SM	A-2	0	100	100	70-95	15-35	---	NP
	6-60	Fine sand, loamy	SP-SM, SM	A-2, A-3	0	90-100	90-100	70-95	5-30	---	NP

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Glenberg:											
30----------	0-13	Fine sandy loam	SM	A-4, A-2	0	95-100	85-100	60-80	30-45	---	NP
	13-60	Stratified loamy sand to loam.	SM	A-2, A-4	0	90-100	75-100	50-70	25-40	---	NP
Gravel pits:											
31.											
Haverson:											
32, 33, 34, 35----	0-4	Loam----------	ML	A-4	0	95-100	80-100	75-90	50-60	20-35	NP-10
	4-60	Stratified clay loam to sand.	ML	A-4	0	95-100	75-100	75-90	50-60	20-35	NP-10
Haxtun:											
36, 37----------	0-8	Loamy sand------	SM	A-2	0	95-100	80-100	50-75	15-30	---	NP

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Julesburg:											
46, 47, 48--------	0-10	Fine sandy loam	SM, ML	A-2, A-4	0	95-100	75-100	45-85	25-55	---	NP
	10-31	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	0	95-100	75-100	50-85	30-55	15-25	NP-5
	31-60	Sandy loam, loamy sand, fine sand.	SM	A-2, A-4	0	95-100	75-100	40-85	15-50	---	NP
49:											
[illegible]	0-10	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Manter:											
59, 60	0-6	Loamy sand	SM	A-2 A-4, A-1	0	95-100	75-100	45-85	15-45	---	NP
	6-24	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	95-100	75-100	50-85	30-55	15-25	NP-5
	24-60	Sandy loam, loamy sand.	SM	A-2, A-4, A-1	0	95-100	75-100	40-85	15-50	---	NP
61, 62, 63	0-10	Sandy loam	SM, ML	A-2, A-4	0	95-100	75-100	45-85	25-55	---	NP
	10-24	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	0	95-100	75-100	50-85	30-55	15-25	NP-5
	24-60	Sandy loam, loamy sand.	SM	A-2, A-4, A-1	0	95-100	75-100	40-85	15-50	---	NP
64, 65	0-10	Sandy loam	SM, ML	A-2, A-4	0	95-100	75-100	45-85	25-55	---	NP
	10-24	Sandy loam, fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0	95-100	75-100	50-85	30-55	15-25	NP-5
	24-60	Sandy loam, loamy sand.	SM	A-2, A-4, A-1	0	95-100	75-100	40-85	15-50	---	NP
Manzanola:											
66	0-3	Clay loam	CL, CL-ML	A-4, A-6	0-5	95-100	80-95	70-95	55-75	25-40	5-20
	3-11	Clay loam, clay	CL	A-6, A-7	0-5	95-100	90-100	85-95	65-85	35-50	20-30
	11-60	Clay loam, loam	CL, ML	A-6, A-4	0-5	95-100	90-100	85-95	60-80	30-40	5-20
Midway:											
67	0-10	Clay loam	CL, CH	A-6, A-7	0	100	100	90-100	80-95	45-60	20-35
	10	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Mitchell:											

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Mitchell:											
Norka part------	0-4	Loam----------	ML, CL-ML	A-4	0	100	95-100	85-95	60-85	20-30	NP-10
	4-12	Silty clay loam, loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	95-100	85-95	25-35	5-15
	12-60	Loam, silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	90-95	85-95	15-25	NP-10
Mosher:											
72----------	0-5	Loam----------	ML, CL-ML	A-4	0	100	100	85-100	60-75	20-30	NP-10
	5-17	Clay loam, clay	CL, CH	A-7	0	100	95-100	85-95	80-90	40-60	20-35
	17-60	Stratified loamy sand to clay.	ML, SM	A-4	0	100	80-100	70-90	45-70	---	NP
73----------	0-5	Clay----------	CL	A-7, A-6	0	100	100	90-100	85-95	30-50	10-30
	5-17	Clay loam, clay	CL, CH	A-7	0	100	95-100	85-95	80-90	40-60	20-35
	17-60	Stratified loamy sand to clay.	ML, SM	A-4	0	100	80-100	70-90	45-70	---	NP
Norka:											
74----------	0-4	Loam----------	ML, CL-ML	A-4	0	100	95-100	85-95	60-85	20-30	NP-10
	4-12	Silty clay loam, loam, clay loam.	CL, CL-ML	A-4	0	100	95-100	95-100	85-95	30-40	5-15
	12-60	Loam, silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	90-95	85-95	15-25	NP-10
[1]75:											
Norka part------	0-4	Loam----------	ML, CL-ML	A-4	0	100	95-100	85-95	60-85	20-30	NP-10
	4-12	Silty clay loam, loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	95-100	85-95	30-40	5-15
	12-60	Loam, silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	90-95	85-95	15-25	NP-10
Ulysses part----	0-5	Loam----------	CL-ML	A-4	0	100	100	90-100	85-100	25-40	5-10
	5-14	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	85-100	25-40	10-20
	14-60	Silt loam-------	CL-ML	A-4	0	100	100	90-100	85-100	25-35	5-10
Nunn:											
76, 77, 78, 79----	0-6	Loam----------	CL, SC	A-6	0-5	95-100	80-95	70-95	45-75	25-40	10-20
	6-26	Clay loam, clay	CL, CH	A-6, A-7	0-5	95-100	90-100	85-95	65-75	35-60	20-35
	26-60	Clay loam, loam, gravelly sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0-5	80-100	80-100	60-90	35-75	15-40	5-20
80, 81----------	0-6	Clay loam-------	CL	A-6	0-5	95-100	80-95	70-95	50-75	25-40	10-20
	6-26	Clay loam, clay	CL, CH	A-6, A-7	0-5	95-100	90-100	85-95	65-75	35-60	20-35
	26-60	Clay loam, loam, gravelly sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0-5	80-100	80-100	60-90	35-75	15-40	5-20
82----------	0-10	Clay loam-------	CL	A-6	0-5	95-100	85-100	75-95	50-75	25-40	10-20
	10-31	Clay loam, clay	CL, CH	A-6, A-7	0-5	95-100	90-100	85-95	65-75	35-60	20-35
	31-60	Clay loam, loam, gravelly sandy loam.	CL, SC, CL-ML, SM-SC	A-6, A-4	0-5	80-100	60-100	60-90	35-75	15-40	5-20
83----------	0-10	Clay loam-------	CL	A-6	0-5	95-100	85-100	75-95	50-75	25-40	10-20
	10-31	Clay loam, clay	CL, CH	A-6, A-7	0-5	95-100	90-100	85-95	65-75	35-60	20-35
	31-60	Clay loam, loam, gravelly sandy loam.	CL, SC, CL-ML, SM-SC	A-6, A-4	0-5	80-100	60-100	60-90	35-75	15-40	5-20

See footnotes at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

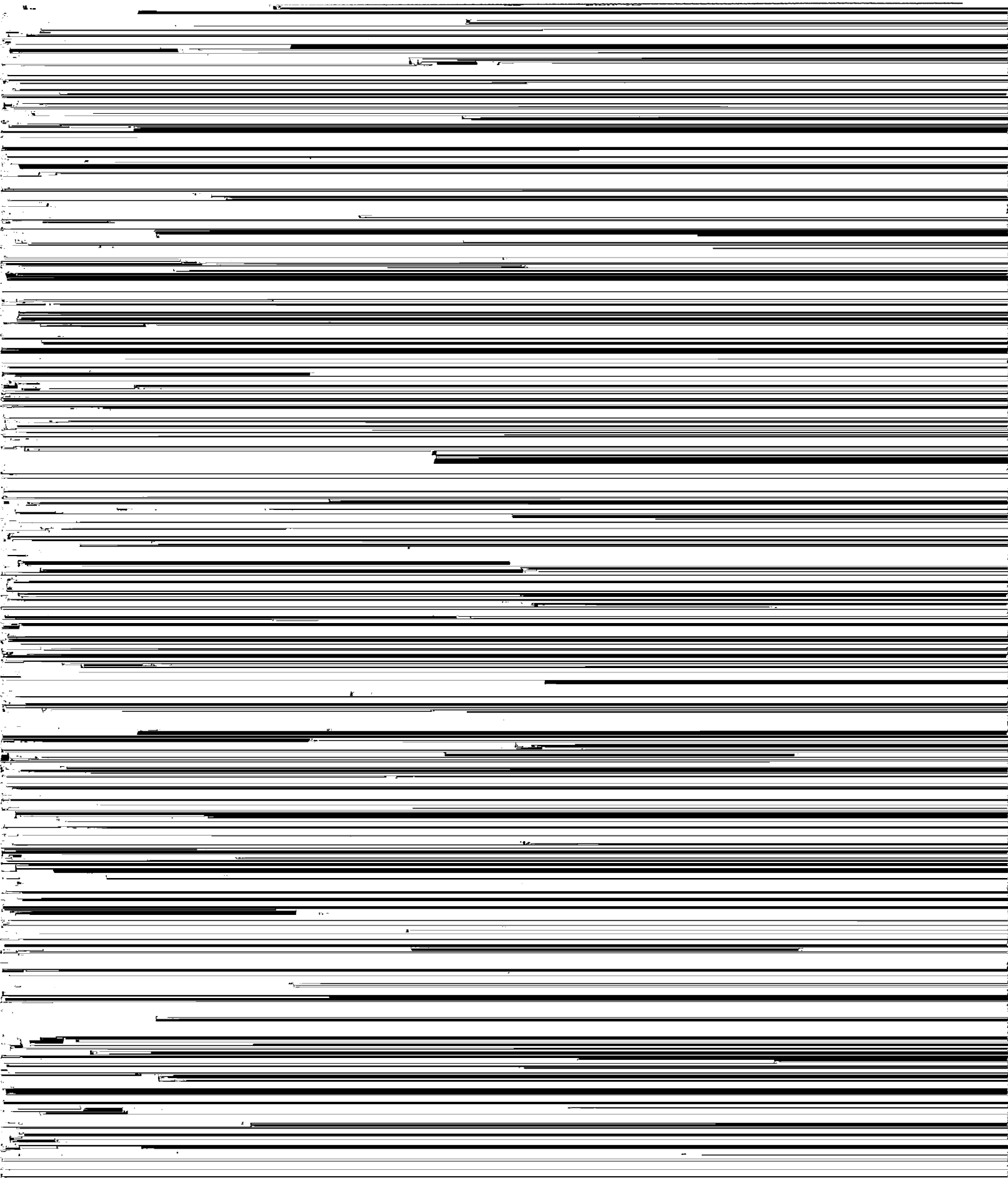


TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Rago:											
92	0-8	Loam	ML	A-4	0	100	95-100	90-100	55-95	20-40	NP-10
	8-26	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	10-20
	26-60	Silt loam, loam, sandy loam.	ML, SM	A-4	0	95-100	90-100	80-100	35-95	20-30	NP-5
93	0-8	Clay loam	CL	A-6	0	100	95-100	80-100	70-80	35-40	10-20

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--			Liquid	Plas-ticity

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Thedalund:											
[1]109:											
Kim part--------	0-4	Loam----------	ML, SM	A-4	0-5	80-100	75-100	60-90	45-75	20-35	NP-5
	4-60	Loam, clay loam	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	70-95	60-85	25-40	5-15
Shingle part----	0-2	Loam----------	ML	A-4	0-5	75-100	75-100	70-95	55-75	25-35	NP-10
	2-10	Clay loam, loam	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ulysses:											
[1]110:											
Ulysses part----	0-5	Loam----------	CL-ML	A-4	0	100	100	90-100	85-100	25-40	5-10
	5-14	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	85-100	25-40	10-20
	14-60	Silt loam-------	CL-ML	A-4	0	100	100	90-100	85-100	25-35	5-10
Norka part------	0-4	Loam----------	ML, CL-ML	A-4	0	100	95-100	85-95	60-85	20-30	NP-10
	4-12	Silty clay loam.	CL-ML, CL	A-4	0	100	95-100	95-100	85-95	30-40	5-15

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Wages:											
118, 119, 120-----	0-4	Loam----------	CL-ML	A-4	0	90-100	75-100	65-90	60-75	20-30	5-10
	4-14	Clay loam, sandy clay loam, loam.	CL, SC	A-6	0	95-100	90-100	75-95	35-75	25-40	15-25
	14-60	Loam, sandy loam	CL, CL-ML, SC, SM-SC	A-4, A-6	0	95-100	75-100	60-95	35-70	15-30	5-15
[1]121:											
Wages part------	0-4	Loam----------	CL-ML	A-4	0	90-100	75-100	65-90	60-75	20-30	5-10
	4-14	Clay loam, sandy clay loam, loam.	CL, SC	A-6	0	95-100	90-100	75-95	35-75	25-40	15-25
	14-60	Loam, sandy loam	CL, CL-ML, SC, SM-SC	A-4, A-6	0	95-100	75-100	60-95	35-70	15-30	5-15
Altvan part-----	0-8	Loam----------	CL-ML	A-4	0	90-100	85-100	60-95	50-75	15-30	5-10
	8-23	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	70-80	35-50	15-25
	23-30	Loam----------	CL-ML	A-4	0	90-100	85-100	60-95	50-60	20-30	5-10

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

| | | Classification | Frag | Percentage passing | | | Pl |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate data were not available. The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH	Mmhos/cm						
Albinas:											
1----------	0-12	0.6-2.0	0.15-0.20	6.6-7.8	<2	Low-------	High-----	Low------	0.32	5	6
	12-29	0.6-2.0	0.14-0.21	6.6-7.8	<2	Moderate	High-----	Low------	0.28		

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

| | | Available | | Shrink | Risk of corrosion | Erosion | Wind |

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Glenberg:											
30	0-13	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low	Moderate	Low	0.24	5	3
	13-60	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low	High	Low	0.10		
Gravel pits:											
31.											
Haverson:											
32, 33, 34, 35	0-4	0.6-2.0	0.14-0.18	6.6-8.4	<8	Low	High	Low	0.28	5	4L
	4-60	0.6-2.0	0.14-0.18	7.4-8.4	<8	Low	High	Low	0.28		
Haxtun:											
36, 37	0-8	6.0-20	0.07-0.11	6.6-7.3	<2	Low	Moderate	Low	0.10	5	2
	8-21	0.6-2.0	0.11-0.14	6.6-7.3	<2	Low	Moderate	Low	0.24		
	21-47	0.6-2.0	0.18-0.20	7.4-7.8	<2	Moderate	High	Low	0.32		
	47-60	0.6-2.0	0.10-0.18	7.4-8.4	<2	Low	High	Low	0.24		
38	0-14	2.0-6.0	0.11-0.14	6.6-7.3	<2	Low	Moderate	Low	0.15	5	3
	14-21	0.6-2.0	0.11-0.14	6.6-7.3	<2	Low	Moderate	Low	0.24		
	21-47	0.6-2.0	0.18-0.20	7.4-7.8	<2	Moderate	High	Low	0.32		
	47-60	0.6-2.0	0.10-0.18	7.4-8.4	<2	Low	High	Low	0.24		
Hayford:											
39, 40	0-7	0.06-0.2	0.16-0.21	7.9-8.4	<16	Moderate	High	Low	0.32	3	4
	7-22	0.06-0.2	0.16-0.21	7.9-8.4	<16	High	High	Low	0.32		
	22-32	0.06-0.2	0.15-0.18	7.9-9.0	<16	Moderate	High	Low	0.24		
	32-60	>6.0	0.04-0.08	7.9-9.0	<2	Low	High	Low	0.10		
Heldt:											
41, 42	0-60	0.06-0.2	0.12-0.17	7.9-9.0	<8	High	High	High	0.28	5	4
Iliff:											
43	0-8	0.6-2.0	0.17-0.21	6.6-7.3	<2	Low	Moderate	Low	0.32	2	6
	8-22	0.06-0.2	0.16-0.20	6.6-7.8	<2	High	High	Low	0.37		
	22-34	0.2-0.6	0.15-0.18	7.4-8.4	<2	Moderate	High	Low	0.32		
	34	---	---	---	---	---	---	---	---		
Julesburg:											
44, 45	0-5	6.0-20	0.08-0.12	6.6-7.8	<2	Low	Moderate	Low	0.20	5	2
	5-31	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	High	Low	0.24		
	31-60	>6.0	0.05-0.13	7.4-7.8	<2	Low	High	Low	0.20		
46, 47, 48	0-10	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	Moderate	Low	0.24	5	3
	10-31	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	High	Low	0.24		
	31-60	>6.0	0.05-0.13	7.4-7.8	<2	Low	High	Low	0.20		
[1]49:											
Julesburg part	0-10	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	Moderate	Low	0.24	5	3
	10-31	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	High	Low	0.24		
	31-60	>6.0	0.05-0.13	7.4-7.8	<2	Low	High	Low	0.20		
Eckley part	0-3	2.0-6.0	0.09-0.15	6.6-7.3	<2	Low	Moderate	Low	0.17	2	5
	3-20	0.6-2.0	0.13-0.18	6.6-7.3	<2	Moderate	High	Low	0.15		
	20-60	>6.0	0.03-0.06	6.6-7.8	<2	Low	High	Low	0.10		
Keith:											
50	0-6	0.6-2.0	0.22-0.24	6.1-6.5	<2	Low	Moderate	Low	0.32	5	6
	6-25	0.6-2.0	0.20-0.22	6.6-8.4	<2	Moderate	High	Low	0.43		
	25-60	0.6-2.0	0.19-0.21	7.4-8.4	<2	Low	High	Low	0.43		
Kim:											
51	0-4	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	Moderate	Low	0.32	5	4L
	4-60	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low	High	Low	0.32		
Kuma:											
52	0-8	0.6-2.0	0.18-0.21	6.6-7.3	<2	Low	Moderate	Low	0.32	5	5
	8-32	0.6-2.0	0.18-0.21	6.6-7.8	<2	Low	High	Low	0.37		
	32-60	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low	High	Low	0.32		
Kutch:											
53, 54	0-3	0.2-0.6	0.15-0.20	6.6-7.8	<2	High	High	Moderate	0.20	2	6
	3-37	0.06-0.2	0.18-0.20	7.4-8.4	<4	High	High	Moderate	0.20		
	37	---	---	---	---	---	---	---	---		

See footnotes at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Lebsack:											
55	0-6	0.06-0.2	0.19-0.21	7.4-8.4	<2	High	High	Low	0.20	5	4
	6-34	0.06-0.2	0.17-0.20	7.4-8.4	<2	High	High	Low	0.28		
	34-60	0.06-0.2	0.14-0.17	7.4-8.4	2-8	High	High	Low	0.28		
56, 57	0-9	0.06-0.2	0.19-0.21	7.4-8.4	2-8	High	High	Low	0.20	3	7
	9-34	0.06-0.2	0.19-0.21	7.9-9.0	4-16	High	High	Moderate	0.24		
	34-60	0.06-0.2	0.19-0.21	7.9-9.0	4-16	High	High	Moderate	0.24		
Loveland:											
58	0-13	0.2-0.6	0.18-0.20	6.6-7.8	2-4	Moderate	High	Low	0.32	3	6
	13-34	0.2-0.6	0.18-0.20	7.4-8.4	2-4	Moderate	High	Low	0.32		
	34-60	>6.0	0.03-0.06	7.4-8.4	<2	Low	High	Low	0.10		
Manter:											
59, 60	0-6	6.0-20	0.08-0.12	6.6-7.8	<2	Low	Moderate	Low	0.10	5	2
	6-24	2.0-6.0	0.11-0.14	6.6-7.8	<2	Low	Moderate	Low	0.15		
	24-60	6.0-20	0.08-0.14	7.9-8.4	<2						

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Renohill:											
194:											
Renohill part---	0-5	0.2-0.6	0.17-0.21	6.6-7.8	<2	Moderate	High-----	Low------	0.37	3	6
	5-20	0.06-0.2	0.14-0.16	6.6-8.4	<2	High------	High-----	Low------	0.32		
	22-27	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	High-----	Low------	0.37		
	27	---	---	---	---	----------	---------	---------	---		
Shingle part----	0-2	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low-------	High-----	Low------	0.32	2	4L
	2-10	0.6-2.0	0.16-0.21	7.9-9.0	<2	Moderate	High-----	Low------	0.49		
	10	---	---	---	---	----------	---------	---------	---		
Rock outcrop:											
195:											
Rock outcrop part.											
Argiustolls part	0-24	---	---	---	---	----------	---------	---------	---	---	---
	24	---	---	---	---	----------	---------	---------	---		
Rosebud:											
196:											
Rosebud part----	0-5	0.6-2.0	0.22-0.24	7.4-8.4	<2	Low-------	High-----	Low------	0.28	3	5
	5-33	0.2-0.6	0.15-0.17	7.4-8.4	<2	Moderate	High-----	Low------	0.28		
	33	---	---	---	---	----------	---------	---------	---		
Escabosa part---	0-10	0.6-2.0	0.15-0.19	7.4-8.4	<2	Low-------	Moderate	Low------	0.24	2	5
	10-32	0.6-2.0	0.13-0.19	7.9-8.4	<2	Low-------	High-----	Low------	0.32		
	32	---	---	---	---	----------	---------	---------	---		
197:											
Rosebud part----	0-5	0.6-2.0	0.22-0.24	7.4-8.4	<2	Low-------	High-----	Low------	0.28	3	5
	5-33	0.2-0.6	0.15-0.17	7.4-8.4	<2	Moderate	High-----	Low------	0.28		
	33	---	---	---	---	----------	---------	---------	---		
Escabosa part---	0-10	0.6-2.0	0.15-0.19	7.4-8.4	<2	Low-------	Moderate	Low------	0.24	2	5
	10-32	0.6-2.0	0.13-0.19	7.9-8.4	<2	Low-------	High-----	Low------	0.32		
	32	---	---	---	---	----------	---------	---------	---		
198:											
Rosebud part----	0-5	0.6-2.0	0.22-0.24	7.4-8.4	<2	Low-------	High-----	Low------	0.28	3	5
	5-33	0.2-0.6	0.15-0.17	7.4-8.4	<2	Moderate	High-----	Low------	0.28		
	33	---	---	---	---	----------	---------	---------	---		
Escabosa part---	0-10	0.6-2.0	0.15-0.19	7.4-8.4	<2	Low-------	Moderate	Low------	0.24	2	5
	10-32	0.6-2.0	0.13-0.19	7.9-8.4	<2	Low-------	High-----	Low------	0.32		
	32	---	---	---	---	----------	---------	---------	---		
Iliff part--	0-8	0.6-2.0	0.17-0.21	6.6-7.8							

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Stoneham:											
105	0-4	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	Moderate	Low	0.17	5	3
	4-13	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	High	Low	0.20		
	13-60	0.6-2.0	0.11-0.18	7.9-8.4	<2	Low	High	Low	0.20		
106, 107	0-4	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	Moderate	Low	0.20	5	5
	4-13	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	High	Low	0.20		
	13-60	0.6-2.0	0.11-0.18	7.9-8.4	<2	Low	High	Low	0.20		
[1]108:											
Stoneham part	0-4	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	Moderate	Low	0.20	5	5
	4-13	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	High	Low	0.20		
	13-60	0.6-2.0	0.11-0.18	7.9-8.4	<2	Low	High	Low	0.20		
Cushman part	0-3	0.6-2.0	0.16-0.20	6.6-7.3	<2	Low	High	Low	0.32	2	5
	3-15	0.6-2.0	0.14-0.18	6.6-7.3	<2	Moderate	High	Low	0.32		
	15-22	0.6-2.0	0.14-0.18	6.6-7.3	<2	Low	High	Low	0.32		
	22	---	---	---	---	---	---	---	---		
Thedalund:											
[1]109:											
Thedalund part	0-14	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	High	Low	0.32	2	4L
	14-31	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	High	Low	0.32		
	31	---	---	---	---	---	---	---	---		
Kim part	0-4	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	Moderate	Low	0.32	5	4L
	4-60	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low	High	Low	0.32		
Shingle part	0-2	0.6-2.0	0.16-0.18	7.4-9.0	<2	Low	High	Low	0.32	2	4L
	2-10	0.6-2.0	0.16-0.21	7.9-9.0	<2	Moderate	High	Low	0.49		
	10	---	---	---	---	---	---	---	---		
Ulysses:											
[1]110:											

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Vona:											
117	0-3	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low	Moderate	Low	0.10	5	3
	3-16	2.0-6.0	0.12-0.14	6.6-8.4	<4	Low	High	Low	0.10		
	16-60	6.0-20	0.08-0.11	7.4-8.4	<4	Low	High	Low	0.10		
Wages:											
118, 119, 120	0-4	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	Moderate	Low	0.20	5	5
	4-14	0.6-2.0	0.14-0.21	7.4-8.4	<2	Moderate	High	Low	0.20		
	14-60	0.6-2.0	0.11-0.18	7.9-8.4	<2	Low	High	Low	0.20		
[1]121:											
Wages part	0-4	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	Moderate	Low	0.20	5	5
	4-14	0.6-2.0	0.14-0.21	7.4-8.4	<2	Moderate	High	Low	0.20		
	14-60	0.6-2.0	0.11-0.18	7.9-8.4	<2	Low	High	Low	0.20		
Altvan part	0-8	0.6-2.0	0.20-0.24	6.1-7.3	<2	Low	Moderate	Low	0.28	3	5
	8-23	0.6-2.0	0.15-0.17	7.4-8.4	<2	Moderate	High	Low	0.28		
	23-30	0.6-2.0	0.17-0.19	7.4-9.0	<2	Low	High	Low	0.28		
	30-60	>20	0.02-0.04	7.4-9.0	<2	Low	High	Low	0.10		
[1]122:											
Wages part	0-4	2.0-6.0	0.11-0.15	6.6-7.8	<2	Low	Moderate	Low	0.17	5	3
	4-14	0.6-2.0	0.14-0.21	7.4-8.4	<2	Moderate	High	Low	0.20		
	14-60	0.6-2.0	0.11-0.18	7.9-8.4	<2	Low	High	Low	0.20		
Manter part	0-10	2.0-6.0	0.12-0.16	6.6-7.8	<2	Low	Moderate	Low	0.15	5	3
	10-24	2.0-6.0	0.11-0.14	6.6-7.8	<2	Low	High	Low	0.15		
	24-60	6.0-20	0.08-0.14	7.9-8.4	<2	Low	High	Low	0.15		
[1]123:											
Wages part	0-4	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	Moderate	Low	0.20	5	5
	4-14	0.6-2.0	0.14-0.21	7.4-8.4	<2	Moderate	High	Low	0.20		
	14-60	0.6-2.0	0.11-0.18	7.9-8.4	<2	Low	High	Low	0.20		
Rosebud part	0-5	0.6-2.0	0.22-0.24	7.4-8.4	<2	Low	High	Low	0.28	3	5
	5-33	0.2-0.6	0.15-0.17	7.4-8.4	<2	Moderate	High	Low	0.28		
	33	---	---	---	---	---	---	---	---		
[1]124:											
Wages part	0-4	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low	Moderate	Low	0.20	5	5
	4-14	0.6-2.0	0.14-0.21	7.4-8.4	<2	Moderate	High	Low	0.20		
	14-60	0.6-2.0	0.11-0.18	7.9-8.4	<2	Low	High	Low	0.20		
Rosebud part	0-5	0.6-2.0	0.22-0.24	7.4-8.4	<2	Low	High	Low	0.28	4-3	5
	5-33	0.2-0.6	0.15-0.17	7.4-8.4	<2	Moderate	High	Low	0.28		
	33	---	---	---	---	---	---	---	---		
Weld:											
125, 126	0-7	0.6-2.0	0.16-0.21	6.6-7.3	<2	Low	Moderate	Low	0.32	5	6
	7-18	0.06-0.2	0.19-0.21	6.6-7.8	<2	High	High	Low	0.28		
	18-32	0.6-2.0	0.16-0.21	7.4-8.4	<2	Low	High	Low	0.28		
	32-60	0.6-2.0	0.10-0.18	7.4-8.4	<2	Low	High	Low	0.28		
Westplain:											
127	0-17	0.06-0.2	0.17-0.20	7.4-8.4	2-8	Moderate	High	Low	0.32	2	5
	17-60	>6.0	0.05-0.08	6.6-7.8	<2	Low	High	Low	0.10		
[1]128:											
Westplain part	0-17	0.06-0.2	0.17-0.20	7.4-8.4	2-8	Moderate	High	Low	0.32	2	5
	17-60	>6.0	0.05-0.08	6.6-7.8	<2	Low	High	Low	0.10		
Alda part	0-10	0.6-2.0	0.20-0.22	6.1-7.8	<2	Low	Moderate	Low	---	---	6
	10-34	0.6-2.0	0.15-0.17	6.6-8.4	<2	Low	High	Low	---		
	34-60	>20	0.20-0.40	6.6-8.4	<2	Low	High	Low	---		

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 15.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols. The symbol < means less than; > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Albinas: 1	B	Occasional	Very brief	Apr-Aug	>6.0	---	---	>60	---	Low.
Alda: 2	C	None	---	---	1.5-3.5	Apparent	Nov-May	>60	---	High.
3	C	Occasional	Brief	Apr-Aug	1.5-3.5	Apparent	Nov-May	>60	---	High.
Altvan: [1]4: Altvan part	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Eckley part	B	None	---	---	>6.0	---	---	>60	---	Low.
[1]5: Altvan part	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Eckley part	B	None	---	---	>6.0	---	---	>60	---	Low.
Aquolls: 6	B/D	Common	Brief	Apr-Aug	1.5-2.5	Apparent	Jan-Dec	>60	---	High.
Argiustolls: 7	B/D	None	---	---	2.0-3.0	---	---	>60	---	High.
[1]8: Argiustolls part	B	None	---	---	>6.0	---	---	>60	---	---
Rock outcrop part.										
Arvada: 9	D	None	---	---	>6.0	---	---	>60	---	Low.
Ascalon: 10, 11, 12	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Badland: 13.										
Bankard: 14	A	Frequent	Brief	Apr-Aug	>6.0	---	---	>60	---	Low.
Bayard: [1]15: Bayard part	A	None	---	---	>6.0	---	---	>60	---	Moderate.
Canyon part	D	None	---	---	>6.0	---	---	6-20	Rippable	Low.
Bridgeport: 16	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Canyon: 17	D	None	---	---	>6.0	---	---	6-20	Rippable	Low.
Chappell: 18	B	Occasional	Very brief	Apr-Aug	>6.0	---	---	>60	---	Low.
Colby: 19	B	None	---	---	>6.0	---	---	>60	---	Low.
Dacono: 20	C	None	---	---	>6.0	---	---	>60	---	Low.

See footnotes at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Dailey: 21, 22, 23	A	None	---	---	>6.0	---	---	>60	---	Low.
Dix: [1]24: Dix part	A	None	---	---	>6.0	---	---	>60	---	Low.
Altvan part	B	None	---	---	>6.0	---	---	>60	---	Moderate.
[1]25: Dix part	A	None	---	---	>6.0	---	---	>60	---	Low.
Eckley part	B	None	---	---	>6.0	---	---	>60	---	Low.
Els: 26	A	Occasional	Brief	Apr-Aug	1.5-3.5	Apparent	Nov-May	>60	---	High.
Epping: 27	D	None	---	---	>6.0	---	---	10-20	Rippable	Low.
Fluvaquentic Haplaquolls: 28	B/D	Frequent	Brief	Apr-Aug	1.5-3.0	Apparent	Nov-Jul	>60	---	High.
Fluvaquents: 29	A/D	Frequent	Brief	Apr-Aug	1.5-3.0	Apparent	Nov-Jul	>60	---	High.
Glenberg: 30	B	Occasional	Very brief	Apr-Aug	>6.0	---	---	>60	---	Low.
Gravel pits: 31.										
Haverson: 32, 33	B	Rare	Brief	Apr-Aug	>6.0	---	---	>60	---	Low.
34	B	Frequent	Brief	Apr-Aug	>6.0	---	---	>60	---	Low.
35	B	Occasional	Brief	Apr-Aug	>6.0	---	---	>60	---	Low.
Haxtun: 36, 37, 38	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Hayford: 39, 40	C	Rare	---	---	1.5-3.5	Apparent	Nov-Jul	>60	---	Moderate.
Heldt: 41, 42	C	None	---	---	>6.0	---	---	>60	---	Low.
Iliff: 43	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate.
Julesburg: 44, 45, 46, 47.										

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Kutch:										
53, 54	C	None	---	---	>6.0	---	---	20-40	Rippable	Moderate.
Lebsack:										
55	C	None	---	---	>6.0	---	---	>60	---	Low.
56, 57	C	None	---	---	5.0-6.0	Apparent	Mar-Oct	>60	---	Moderate.
Loveland:										
58	C	Occasional	Very brief	Mar-Jul	1.5-2.5	Apparent	Nov-May	>60	---	High.
Manter:										
59, 60, 61, 62, 63	B	None	---	---	>6.0	---	---	>60	---	Moderate.
64	B	None	---	---	4.0-6.0	Apparent	Nov-May	>60	---	Moderate.
65	B	None	---	---	2.0-4.0	Apparent	Apr-Oct	>60	---	Moderate.
Manzanola:										
66	C	None	---	---	>6.0	---	---	>60	---	Moderate.

TABLE 15.--SOIL AND WATER FEATURES--Continued

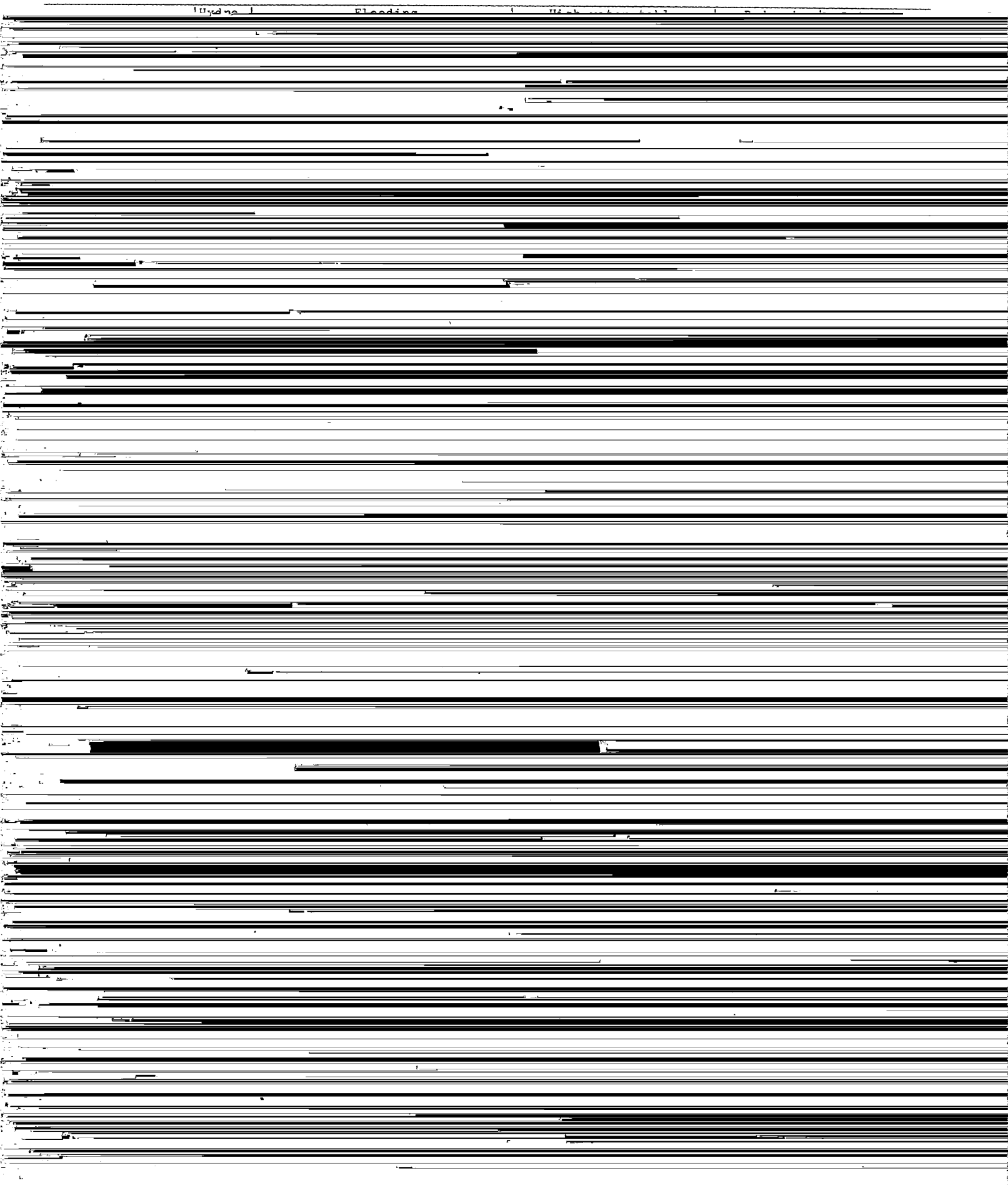


TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Thedalund: [1]109:										
Thedalund part-	C	None	---	---	>6.0	---	---	20-40	Rippable	Low.
Kim part	B	None	---	---	>6.0	---	---	>60	---	Low.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Albinas	Fine-loamy, mixed, mesic Pachic Argiustolls
Alda	Coarse-loamy, mixed, mesic Fluvaquentic Haplustolls
Altvan	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Argiustolls
Aquolls	Aquolls
Argiustolls	Argiustolls
Arvada	Fine, montmorillonitic, mesic Ustollic Natrargids
Ascalon	Fine-loamy, mixed, mesic Aridic Argiustolls
Bankard	Sandy, mixed, mesic Ustic Torrifluvents
Bayard	Coarse-loamy, mixed, mesic Torriorthentic Haplustolls
Bridgeport	Fine-silty, mixed, mesic Fluventic Haplustolls
Canyon	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Chappell	Coarse-loamy, mixed, mesic Aridic Haplustolls
Colby	Fine-silty, mixed (calcareous), mesic Ustic Torriorthents
Cushman	Fine-loamy, mixed, mesic Ustollic Haplargids
Dacono	Clayey over sandy or sandy-skeletal, montmorillonitic, mesic Aridic Argiustolls
Dailey	Sandy, mixed, mesic Torriorthentic Haplustolls
Dix	Sandy-skeletal, mixed, mesic Torriorthentic Haplustolls
Eckley	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Argiustolls
Els	Mixed, mesic Aquic Ustipsamments
Epping	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Escabosa	Fine-loamy, mixed, mesic Aridic Calciustolls