

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (5). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning ustic moisture regime, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustolls (*Argi*, meaning presence of an argillic horizon, plus *ustoll*, the suborder of the Mollisols that has an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aridic* identifies the subgroup receives less moisture than typifies the great group. An example is Aridic Argiustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Aridic Argiustolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (6). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (5). Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alliance Series

The Alliance series consists of deep, well drained, moderately permeable soils on uplands (fig. 19). They

formed in loess that is underlain by weakly cemented, fine grained, limy sandstone. Slopes range from 0 to 6 percent.

Alliance soils are commonly adjacent to Altvan, Duroc, Goshen, Keith, and Rosebud soils. Altvan soils have gravelly sand at a depth of 20 to 40 inches. They are on upland side slopes. Duroc and Goshen soils are pachic. They are in upland swales. Also, Duroc soils do not have an argillic horizon. Keith soils are deep to weakly cemented, fine grained, limy sandstone and are in landscape positions similar to those of the Alliance soils. Rosebud soils contain more sand and less silt in the control section than the Alliance soils. They are moderately deep to weakly cemented, fine grained, limy sandstone bedrock and are in landscape positions similar to those of the Alliance soils.

Typical pedon of Alliance loam, 1 to 3 percent slopes, 1,600 feet south and 100 feet west of the northeast corner of sec. 35, T. 15 N., R. 48 W.

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

A—6 to 9 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; few thin clay films on faces of peds; neutral; abrupt smooth boundary.

Bt1—9 to 15 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.

Bt2—15 to 21 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; neutral; clear smooth boundary.

BC—21 to 29 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable; neutral; gradual smooth boundary.

C—29 to 52 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; soft, very friable; strong effervescence; mildly alkaline; clear smooth boundary.

Cr—52 to 60 inches; very pale brown (10YR 7/3), weakly cemented, fine grained, limy sandstone bedrock, pale brown (10YR 6/3) moist; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 16 to 35 inches. The depth to free carbonates ranges from 16 to

35 inches. The thickness of the mollic epipedon ranges from 8 to 20 inches. The depth to the Cr horizon ranges from 40 to 60 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is typically loam, but the range includes very fine sandy loam. The Bt horizon has value of 5 or 6 (3 to 5 moist) and chroma of 2 or 3. It is typically silty clay loam and silt loam, but the range includes loam. The C horizon has value of 6 to 8 (5 or 6 moist) and chroma of 2 or 3. It is typically silt loam, but the range includes very fine sandy loam, fine sandy loam, and loam. The Cr horizon has value of 7 or 8 (6 or 7 moist) and chroma of 2 to 4.

Altvan Series

The Altvan series consists of very deep, well drained soils that have gravelly sand at a depth of 20 to 40 inches (fig. 20). Permeability is moderate in the solum and very rapid in the 2C horizon. These soils formed in loamy sediments on uplands and stream terraces. Slopes range from 1 to 9 percent.

Altvan soils are commonly adjacent to Alliance, Dix, Johnstown, Rosebud, and Satanta soils. Alliance soils have a fine-silty control section and have weakly cemented, fine grained, limy sandstone bedrock below a depth of 40 inches. They are in landscape positions on uplands that are similar to those of the Altvan soils. Dix soils have very gravelly sand at a depth of 10 to 20 inches. They are on ridgetops and stream terraces. Johnstown soils are pachic. They have a buried horizon and have gravelly sand at a depth of 40 to 60 inches. They are on the less sloping landscapes. Rosebud soils are moderately deep to weakly cemented, fine grained, limy sandstone bedrock. They are in landscape positions similar to those of the Altvan soils. Satanta soils have gravelly loamy sand below a depth of 40 inches. They are in landscape positions similar to those of the Altvan soils.

Typical pedon of Altvan loam, 1 to 3 percent slopes, 2,240 feet south and 130 feet west of the northeast corner of sec. 32, T. 17 N., R. 48 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; slightly acid; abrupt smooth boundary.

AB—7 to 11 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to weak fine granular; slightly hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.

Bt1—11 to 17 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium

subangular blocky; slightly hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.

Bt2—17 to 21 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, friable; strong effervescence; mildly alkaline; clear smooth boundary.

BC—21 to 30 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; soft, friable; strong effervescence; mildly alkaline; gradual smooth boundary.

C1—30 to 34 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, friable; violent effervescence; mildly alkaline; abrupt smooth boundary.

2C2—34 to 40 inches; very pale brown (10YR 7/4) gravelly sand, light yellowish brown (10YR 6/4) moist; single grain; loose; about 20 percent gravel, by volume; violent effervescence; mildly alkaline; abrupt smooth boundary.

2C3—40 to 60 inches; pink (7.5YR 7/4) gravelly sand, light brown (7.5YR 6/4) moist; single grain; loose; about 25 percent gravel, by volume; very slight effervescence; mildly alkaline.

The thickness of the solum ranges from 16 to 38 inches. The depth to free carbonates ranges from 16 to 38 inches. The thickness of the mollic epipedon ranges from 7 to 20 inches. The depth to gravelly sand ranges from 20 to 40 inches. The solum contains 0 to 15 percent gravel.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. The Bt horizon has value of 4 to 6 and chroma of 2 or 3. It is typically clay loam, but the range includes loam and sandy clay loam. The C horizon has value of 6 or 7 (5 or 6 moist) and chroma of 2 or 3. It is typically fine sandy loam, but the range includes loam and silt loam. The 2C horizon has value of 6 or 7 (5 or 6 moist) and chroma of 3 or 4. It is typically gravelly sand, but the range includes gravelly coarse sand, sand, and coarse sand.

Bankard Series

The Bankard series consists of very deep, somewhat excessively drained, rapidly permeable soils on flood plains. The soils formed in stratified sandy, calcareous alluvium. Slopes range from 0 to 3 percent.

Bankard soils are commonly adjacent to Bayard, Bridget, Dwyer, and Glenberg soils. Bayard and Bridget soils have a mollic epipedon. They are not stratified and have finer textured material than the Bankard soils. They are on the more sloping, higher parts of the landscape. Dwyer soils are not stratified and are more

uniformly textured. They are on the steeper, higher, dune-like formations adjacent to the Bankard soils. Glenberg soils have finer textured material than the Bankard soils. They are in landscape positions similar to those of the Bankard soils.

Typical pedon of Bankard loamy sand, 0 to 2 percent slopes, 450 feet north and 200 feet west of the southeast corner of sec. 29, T. 14 N., R. 52 W.

A—0 to 6 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; slight effervescence; mildly alkaline; clear smooth boundary.

C—6 to 60 inches; stratified brown (10YR 5/3), grayish brown (10YR 5/2), and pale brown (10YR 6/3) fine sand, loamy sand, loamy very fine sand, and gravelly sand, brown (10YR 4/3) and dark grayish brown (10YR 4/2) moist; single grain; soft or loose, very friable or loose; strongly effervescent increasing to violently effervescent with depth; moderately alkaline.

The thickness of the solum ranges from 4 to 8 inches. Free carbonates are typically at the surface, but some pedons are noncalcareous in the upper part of the solum.

The A horizon has value of 5 or 6 (3 or 4 moist) and chroma of 2 or 3. It typically is loamy sand, but the range includes loamy fine sand. The C horizon has value of 5 to 7 (4 or 5 moist) and chroma of 2 or 3. Typically, it consists of strata of fine sand, loamy very fine sand, loamy sand, and gravelly sand. Some C horizons have strata of loamy fine sand, coarse sand, gravelly coarse sand, and sand.

Bayard Series

The Bayard series consists of very deep, well drained, moderately rapidly permeable soils on foot slopes, alluvial fans, and stream terraces. The soils formed in colluvial and alluvial sediments that weathered from weakly cemented, fine grained, limy sandstone. Slopes range from 0 to 20 percent.

Bayard soils are commonly adjacent to Bankard, Bridget, Canyon, and Glenberg soils. Bankard soils do not have a mollic epipedon. They are stratified and have coarser textured material than the Bayard soils. They are on the lower part of the landscape. Bridget soils have finer textured material than the Bayard soils. They are in landscape positions similar to those of the Bayard soils. Canyon soils have weakly cemented, fine grained, limy sandstone bedrock at shallow depths. They are on the higher part of the landscape. Glenberg soils do not have a mollic epipedon and are stratified.

They are on the lower part of the landscape.

Typical pedon of Bayard fine sandy loam, 3 to 6 percent slopes, 150 feet south and 100 feet west of the northeast corner of sec. 12, T. 13 N., R. 52 W.

A1—0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary.

A2—8 to 12 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak fine granular; soft, very friable; violent effervescence; mildly alkaline; clear smooth boundary.

AC—12 to 22 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak fine granular; soft, very friable; violent effervescence; mildly alkaline; gradual smooth boundary.

C1—22 to 30 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable; violent effervescence; moderately alkaline; clear smooth boundary.

C2—30 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 15 to 30 inches. The thickness of the mollic epipedon ranges from 8 to 20 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. It is typically fine sandy loam, but the range includes sandy loam and very fine sandy loam. Reaction is neutral or mildly alkaline. The AC horizon has value of 5 or 6 (3 or 4 moist) and chroma of 2 or 3. It is typically fine sandy loam, but the range includes sandy loam and very fine sandy loam. The C horizon has value of 6 or 7 (4 or 5 moist) and chroma of 2 or 3. It is typically fine sandy loam or very fine sandy loam. In some pedons loamy fine sand is below a depth of 30 inches.

Bridget Series

The Bridget series consists of very deep, well drained, moderately permeable soils on foot slopes, alluvial fans, and stream terraces. The soils formed in loamy, calcareous, colluvial and alluvial sediments. Slopes range from 0 to 9 percent.

Bridget soils are commonly adjacent to Bankard, Bayard, Glenberg, and Mitchell soils. Bankard soils are occasionally flooded or frequently flooded. They have

coarser textured material throughout the profile than the Bridget soils and are on flood plains. Bayard soils have coarser textured material than the Bridget soils. They are in landscape positions similar to those of the Bridget soils. Glenberg soils have coarser textured material than the Bridget soils and are stratified. They are on flood plains. Mitchell soils do not have a mollic epipedon. They are on the higher part of the landscape.

Typical pedon of Bridget very fine sandy loam, 1 to 3 percent slopes, 1,000 feet north and 200 feet west of the southeast corner of sec. 12, T. 13 N., R. 51 W.

Ap—0 to 5 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; strong effervescence; mildly alkaline; abrupt smooth boundary.

A—5 to 13 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, very friable; strong effervescence; mildly alkaline; clear smooth boundary.

AC—13 to 19 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, very friable; violent effervescence; mildly alkaline; clear smooth boundary.

C—19 to 60 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 7 to 30 inches. The depth to free carbonates ranges from 0 to 15 inches. The thickness of the mollic epipedon ranges from 7 to 18 inches.

The A horizon has chroma of 2 or 3. It is typically very fine sandy loam, but the range includes silt loam. The C horizon has value of 6 to 8 (4 to 6 moist) and chroma of 2 to 4. It is typically very fine sandy loam or silt loam.

Busher Series

The Busher series consists of deep, well drained, moderately rapidly permeable soils on uplands. They formed in material weathered from weakly cemented, fine grained sandstone. Slopes range from 3 to 30 percent.

Busher soils are commonly adjacent to Dix, Duroc, Jayem, and Tassel soils and areas of Rock outcrop. Dix soils have very gravelly sand at a depth of 10 to 20 inches. They are on uplands in landscape positions similar to those of the Busher soils and on small knobs

at the higher elevations. Duroc soils have a dark surface soil that is more than 20 inches thick and have finer textured material than the Busher soils. They are in upland swales and on side slopes near drainageways. Jayem soils do not have free carbonates within a depth of 40 inches and do not have weakly cemented, fine grained sandstone bedrock within a depth of 60 inches. They are typically on the less steep part of the landscape. Tassel soils are shallow to sandstone and are on the steeper side slopes and narrow ridgetops. Areas of Rock outcrop consist of bare sandstone and are on narrow ridgetops and on sharp slope breaks.

Typical pedon of Busher fine sandy loam, in an area of Busher-Tassel complex, 3 to 9 percent slopes, 300 feet east and 200 feet south of the northwest corner of sec. 21, T. 17 N., R. 48 W.

- Ap—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.
- A1—6 to 10 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak fine granular; soft, very friable; neutral; clear smooth boundary.
- A2—10 to 19 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable; neutral; gradual wavy boundary.
- Bw—19 to 31 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure; soft, very friable; strong effervescence; mildly alkaline; gradual wavy boundary.
- C1—31 to 37 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline; gradual wavy boundary.
- C2—37 to 45 inches; very pale brown (10YR 7/3) loamy very fine sand, brown (10YR 5/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline; gradual wavy boundary.
- Cr—45 to 60 inches; very pale brown (10YR 7/3) weakly cemented, fine grained sandstone bedrock, brown (10YR 5/3) moist; violent effervescence.

The thickness of the solum ranges from 15 to 40 inches. The depth to free carbonates ranges from 18 to 48 inches. The thickness of the mollic epipedon ranges from 7 to 20 inches. Weakly cemented, fine grained sandstone bedrock is at a depth of 40 to 60 inches.

The A horizon has value of 4 or 5 (2 or 3 moist). The

Bw horizon has value of 5 or 6 (4 or 5 moist) and chroma of 2 or 3. It is typically fine sandy loam, but the range includes loamy very fine sand and very fine sandy loam. The C horizon has value of 5 to 8 (4 to 7 moist) and chroma of 2 or 3. It is typically fine sandy loam and loamy very fine sand, but the range includes very fine sandy loam.

Canyon Series

The Canyon series consists of shallow, well drained, moderately permeable soils on uplands. These soils formed in loamy, calcareous material weathered from weakly cemented, fine grained, limy sandstone. Slopes range from 3 to 45 percent.

Canyon soils are commonly adjacent to Alliance, Bayard, Rosebud, and Sidney soils and areas of Rock outcrop. Alliance soils have an argillic horizon and are deep to weakly cemented, fine grained, limy sandstone bedrock. They are in the less sloping areas. Bayard soils do not have weakly cemented, fine grained, limy sandstone bedrock within a depth of 60 inches. They are on foot slopes. Rosebud soils are moderately deep and have an argillic horizon. They are on the higher part of the landscape. Sidney soils have weakly cemented, fine grained, limy sandstone bedrock at a depth of 40 to 60 inches. They are on the lower side slopes. Areas of Rock outcrop consist of sandstone and are on narrow ridgetops and on sharp slope breaks.

Typical pedon of Canyon fine sandy loam, 6 to 30 percent slopes (fig. 21), 2,050 feet east and 150 feet south of the northwest corner of sec. 19, T. 14 N., R. 51 W.

- A1—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; strong effervescence; mildly alkaline; clear smooth boundary.
- A2—3 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable; violent effervescence; mildly alkaline; clear smooth boundary.
- C—6 to 11 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; massive; about 18 percent gravel, by volume; violent effervescence; moderately alkaline; abrupt smooth boundary.
- Cr—11 to 60 inches; white (10YR 8/2) and light gray (10YR 7/2), weakly cemented, fine grained, limy sandstone bedrock, very pale brown (10YR 7/3) and pale brown (10YR 6/3) moist; violent effervescence.

The thickness of the solum is typically 6 inches but ranges up to 12 inches. The depth to free carbonates

ranges from 0 to 6 inches. The depth to weakly cemented, fine grained, limy sandstone bedrock ranges from 6 to 20 inches. The content of coarse fragments ranges from 0 to 25 percent, by volume, in the C horizon.

The A horizon has value of 4 to 7 (3 to 6 moist) and chroma of 2 or 3. It is typically fine sandy loam, but the range includes very fine sandy loam, loam, and gravelly loam. The C horizon has value of 6 to 8 (4 to 7 moist) and chroma of 2 to 4. It is typically gravelly loam, but the range includes very fine sandy loam and loam.

Creighton Series

The Creighton series consists of very deep, well drained, moderately permeable soils on uplands. The soils formed in calcareous eolian material. Slopes range from 1 to 6 percent.

Creighton soils are commonly adjacent to Alliance, Busher, Duroc, Jayem, and Keith soils. Alliance soils have finer textured material than the Creighton soils. They have an argillic horizon and have weakly cemented, fine grained, limy sandstone bedrock at a depth of 40 to 60 inches. They are in landscape positions similar to those of the Creighton soils. Busher soils have weakly cemented, fine grained sandstone bedrock at a depth of 40 to 60 inches. They are on the steeper side slopes. Duroc soils have finer textured material than the Creighton soils and are pachic. They are in upland swales and near drainageways. Jayem soils have slightly coarser textured material than the Creighton soils and are free of carbonates at a depth of more than 20 inches. They are in landscape positions similar to those of the Creighton soils. Keith soils have finer textured material than the Creighton soils and have an argillic horizon. They are in landscape positions similar to those of the Creighton soils.

Typical pedon of Creighton very fine sandy loam, 3 to 6 percent slopes, 2,550 feet east and 250 feet south of the northwest corner of sec. 22, T. 17 N., R. 48 W.

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

A—5 to 10 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable; neutral; clear smooth boundary.

Bw1—10 to 19 inches; brown (10YR 5/3) very fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable; mildly alkaline; clear smooth boundary.

Bw2—19 to 23 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable; slight effervescence; mildly alkaline; clear smooth boundary.

Bk—23 to 30 inches; very pale brown (10YR 7/3) and pale brown (10YR 6/3) very fine sandy loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; soft, very friable; common soft masses and threads of lime; violent effervescence; mildly alkaline; gradual smooth boundary.

C—30 to 60 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 15 to 40 inches. The depth to free carbonates ranges from 6 to 20 inches. The thickness of the mollic epipedon ranges from 7 to 19 inches.

The A horizon has value of 4 or 5 and chroma of 2 or 3. The B horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It is typically very fine sandy loam, but the range includes loam. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It is typically very fine sandy loam, but the range includes loam.

Dix Series

The Dix series consists of very deep, excessively drained soils that have very gravelly sand at a depth of 10 to 20 inches. They are on uplands and stream terraces. Permeability is rapid in the solum and very rapid in the underlying material. These soils formed in loamy, sandy, and gravelly sediments. Slopes range from 3 to 50 percent.

Dix soils are commonly adjacent to Altvan, Bankard, Canyon, Rosebud, and Tassel soils. Altvan soils have an argillic horizon and have gravelly sand at a depth of 20 to 40 inches. They are on the less sloping part of the landscape. Bankard soils are stratified and calcareous. They are on flood plains. Canyon and Tassel soils are calcareous and shallow to weakly cemented, fine grained, limy sandstone bedrock. They are in landscape positions similar to those of the Dix soils. Rosebud soils have finer textured material than the Dix soils. They have an argillic horizon and are moderately deep to weakly cemented, fine grained, limy sandstone bedrock. They are on the higher landscapes.

Typical pedon of Dix gravelly loam, 3 to 11 percent slopes (fig. 22), 2,575 feet south and 200 feet east of the northwest corner of sec. 29, T. 14 N., R. 46 W.

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2)

moist; weak fine granular structure; soft, very friable; about 18 percent gravel, by volume; neutral; clear smooth boundary.

AC—6 to 11 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable; about 22 percent gravel, by volume; neutral; gradual smooth boundary.

C1—11 to 19 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 4/3) moist; single grain; loose; about 25 percent gravel, by volume; neutral; gradual smooth boundary.

C2—19 to 60 inches; pale brown (10YR 6/3) very gravelly sand, brown (10YR 5/3) moist; single grain; loose; about 40 percent gravel, by volume; neutral.

These soils generally do not have free carbonates, but in some pedons the pebbles have a coating of lime. The thickness of the mollic epipedon ranges from 7 to 20 inches. The depth to very gravelly sandy material ranges from 10 to 20 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. It is typically gravelly loam, but the range includes sandy loam. The C horizon has hue of 7.5YR or 10YR, value of 5 to 8 (3 to 6 moist), and chroma of 2 to 4. It is typically gravelly loamy coarse sand and very gravelly sand, but the range includes gravelly coarse sand and very gravelly coarse sand.

The Dix soils in Altvan-Dix complex, 3 to 9 percent slopes, have a particle-size control section that contains less gravel than is defined as the range for the series. This difference, however, does not affect the use and management of the soils.

Duroc Series

The Duroc series consists of very deep, well drained, moderately permeable soils on slightly concave parts of alluvial fans and side slopes near drainageways and in swales on stream terraces and uplands. They formed in alluvial sediments and eolian material. Slopes range from 0 to 3 percent.

Duroc soils are commonly adjacent to Alliance, Goshen, Keith, Kuma, and Lodgepole soils. Alliance and Keith soils are not pachic and have a well developed subsoil. They are higher on the landscape than the Duroc soils. Also, Alliance soils have weakly cemented, fine grained, limy sandstone bedrock at a depth of 40 to 60 inches. Goshen soils are pachic and have a well developed subsoil that contains more clay than that of the Duroc soils. They are in swales. Kuma soils are pachic and have a polygenetic solum. They are in landscape positions that are similar to those of the Duroc soils. Lodgepole soils have more clay in the subsoil than the Duroc soils. They are in depressions.

Typical pedon of Duroc loam, 0 to 1 percent slopes (fig. 23), 570 feet south and 220 feet east of the northwest corner of sec. 13, T. 16 N., R. 49 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

A—6 to 19 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) exterior and very dark brown (10YR 2/2) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; slightly hard, friable; neutral; clear wavy boundary.

Bw—19 to 31 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; moderately alkaline; clear wavy boundary.

Bk—31 to 41 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable; common threads of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

BC—41 to 55 inches; about 85 percent brown (10YR 5/3) and 15 percent dark grayish brown (10YR 4/2) silt loam, 85 percent brown and dark brown (10YR 4/3) and 15 percent very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, friable; strong effervescence; moderately alkaline; gradual wavy boundary.

C—55 to 60 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak coarse prismatic structure; soft, very friable; common very coarse rounded soft dark masses; strong effervescence; strongly alkaline.

The depth to free carbonates ranges from 10 to 36 inches. The thickness of the mollic epipedon ranges from 20 to 50 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is typically loam, but the range includes silt loam. The Bw horizon has value of 5 to 7 (3 to 6 moist) and chroma of 2 to 6. It is typically loam and silt loam. Some pedons do not have a Bw horizon. The C horizon is typically loam, but the range includes silt loam.

Dwyer Series

The Dwyer series consists of very deep, excessively drained, rapidly permeable soils on dune-like formations

on or near alluvial terraces. They formed in eolian sand. Slopes range from 9 to 17 percent.

Dwyer soils are commonly adjacent to Bankard, Bayard, Bridget, and Glenberg soils. Bankard and Glenberg soils are stratified. They are on flood plains. Bankard soils contain coarse sand and gravel. Bayard and Bridget soils have finer textured material than the Dwyer soils. They are on terraces and foot slopes.

Typical pedon of Dwyer loamy fine sand, 9 to 17 percent slopes, 1,200 feet north and 150 feet east of the southwest corner of sec. 29, T. 14 N., R. 52 W.

A—0 to 4 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; strong effervescence; mildly alkaline; clear smooth boundary.

C1—4 to 15 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; soft, very friable; strong effervescence; moderately alkaline; clear smooth boundary.

C2—15 to 32 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline; gradual smooth boundary.

C3—32 to 60 inches; pale brown (10YR 6/3) fine sand, brown (10YR 4/3) moist; single grain; loose; violent effervescence; moderately alkaline.

Typically, these soils are calcareous to the surface. The control section is loamy fine sand, loamy sand, or fine sand.

The A horizon has value of 5 or 6 (3 or 4 moist) and chroma of 2 or 3. The C horizon has value of 4 or 5 moist.

Epping Series

The Epping series consists of shallow, well drained, moderately permeable soils on uplands and foot slopes. They formed in loamy material weathered from siltstone that contains material from volcanic ash. Slopes range from 3 to 45 percent.

Epping soils are commonly adjacent to Bridget and Mitchell soils and areas of siltstone Rock outcrop. Bridget soils have a mollic epipedon. They are on the slightly lower foot slopes. Mitchell soils are very deep. They are on the lower foot slopes. Areas of siltstone Rock outcrop consist of bare rock. They are on the higher and steeper slope breaks.

Typical pedon of Epping loam, in an area of Epping-Mitchell complex, 3 to 20 percent slopes, 600 feet south and 150 feet west of the northeast corner of sec. 24, T. 13 N., R. 51 W.

A1—0 to 1 inch; pale brown (10YR 6/3) loam, dark

grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable; violent effervescence; mildly alkaline; clear smooth boundary.

A2—1 to 5 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable; violent effervescence; moderately alkaline; clear smooth boundary.

C—5 to 13 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable; violent effervescence; mildly alkaline; abrupt smooth boundary.

Cr—13 to 60 inches; very pale brown (10YR 7/3) siltstone bedrock; violent effervescence.

The depth to free carbonates ranges from 0 to 6 inches. The depth to siltstone bedrock ranges from 10 to 20 inches.

The A horizon has value of 5 or 6 (3 or 4 moist). It is typically loam, but the range includes silt loam. The C horizon has value of 6 to 8 (4 or 5 moist). It is typically loam, but the range includes silt loam.

Glenberg Series

The Glenberg series consists of very deep, well drained, moderately rapidly permeable soils on flood plains. The soils formed in stratified, calcareous alluvium derived from mixed sources. Slopes range from 0 to 2 percent.

The Glenberg soils in Cheyenne County are a taxadjunct to the Glenberg series because they are in a more humid climate than is definitive for the series. This difference, however, does not alter the use or behavior of these soils. In this survey area the Glenberg soils are coarse-loamy, mixed (calcareous), mesic Ustic Torrfluvents.

Glenberg soils are commonly adjacent to Bankard, Bayard, Bridget, and Dwyer soils. The somewhat excessively drained Bankard soils have a control section that is coarser textured than that of the Glenberg soils. They are on landscape positions similar to those of the Glenberg soils. Bayard and Bridget soils have a mollic epipedon and are not stratified. They are on the higher part of the landscape. Dwyer soils are not stratified and are more uniformly textured. They are on the steeper, higher, dune-like formations on bottom land.

Typical pedon of Glenberg fine sandy loam, 0 to 2 percent slopes, 500 feet south and 150 feet west of the northeast corner of sec. 33, T. 14 N., R. 47 W.

Ap—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist;

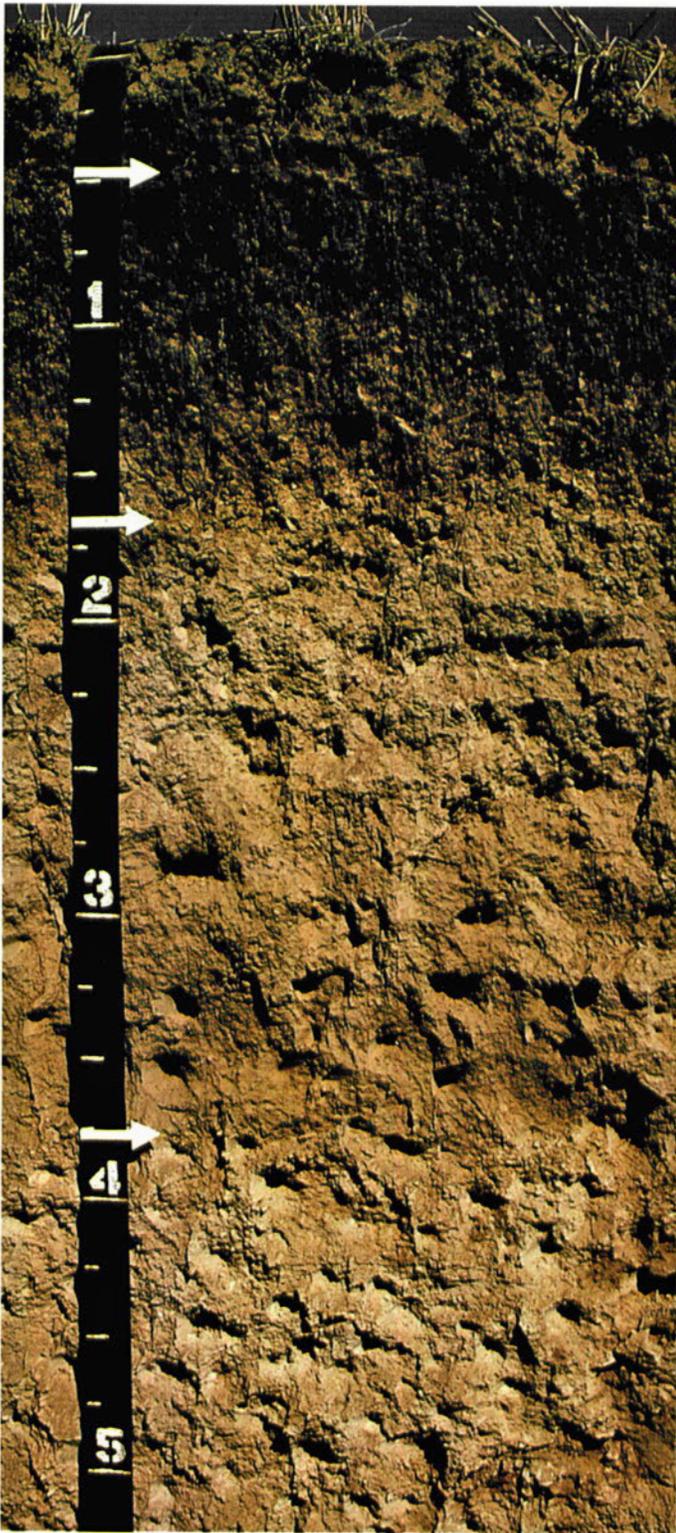


Figure 19.—Profile of Alliance loam. Depth to soft bedrock ranges from 40 to 60 inches. Depth is marked in feet.

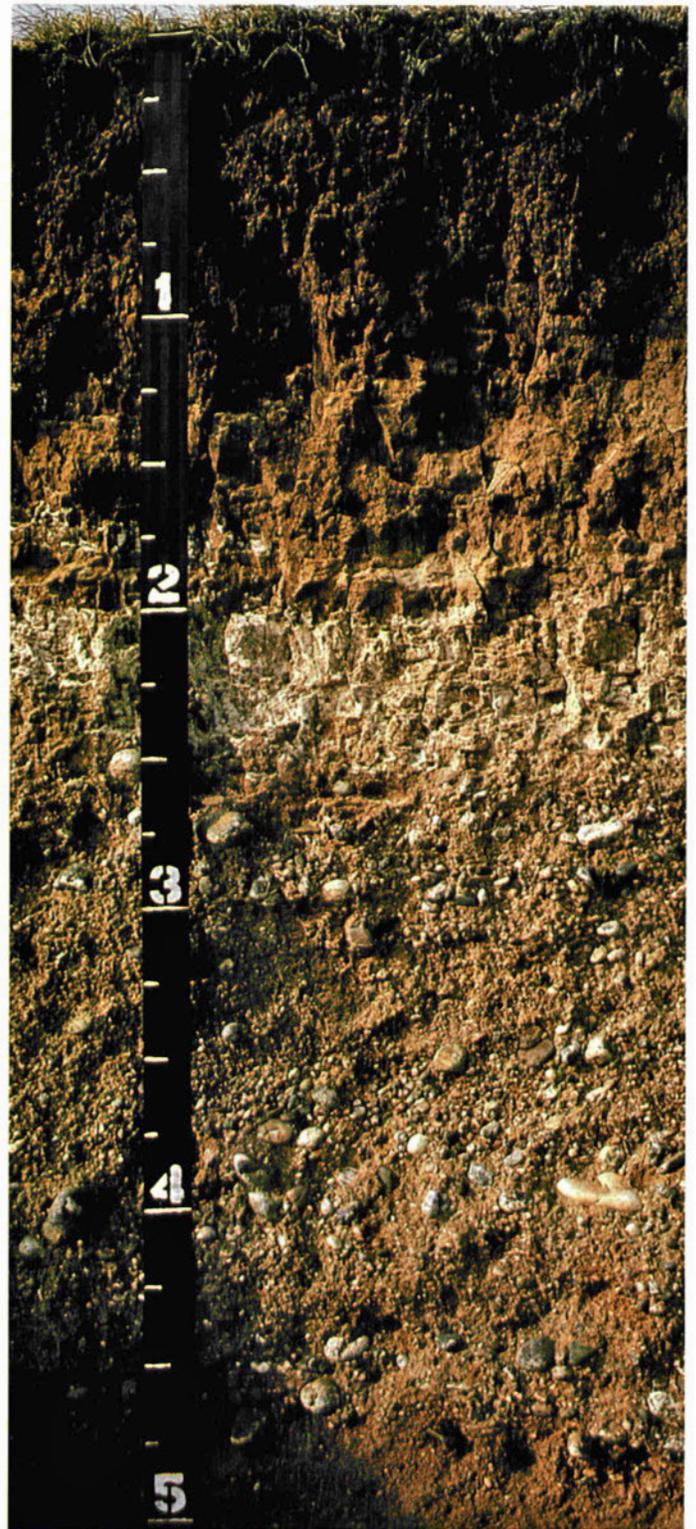


Figure 20.—Profile of Altvan loam. Depth to gravelly sand ranges from 20 to 40 inches. Depth is marked in feet.

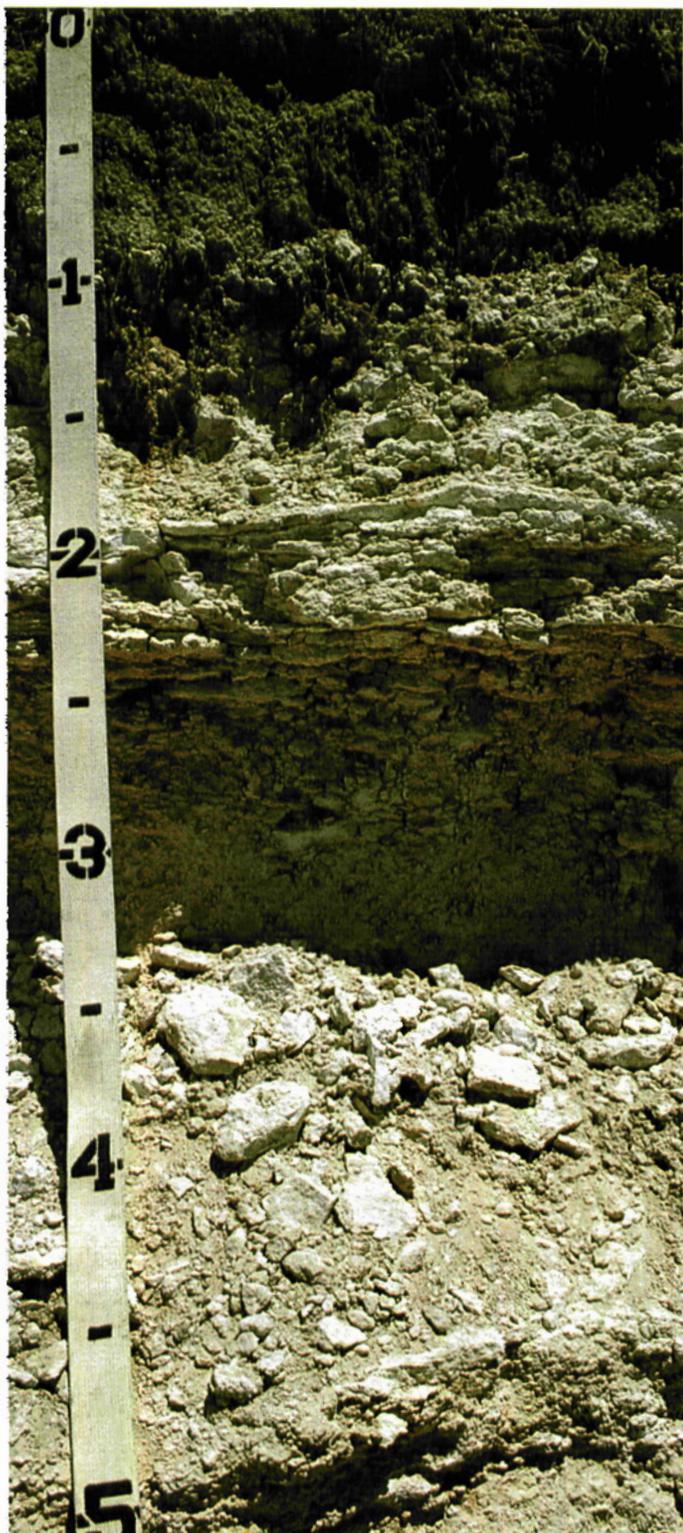


Figure 21.—Profile of Canyon fine sandy loam. Depth to bedrock ranges from 6 to 20 inches. Depth is marked in feet.

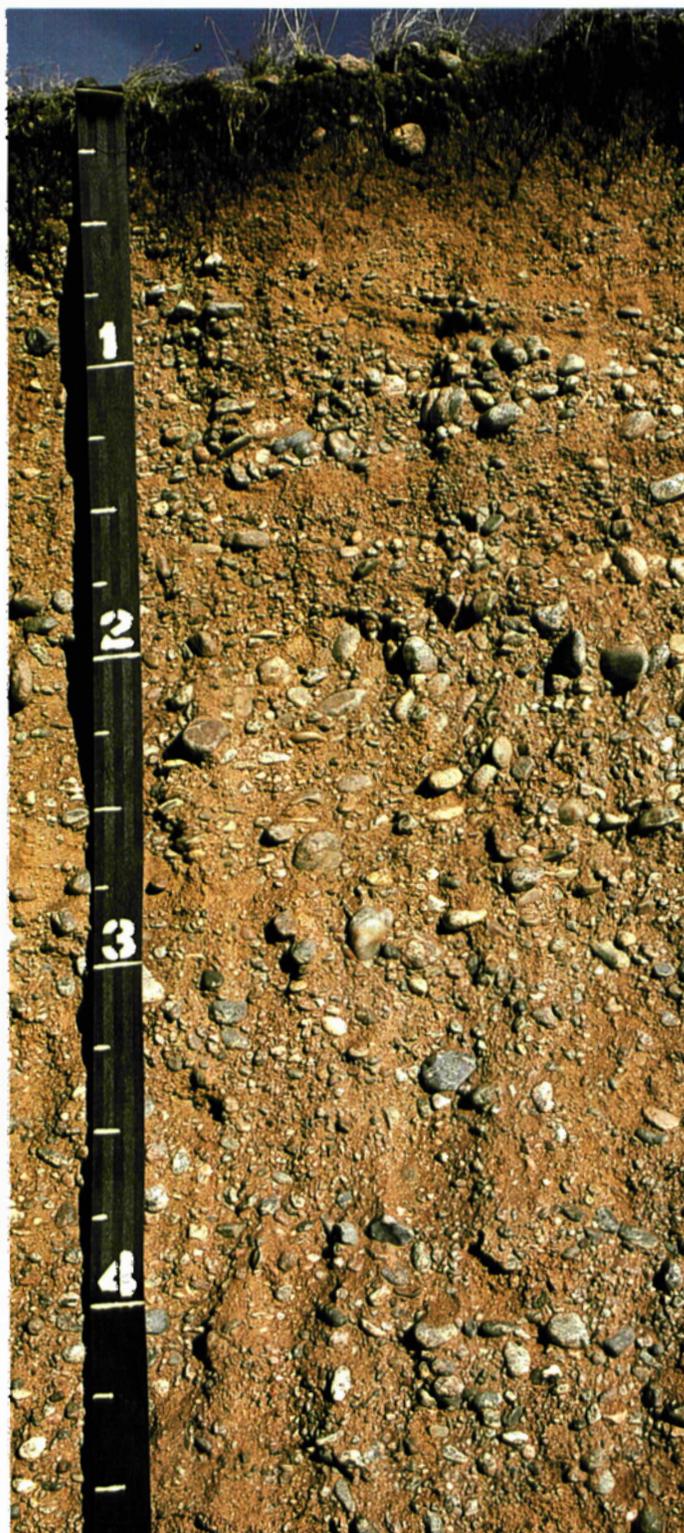


Figure 22.—Profile of Dix gravelly loam. Depth to very gravelly sand ranges from 10 to 20 inches. Depth is marked in feet.

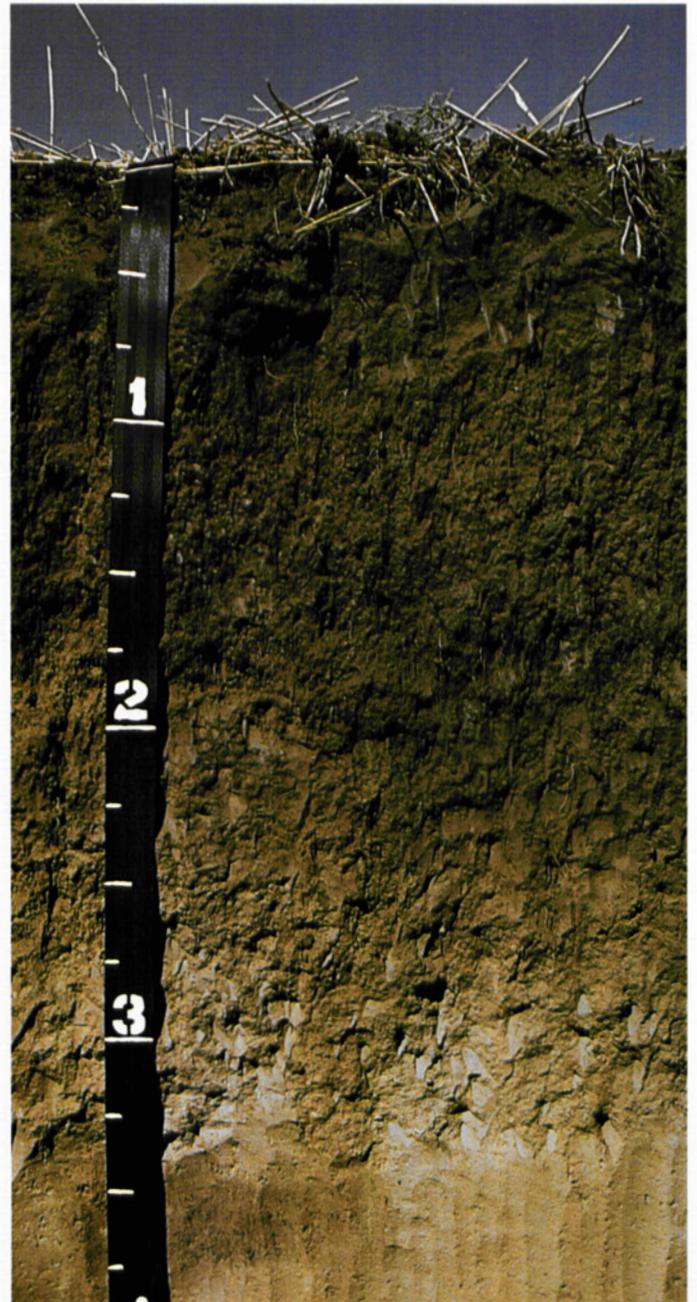
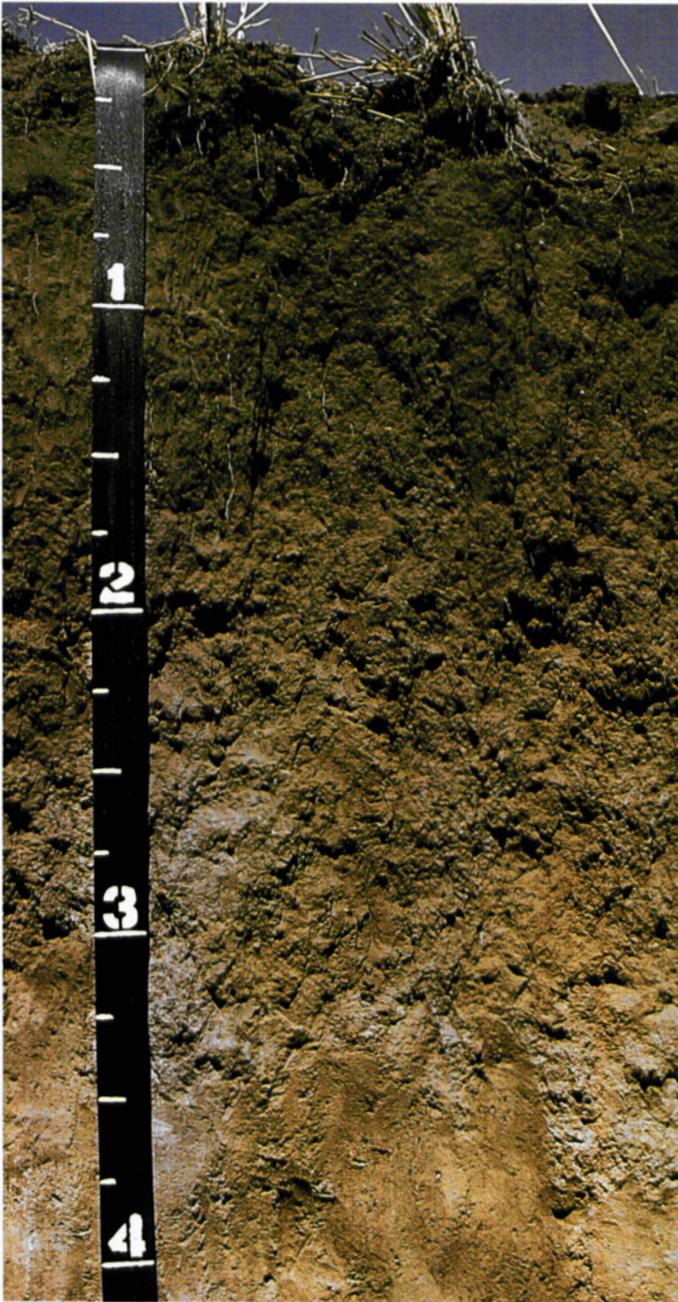


Figure 23.—Profile of Duroc loam. This soil is very deep and well drained and has a thick surface layer. Depth is marked in feet.

Figure 24.—Profile of Kuma loam. This soil is very deep and well drained and has a buried horizon. Depth is marked in feet.



Figure 25.—Profile of Mitchell very fine sandy loam. This soil has a thin surface layer. Depth is marked in feet.

weak fine granular structure; soft, very friable; strong effervescence; mildly alkaline; abrupt smooth boundary.

C—6 to 60 inches; stratified light brownish gray (10YR 6/2), light gray (10YR 7/2), and grayish brown (2.5Y 5/2) fine sandy loam, loamy fine sand, very fine sandy loam, and silt loam, dark grayish brown (10YR 4/2 and 2.5Y 4/2), grayish brown (10YR 5/2), and very dark grayish brown (2.5Y 3/2) moist; massive; soft, very friable; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 4 to 8 inches. Free carbonates are at the surface or leached to a depth of a few inches in some pedons.

The A horizon has value of 5 or 6 (3 or 4 moist) and chroma of 2 or 3. It is typically fine sandy loam, but the range includes very fine sandy loam and loam. The C horizon has value of 5 to 7 (4 or 5 moist) and chroma of 2 or 3. Strata of darker colors are below a depth of 40 inches. It is typically fine sandy loam, loamy fine sand, and very fine sandy loam, but the range includes stratified loamy sand to clay loam.

Goshen Series

The Goshen series consists of very deep, well drained, moderately permeable soils in upland swales. These soils formed in silty alluvium derived from soils formed in loess. Slopes are 0 to 1 percent.

Goshen soils are commonly adjacent to Alliance, Duroc, Keith, and Sidney soils. Alliance, Keith, and Sidney soils are not pachic. They are higher on the landscape than the Goshen soils. Also, Alliance and Sidney soils have weakly cemented, fine grained, limy sandstone bedrock at a depth of 40 to 60 inches. Duroc soils do not have a strongly developed subsoil. They have less clay and more silt in the control section than the Goshen soils. They are in landscape positions similar to those of the Goshen soils.

Typical pedon of Goshen silt loam, 0 to 1 percent slopes, 1,350 feet east and 250 feet north of the southwest corner of sec. 7, T. 12 N., R. 51 W.

Ap1—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, friable; neutral; abrupt smooth boundary.

Ap2—4 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; slightly hard, friable; slightly acid; abrupt smooth boundary.

A—7 to 12 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable;

neutral; clear smooth boundary.

Bt1—12 to 17 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm; few thin clay films on faces of peds; neutral; clear smooth boundary.

Bt2—17 to 25 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm; few thin clay films on faces of peds; neutral; clear smooth boundary.

Bt3—25 to 37 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm; few thin clay films on faces of peds; neutral; gradual smooth boundary.

BC—37 to 44 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable; strong effervescence; mildly alkaline; gradual smooth boundary.

C—44 to 60 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable; violent effervescence; mildly alkaline.

The thickness of the solum ranges from 35 to 60 inches. The depth to free carbonates ranges from 34 to more than 60 inches. The mollic epipedon is 20 inches thick in places. It always extends into the B horizon.

The A horizon has value of 3 to 5 (2 or 3 moist) and chroma of 2 or 3. It is typically silt loam, but the range includes loam and fine sandy loam. The Bt horizon has value of 5 or 6 (3 to 5 moist) and chroma of 2 or 3. It is typically silty clay loam, but the range includes loam and silt loam. The C horizon has value of 6 to 8 (4 to 6 moist) and chroma of 2 or 3. It is typically silt loam, but the range includes loam and very fine sandy loam.

Jayem Series

The Jayem series consists of very deep, well drained, moderately rapidly permeable soils on uplands. These soils formed in eolian material weathered from noncalcareous sandstone. Slopes range from 1 to 6 percent.

Jayem soils are commonly adjacent to Busher, Creighton, Duroc, Keith, and Valent soils. Busher soils have weakly cemented, fine grained sandstone bedrock at a depth of 40 to 60 inches. They are on the steeper slopes. Creighton soils have free carbonates within a depth of 40 inches. They are in landscape positions similar to those of the Jayem soils. Duroc soils have finer textured material than the Jayem soils and are pachic. They are in upland swales and along wide drainageways. Keith soils have an argillic horizon and

have finer textured material than the Jayem soils. They are in landscape positions similar to those of the Jayem soils. Valent soils do not have a mollic epipedon and contain slightly more sand than the Jayem soils. They are in the more sloping areas, generally at lower elevations.

Typical pedon of Jayem fine sandy loam, 3 to 6 percent slopes, 300 feet west and 200 feet south of the northeast corner of sec. 25, T. 16 N., R. 49 W.

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

A—5 to 19 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable; neutral; gradual smooth boundary.

Bw—19 to 30 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable; neutral; gradual smooth boundary.

C1—30 to 54 inches; pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable; neutral; gradual smooth boundary.

C2—54 to 60 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; violent effervescence; mildly alkaline.

The thickness of the solum ranges from 15 to 40 inches. The mollic epipedon ranges from 7 to 20 inches in thickness.

The A horizon has value of 4 or 5 (2 or 3 moist). It is typically fine sandy loam, but the range includes loamy fine sand. The Bw horizon has value of 5 or 6 (4 or 5 moist) and chroma of 2 to 4. It typically is fine sandy loam, but the range includes very fine sandy loam. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It typically is fine sandy loam, but the range includes loamy very fine sand and very fine sandy loam.

Johnstown Series

The Johnstown series consists of very deep, well drained soils on upland flats. Permeability is moderate in the solum and very rapid in the underlying material. These soils formed in loess and loamy sediments. They have a buried soil. Slopes are 0 to 1 percent.

Johnstown soils are commonly adjacent to Altvan, Duroc, Kuma, and Satanta soils. Altvan soils are on the more sloping landscapes and have gravelly sand at a depth of 20 to 40 inches. Duroc soils do not have an argillic horizon. They are in upland swales. Kuma soils do not have gravelly sand in the lower part of the

underlying material. They are in landscape positions similar to those of the Johnstown soils. Satanta soils are not pachic. They are in landscape positions similar to those of the Johnstown soils.

Typical pedon of Johnstown loam, 0 to 1 percent slopes, 1,350 feet west and 100 feet north of the southeast corner of sec. 13, T. 12 N., R. 51 W.

Ap—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

A—5 to 9 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; neutral; clear smooth boundary.

Bt—9 to 14 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable; few thin clay films on faces of peds; neutral; abrupt smooth boundary.

Btb1—14 to 18 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.

Btb2—18 to 22 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.

Btb3—22 to 25 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.

Bkb—25 to 46 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable; common accumulations of carbonates; violent effervescence; moderately alkaline; clear smooth boundary.

2C—46 to 60 inches; pale brown (10YR 6/3) gravelly sand, brown (10YR 4/3) moist; single grain; about 20 percent gravel, by volume; strong effervescence; mildly alkaline.

The depth to free carbonates ranges from 25 to 46 inches. The thickness of the mollic epipedon ranges from 20 to 44 inches. The thickness of the solum ranges from 36 to 55 inches.

The A horizon has value of 4 or 5 and chroma of 1 to 3. It is typically loam, but the range includes silt loam and fine sandy loam. The Bt horizon has value of 4 or 5 and chroma of 2 or 3. It is typically clay loam, but the range includes silty clay loam. The Btb horizon has value of 3 to 6 (2 to 5 moist) and chroma of 1 to 4. It is typically clay loam, but the range includes silty clay loam and clay loam. The 2C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It is typically gravelly sand, but the range includes gravelly coarse sand.

Keith Series

The Keith series consists of very deep, well drained, moderately permeable soils on uplands. They formed in loess. Slopes range from 0 to 6 percent.

Keith soils are commonly adjacent to Alliance, Duroc, Kuma, Rosebud, and Ulysses soils. Alliance and Rosebud soils are less than 60 inches to weakly cemented, fine grained, limy sandstone bedrock. They are on landscape positions similar to those of the Keith soils. Duroc and Kuma soils are pachic. They are on the lower part of the landscape. Also, Duroc soils do not have an argillic horizon, and Kuma soils have a buried horizon. Ulysses soils do not have an argillic horizon and have carbonates nearer to the surface. They are on landscape positions similar to those of the Keith soils.

Typical pedon of Keith loam, 1 to 3 percent slopes, 550 feet west and 150 feet south of the northeast corner of sec. 35, T. 17 N., R. 47 W.

- 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, very friable; few thin clay films on faces of peds; neutral; abrupt smooth boundary.
- A—6 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to weak medium granular; slightly hard, very friable; few thin clay films on faces of peds; neutral; clear smooth boundary.
- Bt1—10 to 14 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak fine subangular blocky; hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.
- Bt2—14 to 18 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.
- BC—18 to 23 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak medium subangular

blocky structure; hard, friable; neutral; gradual smooth boundary.

- C1—23 to 34 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; slightly hard, very friable; strong effervescence; mildly alkaline; gradual smooth boundary.
- C2—34 to 60 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; violent effervescence; mildly alkaline.

The thickness of the solum ranges from 15 to 48 inches. The depth to free carbonates ranges from 15 to 38 inches. The thickness of the mollic epipedon ranges from 7 to 20 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 or 2. It is typically loam, but the range includes silt loam and very fine sandy loam. The Bt horizon has value of 4 to 6 (3 or 4 moist) and chroma of 2 or 3. It is typically silt loam, but the range includes silty clay loam and loam. The C horizon has value of 6 to 8 (5 or 6 moist) and chroma of 2 to 4. It is typically silt loam and very fine sandy loam, but the range includes loam.

Kuma Series

The Kuma series consists of very deep, well drained, moderately permeable soils on upland flats and drainageways. They formed in loess over a buried soil that also formed in loess. Slopes are 0 to 1 percent.

Kuma soils are commonly adjacent to Altvan, Duroc, Goshen, and Keith soils. All of the adjacent soils do not have a buried soil. Altvan soils are not pachic. They are on the more sloping landscapes. Also, they have gravelly sand at a depth of 20 to 40 inches. Duroc and Goshen soils are in upland swales. Also, Duroc soils do not have an argillic horizon. Keith soils are not pachic. They are higher on the landscape than the Kuma soils.

Typical pedon of Kuma loam, 0 to 1 percent slopes (fig. 24), 2,300 feet west and 275 feet south of the northeast corner of sec. 26, T. 16 N., R. 50 W.

- Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.
- Bt—7 to 14 inches; brown and dark brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.
- Btb1—14 to 24 inches; dark grayish brown (10YR 4/2)

silt loam, black (10YR 2/1) exterior and very dark brown (10YR 2/2) moist; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, friable; few thin clay films on faces of peds; mildly alkaline; clear wavy boundary.

Btb2—24 to 32 inches; brown (10YR 5/3) silt loam, brown and dark brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable; few thin clay films on faces of peds; common coarse cylindrical insect casts; moderately alkaline; clear wavy boundary.

Bkb—32 to 42 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak prismatic structure parting to weak medium subangular blocky; soft, very friable; threaded soft masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

C1—42 to 56 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure; soft, very friable; common very coarse rounded soft dark masses; violent effervescence; strongly alkaline; gradual wavy boundary.

C2—56 to 60 inches; very pale brown (10YR 7/3) very fine sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable; violent effervescence; strongly alkaline.

The depth to free carbonates ranges from 10 to 40 inches. The thickness of the mollic epipedon ranges from 20 to 50 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 1 to 3. It is typically loam, but the range includes silt loam and very fine sandy loam. The Bt horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. It is typically silty clay loam, but the range includes loam and silt loam. The buried B horizon has value of 4 to 6 (2 to 5 moist) and chroma of 1 to 3. It is typically silt loam, but the range includes silty clay loam, clay loam, and loam. The C horizon is typically silt loam and very fine sandy loam, but the range includes loam.

Las Series

The Las series consists of very deep, somewhat poorly drained, moderately slowly permeable soils on flood plains. They formed in light colored, calcareous, loamy alluvium. Slopes are 0 to 1 percent.

Las soils are commonly adjacent to Bankard, Glenberg, Las Animas, and McCook soils. Bankard soils are somewhat excessively drained, and Glenberg soils are well drained. Both soils have coarser textured material than the Las soils and are in landscape positions similar to those of the Las soils. Las Animas

soils are poorly drained and are coarse-loamy. They are on the slightly lower landscapes. McCook soils are well drained and are coarse-silty. They are on the slightly higher landscapes.

Typical pedon of Las loam, 0 to 1 percent slopes, 500 feet north and 100 feet east of the southwest corner of sec. 30, T. 14 N., R. 47 W.

A1—0 to 4 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; soft, very friable; strong effervescence; mildly alkaline; clear smooth boundary.

A2—4 to 11 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine angular blocky structure; slightly hard, friable; violent effervescence; moderately alkaline; clear smooth boundary.

C1—11 to 19 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; violent effervescence; moderately alkaline; clear smooth boundary.

C2—19 to 26 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; very few fine faint brown (7.5YR 4/4) mottles; massive; slightly hard, friable; violent effervescence; moderately alkaline; gradual smooth boundary.

C3—26 to 33 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; violent effervescence; moderately alkaline; gradual smooth boundary.

C4—33 to 46 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable; soft accumulations of lime; violent effervescence; moderately alkaline; gradual smooth boundary.

C5—46 to 54 inches; light brownish gray (10YR 6/2) sandy loam, grayish brown (10YR 5/2) moist; few fine faint dark brown (7.5YR 4/4) mottles; massive; soft, very friable; violent effervescence; moderately alkaline; gradual smooth boundary.

C6—54 to 60 inches; light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; common fine distinct yellowish brown (10YR 5/6) mottles; massive; slightly hard, friable; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 5 to 15 inches.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5 moist, and chroma of 2 or 3. It is typically loam, but the range includes clay loam. Some pedons have an AC horizon. The C horizon has value of 5 to 7 and chroma of 2 or 3. It is typically loam, clay loam, sandy loam, and sandy clay loam that have thin strata of

sandy and clayey material. Some pedons have a 2C horizon below a depth of 40 inches.

Las Animas Series

The Las Animas series consists of very deep, poorly drained, moderately rapidly permeable soils on flood plains. They formed in thick, calcareous, stratified alluvial sediments derived from mixed sources. Slopes range from 0 to 2 percent.

Las Animas soils are commonly adjacent to Bankard, Glenberg, and Las soils. All of the adjacent soils are slightly higher on the landscape than the Las Animas soils. Bankard soils have more sand in the control section than the Las Animas soils. They are somewhat excessively drained. Glenberg soils are well drained. Las soils are somewhat poorly drained and are fine-loamy.

Typical pedon of Las Animas loam, 0 to 2 percent slopes, 1,850 feet east and 400 feet north of the southwest corner of sec. 32, T. 14 N., R. 46 W.

A—0 to 5 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; few fine faint dark yellowish brown (10YR 3/4) mottles; weak fine granular structure; soft, very friable; strong effervescence; moderately alkaline; clear smooth boundary.

ACg—5 to 11 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; few fine faint dark yellowish brown (10YR 4/4) mottles; weak medium granular structure; soft, very friable; strong effervescence; moderately alkaline; clear smooth boundary.

Cg1—11 to 33 inches; stratified light gray (2.5Y 7/2) and light brownish gray (2.5Y 6/2) fine sandy loam and sandy loam, grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) moist; common fine faint yellowish brown (10YR 5/6) mottles; massive; slightly hard, very friable; strong effervescence; moderately alkaline; clear smooth boundary.

Cg2—33 to 60 inches; stratified light brownish gray (2.5Y 6/2) and light gray (5Y 6/1) loamy fine sand and very fine sandy loam, dark grayish brown (2.5Y 4/2) and dark gray (5Y 4/1) moist; massive; slightly hard, very friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 4 to 16 inches. The depth to free carbonates ranges from 0 to 10 inches. The content of gravel ranges from 0 to 15 percent throughout the profile.

The A horizon has hue of 2.5Y or 10YR, value of 4 or 5 (2 or 3 moist) and chroma of 0 to 2. It is typically loam, but the range includes fine sandy loam, sandy

loam, and very fine sandy loam. The Cg horizon has hue of 5Y to 10YR. It is typically fine sandy loam, sandy loam, loamy fine sand, and very fine sandy loam, but the range includes strata of loamy sand to loam.

Lodgepole Series

The Lodgepole series consists of very deep, somewhat poorly drained, very slowly permeable soils in depressions on uplands. They formed in loess and loamy sediments. Slopes are 0 to 1 percent.

The Lodgepole soils in Cheyenne County are taxadjuncts to the Lodgepole series because they contain an albic horizon, which is not definitive of the series. This difference, however, does not alter the use or behavior of these soils. In this survey area the Lodgepole soils are fine, montmorillonitic, mesic Typic Argiaquolls.

Lodgepole soils are commonly adjacent to Alliance, Duroc, Goshen, Keith, and Kuma soils. The adjacent soils are well drained and have less clay in the control section than the Lodgepole soils. Also, Alliance and Keith soils are not pachic. Alliance soils have weakly cemented, fine grained, limy sandstone bedrock within a depth of 60 inches. Duroc and Goshen soils are in landscape positions similar to those of the Lodgepole soils. Alliance, Keith, and Kuma soils are on the higher part of the landscape.

Typical pedon of Lodgepole silt loam, 0 to 1 percent slopes, 1,800 feet west and 150 feet south of the northeast corner of sec. 26, T. 13 N., R. 53 W.

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

A2—3 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, very friable; mildly alkaline; clear smooth boundary.

E—7 to 9 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium platy structure parting to weak fine subangular blocky; slightly hard, friable; mildly alkaline; abrupt smooth boundary.

Bt1—9 to 17 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong fine angular blocky; hard, firm; few thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

Bt2—17 to 33 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong medium angular blocky; very hard, very firm;

few thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

BC—33 to 47 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm; mildly alkaline; gradual smooth boundary.

C—47 to 58 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable; few fine soft iron segregations; slight effervescence; mildly alkaline; gradual smooth boundary.

Cz—58 to 60 inches; very pale brown (10YR 7/3) sandy loam, pale brown (10YR 6/3) moist; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 60 inches. The depth to free carbonates ranges from 24 to 60 inches. The mollic epipedon ranges from 20 to 41 inches in thickness.

The A horizon has value of 4 or 5 and chroma of 1 or 2. It is typically silt loam, but the range includes loam. The E horizon, if it occurs, has value of 5 or 6 (3 or 4 moist) and chroma of 1 or 2. The Bt horizon has value of 2 or 3 moist and chroma of 1 to 3. It is typically silty clay and clay, but the range includes silty clay loam. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It is typically silt loam, but the range includes fine sandy loam, sandy loam, and loam. In some pedons this horizon has weakly cemented, calcareous material below a depth of 40 inches.

McCook Series

The McCook series consists of very deep, well drained, moderately permeable soils on flood plains. They formed in weakly stratified, calcareous, loamy alluvium. Slopes are 0 to 1 percent.

McCook soils are commonly adjacent to Bankard, Bridget, Glenberg, and Las soils. Bankard and Glenberg soils have coarser textured material than the McCook soils. They do not have a mollic epipedon. Bankard soils are on the lower part of the landscape, and Glenberg soils are in landscape positions similar to those of the McCook soils. Bridget soils are not stratified. They are on the higher part of the landscape. Las soils are somewhat poorly drained. They have finer textured material in the control section than the McCook soils and are on the lower part of the landscape.

Typical pedon of McCook very fine sandy loam, 0 to 1 percent slopes, 900 feet south and 120 feet west of the northeast corner of sec. 33, T. 14 N., R. 48 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2)

moist; weak fine granular structure; soft, very friable; strong effervescence; mildly alkaline; abrupt smooth boundary.

A—8 to 12 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; soft, very friable; strong effervescence; mildly alkaline; clear smooth boundary.

AC—12 to 19 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; soft, very friable; violent effervescence; mildly alkaline; clear smooth boundary.

C1—19 to 25 inches; grayish brown (10YR 5/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable; violent effervescence; mildly alkaline; clear smooth boundary.

C2—25 to 53 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; violent effervescence; moderately alkaline; gradual smooth boundary.

C3—53 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; violent effervescence; moderately alkaline.

The thickness of the mollic epipedon ranges from 10 to 20 inches. The thickness of the solum ranges from 16 to 33 inches.

The A horizon has value of 4 or 5 dry. It is typically very fine sandy loam, but the range includes fine sandy loam and loam. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 or 3. It is typically very fine sandy loam and fine sandy loam, but the range includes silt loam and loam. Some pedons have coarser textured material below a depth of 40 inches.

Mitchell Series

The Mitchell series consists of very deep, well drained, moderately permeable soils on foot slopes and valley side slopes. They formed in colluvial and alluvial sediments weathered from siltstone. Slopes range from 3 to 20 percent.

The Mitchell soils in Cheyenne County are taxadjuncts to the Mitchell series because they are in a more humid climate than is definitive for the series. This difference, however, does not alter the use or behavior of these soils. In this survey area the Mitchell soils are coarse-silty, mixed (calcareous), mesic Ustic Torriorthents.

Mitchell soils are commonly adjacent to Bayard, Bridget, and Epping soils. Bayard and Bridget soils have a mollic epipedon. They are on the lower foot

slopes. Also, Bayard soils have coarser textured material than the Mitchell soils. Epping soils have bedrock within a depth of 20 inches. They are on the higher foot slopes and on uplands.

Typical pedon of Mitchell very fine sandy loam, 6 to 9 percent slopes (fig. 25), 600 feet south and 200 feet west of the northeast corner of sec. 13, T. 13 N., R. 51 W.

Ap—0 to 5 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable; violent effervescence; mildly alkaline; abrupt smooth boundary.

AC—5 to 17 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable; violent effervescence; mildly alkaline; gradual smooth boundary.

C1—17 to 44 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; soft, very friable; violent effervescence; mildly alkaline; gradual smooth boundary.

C2—44 to 60 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 7 to 24 inches. The depth to free carbonates ranges from 0 to 10 inches.

The A horizon has value of 5 or 6 and chroma of 2 or 3. It is typically very fine sandy loam, but the range includes silt loam, loam, or fine sandy loam. The AC and C horizons have value of 6 to 8 (5 or 6 moist) and chroma of 2 or 3. They are typically silt loam, but the range includes very fine sandy loam and loam.

Rosebud Series

The Rosebud series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in loamy, calcareous residuum of weakly cemented, fine grained, limy sandstone. Slopes range from 0 to 9 percent.

Rosebud soils are commonly adjacent to Alliance, Altvan, Canyon, and Sidney soils. The deep Alliance soils contain more silt and less sand in the control section than the Rosebud soils. They are in landscape positions similar to those of the Rosebud soils. Altvan soils have gravelly sand at a depth of 20 to 40 inches. They are in landscape positions similar to those of the Rosebud soils. Canyon soils are shallow. They are on the steeper side slopes and ridgetops. Sidney soils are deep and do not have an argillic horizon. They are in landscape positions similar to those of the Rosebud soils.

Typical pedon of Rosebud loam, 1 to 3 percent slopes, 425 feet north and 75 feet west of the southeast corner of sec. 36, T. 14 N., R. 53 W.

Ap—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; about 2 percent sandstone pebbles; mildly alkaline; abrupt smooth boundary.

Bt1—4 to 7 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; about 50 percent very dark brown (10YR 2/2) exterior coatings moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few thin clay films on faces of peds; about 2 percent sandstone gravel, by volume; mildly alkaline; gradual smooth boundary.

Bt2—7 to 15 inches; brown (10YR 5/3) loam, brown and dark brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few thin clay films on faces of peds; about 5 percent sandstone gravel, by volume; mildly alkaline; clear wavy boundary.

Bk1—15 to 20 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable; about 5 percent sandstone pebbles; strong effervescence; mildly alkaline; gradual smooth boundary.

Bk2—20 to 30 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; slightly hard, friable; about 8 percent sandstone gravel, by volume; violent effervescence; moderately alkaline; clear wavy boundary.

2Cr1—30 to 50 inches; white (10YR 8/1) weathered sandstone bedrock, light gray (10YR 7/2) moist; massive; violent effervescence; moderately alkaline; gradual smooth boundary.

2Cr2—50 to 60 inches; white (10YR 8/1) weathered sandstone bedrock, light gray (2.5Y 7/2) moist; massive; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 12 to 34 inches. The depth to free carbonates ranges from 9 to 24 inches. The thickness of the mollic epipedon is typically 7 inches but ranges up to 20 inches. Depth to the Cr horizon ranges from 20 to 40 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. It is typically loam, but the range includes silt loam and fine sandy loam. The Bt horizon has value of 4 to 6 dry. It is typically clay loam, but the range includes loam. The C horizon, if it occurs, has value of 6 or 7 (5 or 6 moist) and chroma of 3 or 4. It is

typically loam, but the range includes sandy loam, sandy clay loam, and very fine sandy loam.

Satanta Series

The Satanta series consists of very deep, well drained soils on uplands and high stream terraces. Permeability is moderate in the solum and the upper part of the underlying material and rapid in the lower part of the underlying material. These soils formed in loamy eolian or alluvial sediments over gravelly loamy sand. Slopes range from 0 to 6 percent.

Satanta soils are commonly adjacent to Alliance, Altvan, Johnstown, and Keith soils. Alliance and Keith soils have a fine-silty control section. They are in landscape positions similar to those of the Satanta soils. Also, Alliance soils have weakly cemented, fine grained, limy sandstone bedrock at a depth of 40 to 60 inches. Altvan soils have gravelly sand at a depth of 20 to 40 inches. They are in landscape positions similar to those of the Satanta soils. Johnstown soils have a mollic epipedon more than 20 inches thick and have a buried horizon. They are on broad uplands.

Typical pedon of Satanta loam, gravelly substratum, 1 to 3 percent slopes, 1,900 feet south and 250 feet east of the northwest corner of sec. 26, T. 13 N., R. 51 W.

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

A—6 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable; neutral; clear smooth boundary.

Bt1—10 to 14 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, friable; few thin clay films on faces of peds; neutral; clear smooth boundary.

Bt2—14 to 18 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable; few thin clay films on faces of peds; neutral; gradual wavy boundary.

BCk—18 to 27 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; slightly hard, friable; about 3 percent gravel, by volume; violent effervescence; mildly alkaline; gradual smooth boundary.

C1—27 to 44 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; massive; soft, very friable; about 5 percent gravel, by volume; violent

effervescence; mildly alkaline; gradual smooth boundary.

C2—44 to 56 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; about 8 percent gravel, by volume; violent effervescence; mildly alkaline; gradual smooth boundary.

2C3—56 to 60 inches; very pale brown (10YR 7/3) gravelly loamy sand, light yellowish brown (10YR 6/4) moist; single grain; about 30 percent gravel; violent effervescence; mildly alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to free carbonates ranges from 15 to 36 inches. The thickness of the mollic epipedon ranges from 8 to 20 inches and commonly includes the upper part of the Bt horizon.

The A horizon has value of 2 or 3 moist. It is typically loam, but the range includes fine sandy loam and clay loam. The Bt horizon has value of 4 to 6 (3 or 4 moist) and chroma of 2 or 3. It is typically clay loam, but the range includes loam and sandy clay loam. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It is typically loam and fine sandy loam, but the range includes very fine sandy loam. The 2C horizon has hue of 7.5YR or 10YR, value of 6 or 7 (5 or 6 moist), and chroma of 3 to 6. It is typically gravelly loamy sand, but the range includes gravelly sand, gravelly coarse sand, and gravelly sandy loam.

Sidney Series

The Sidney series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loamy, calcareous colluvium that weathered from weakly cemented, fine grained, limy sandstone. Slopes range from 3 to 9 percent.

Sidney soils are commonly adjacent to Alliance, Altvan, Canyon, and Rosebud soils. Alliance soils have an argillic horizon and have finer textured material throughout the profile than the Sidney soils. They are in landscape positions similar to those of the Sidney soils. Altvan soils have an argillic horizon and have gravelly sand at a depth of 20 to 40 inches. They are in landscape positions similar to those of the Sidney soils. Canyon soils are shallow to weakly cemented, fine grained, limy sandstone bedrock. They are on ridgetops and dissected side slopes. Rosebud soils have an argillic horizon and are moderately deep to weakly cemented, fine grained, limy sandstone bedrock. They are in landscape positions similar to those of the Sidney soils.

Typical pedon of Sidney loam, in an area of Sidney-Canyon complex, 3 to 9 percent slopes, 1,200 feet

south and 225 feet east of the northwest corner of sec. 27, T. 14 N., R. 51 W.

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable; strong effervescence; mildly alkaline; abrupt smooth boundary.

Bw—7 to 10 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium granular; slightly hard, friable; strong effervescence; mildly alkaline; clear smooth boundary.

Bk—10 to 18 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; slightly hard, friable; common soft masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.

C1—18 to 42 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; massive; slightly hard, friable; violent effervescence; moderately alkaline; gradual smooth boundary.

C2—42 to 50 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable; violent effervescence; strongly alkaline; abrupt smooth boundary.

Cr—50 to 60 inches; white (10YR 8/2) weakly cemented, fine grained, limy sandstone bedrock, light gray (10YR 7/2) moist; violent effervescence.

The thickness of the solum ranges from 10 to 30 inches. The depth to carbonates ranges from 0 to 18 inches. The thickness of the mollic epipedon ranges from 7 to 20 inches. Depth to the Cr horizon ranges from 40 to 60 inches.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. It is typically loam, but the range includes fine sandy loam. The Bw horizon has value of 5 or 6 (3 or 4 moist) and chroma of 2 or 3. It is typically loam, but the range includes silt loam, very fine sandy loam, and fine sandy loam. Some pedons have an AC horizon. The C horizon has value of 6 or 7 (4 or 5 moist) and chroma of 2 or 3. It is typically loam, but the range includes very fine sandy loam, fine sandy loam, and sandy loam.

Tassel Series

The Tassel series consists of shallow, well drained, moderately rapidly permeable soils on uplands. The soils formed in calcareous material weathered from weakly cemented, fine grained sandstone. Slopes range from 3 to 60 percent.

Tassel soils are commonly adjacent to Busher and

Dix soils and areas of Rock outcrop. Busher soils are deep and have a mollic epipedon. They are on the smoother, less steep slopes in landscape positions similar to those of the Tassel soils. Dix soils are excessively drained. They have very gravelly sand at a depth of 10 to 20 inches. They are in landscape positions similar to those of the Tassel soils. Areas of Rock outcrop consist of sandstone. They are on the upper parts of dissected side slopes and on the summits of narrow ridgetops.

Typical pedon of Tassel loamy very fine sand, in an area of Tassel-Busher complex, 3 to 30 percent slopes, 2,500 feet east and 2,300 feet north of the southwest corner of sec. 20, T. 17 N., R. 50 W.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) loamy very fine sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; mildly alkaline; clear smooth boundary.

A2—3 to 6 inches; brown (10YR 5/3) loamy very fine sand, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable; about 2 percent sandstone gravel, by volume; strong effervescence; mildly alkaline; clear smooth boundary.

C—6 to 13 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 5/3) moist; massive; soft, very friable; about 12 percent gravel, by volume; violent effervescence; moderately alkaline; gradual smooth boundary.

Cr—13 to 60 inches; white (10YR 8/2) weakly cemented, fine grained sandstone bedrock, light gray (10YR 7/2) moist; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 3 to 9 inches. The depth to free carbonates is 0 to 3 inches. Depth to the Cr horizon ranges from 6 to 20 inches.

The A horizon has value of 4 to 6 (3 to 5 moist) and chroma of 2 or 3. It is typically loamy very fine sand, but the range includes fine sandy loam, loamy fine sand, or very fine sandy loam. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 or 3. It is typically gravelly loamy very fine sand, but the range includes loamy very fine sand, fine sandy loam, or loamy fine sand.

Ulysses Series

The Ulysses series consists of very deep, well drained, moderately permeable soils on uplands. They formed in calcareous loess. Slopes range from 1 to 6 percent.

Ulysses soils are commonly adjacent to Alliance, Keith, Kuma, and Rosebud soils. Alliance and Keith

soils have free carbonates below a depth of 15 inches and have an argillic horizon. They are in landscape positions similar to those of the Ulysses soils. Alliance soils have weakly cemented, fine grained, limy sandstone bedrock below a depth of 40 inches. Kuma soils have a mollic epipedon more than 20 inches thick and have a buried soil. They are slightly lower on the landscape than the Ulysses soils. Rosebud soils have an argillic horizon and are moderately deep over weakly cemented, fine grained, limy sandstone bedrock. They are in landscape positions similar to those of the Ulysses soils.

Typical pedon of Ulysses loam, 1 to 3 percent slopes, 1,200 feet east and 100 feet south of the northwest corner of sec. 10, T. 12 N., R. 52 W.

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

A—6 to 12 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable; neutral; clear smooth boundary.

Bw—12 to 19 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak fine subangular blocky; slightly hard, friable; strong effervescence; mildly alkaline; clear smooth boundary.

BC—19 to 24 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; slightly hard, friable; violent effervescence; mildly alkaline; gradual smooth boundary.

C—24 to 60 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; violent effervescence; moderately alkaline.

The solum is 10 to 24 inches thick. The depth to free carbonates is 7 to 15 inches. The mollic epipedon is 7 to 20 inches thick.

The A horizon has value of 4 or 5 (2 or 3 moist) and chroma of 2 or 3. It is typically loam, but the range includes silt loam and very fine sandy loam. The Bw horizon has value of 4 to 6 (3 or 4 moist) and chroma of 2 or 3. It is typically silt loam, but the range includes very fine sandy loam and loam. The C horizon has value of 6 or 7 (4 or 5 moist) and chroma of 2 to 4. It is silt loam, loam, or very fine sandy loam.

Valent Series

The Valent series consists of very deep, excessively drained, rapidly permeable soils on undulating to dune uplands. The soils formed in uniform eolian material that weathered from a variety of sources. Slopes range from 6 to 9 percent.

Valent soils are commonly adjacent to Busher, Duroc, Jayem, and Keith soils. Busher soils have a mollic epipedon and have weakly cemented sandstone bedrock at a depth of 40 to 60 inches. They are on ridgetops and convex side slopes. Duroc soils are pachic and have finer textured material than the Valent soils. They are in the less sloping areas in upland swales and near drainageways. Jayem soils have a mollic epipedon and contain slightly more silt than the Valent soils. They are in the less sloping areas, generally at higher elevations. Keith soils have a mollic epipedon, have finer textured material than the Valent soils, and have an argillic horizon. They are on broad upland divides and side slopes.

Typical pedon of Valent loamy fine sand, 6 to 9 percent slopes, 1,900 feet south and 80 feet east of the northwest corner of sec. 24, T. 16 N., R. 49 W.

Ap—0 to 6 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; loose, very friable; neutral; abrupt smooth boundary.

AC—6 to 12 inches; brown (10YR 5/3) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak fine granular; loose, very friable; neutral; clear smooth boundary.

C1—12 to 57 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; single grain; loose, very friable; neutral; gradual smooth boundary.

C2—57 to 60 inches; light gray (10YR 7/2) and very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; single grain; loose, very friable; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 9 to 19 inches. The depth to free carbonates ranges from 40 to more than 60 inches.

The A horizon has value of 4 to 6 (3 or 4 moist) and chroma of 2 or 3. It is typically loamy fine sand, but the range includes loamy sand. The AC horizon has value of 4 to 6 (3 to 5 moist) and chroma of 2 or 3. It is loamy fine sand, but the range includes fine sand and loamy sand. The C horizon has value of 5 to 7 (4 to 6 moist) and chroma of 2 to 4. It is typically loamy fine sand, but the range includes fine sand and loamy sand.

Formation of the Soils

Soil forms through processes acting on deposited or accumulated geologic material. The characteristics of the soil are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material.

Climate and plant and animal life, mainly plants, are the active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material also affects the kind of soil that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for changing the parent material into a soil. Generally, a long time is required for the development of distinct horizons, but more or less time may be required, depending on the other soil-forming factors.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other factors. Some of the processes of soil development are unknown.

Parent Material

Parent material is the unconsolidated mineral material in which the soil forms. It determines the mineralogical and chemical composition of the soil. The soils in Cheyenne County formed in material that weathered from the underlying geologic formations or in material that was transported by wind or water (fig. 26). These materials are Brule siltstone, Ogallala sandstone, sands and gravel of Pleistocene age or of older origin, loess, eolian loamy sand, alluvium and mixed alluvium, and colluvium.

The Brule Formation is at or near the surface along Lodgepole Creek and Sidney Draw. It is made up of

beds of volcanic ash containing calcareous siltstone. The soils formed in place or in material that was locally reworked and transported by wind and water. These deposits range in thickness from a few inches to several feet. Epping and Mitchell soils formed in this material.

The Ogallala Group extends throughout the county. It is primarily fine grained to coarse grained, calcareous sandstone with some locally thin layers of gravel, silt, and clay and some beds of volcanic ash. Much of the Ogallala Group is cemented by calcium carbonate. Thus, the rock ranges from friable caliche that is only partly indurated to relatively hard, resistant mortar beds that form ledges. Canyon, Busher, Rosebud, and Tassel soils formed in material weathered from the Ogallala Group.

Sand and gravel of Pleistocene age or of older origin occur in areas throughout the county. They are mainly in association with some sort of drainage but may be in areas that appear to have been capped by this material at an early time. Dix and Altvan soils formed in material mixed with or weathered from these beds.

A thin mantle of loess, or wind-deposited silty material, covers large areas of the uplands in the county. It is friable, calcareous, massive, and generally yellowish brown. It ranges from a few inches to several feet thick. Keith, Kuma, and Ulysses soils formed in the thicker deposits of loess. Alliance soils formed in loess underlain by material weathered from the Ogallala Group. Some of the shallow and moderately deep soils underlain by material weathered from the Ogallala Group have varying amounts of loess mixed in the upper layers of the soil. Lodgepole soils formed in loess that has been modified by water in upland depressions.

Eolian loamy sand covers only small areas in the northern and north-central parts of the county. It is a mixture of silt and sand that has been deposited by wind. In some areas this material is calcareous, and in others the calcium carbonate appears to have been flushed downward to some depth. Valent and Jayem soils formed in wind-deposited loamy sands and sandy loams. Busher soils formed in material weathered from the Ogallala Group and have been affected by these wind-deposited materials in various degrees.

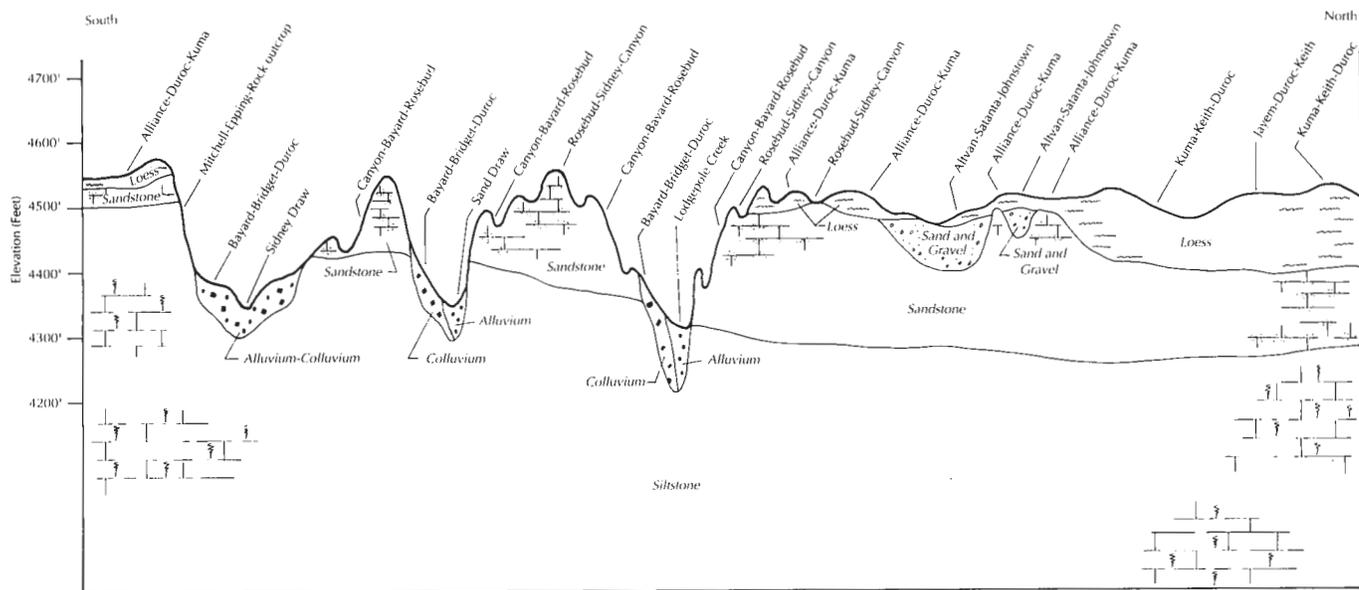


Figure 26.—A generalized north-south cross section through western Cheyenne County that shows the relationship of parent material, soil associations, and elevation.

Alluvium consists of sand, silt, clay, and some gravel washed from the higher areas and deposited by streams. It is on flood plains and stream terraces. These deposits are young and generally have weakly expressed horizons. Bankard and Glenberg soils formed in coarser alluvial material. Duroc and Goshen soils formed in silty alluvial material and may have been influenced by some wind-borne deposits.

Alluvium and colluvium have been deposited on foot slopes at the base of hills and along small drainageways or in swales. Except for a dark surface layer, the soils formed in these materials have only weakly expressed horizons. Bayard, Bridget, and Duroc soils formed in these materials.

Climate

Cheyenne County has a semiarid climate that is characterized by cold winters; short, hot summers; high winds; and frequent changes in weather conditions. The mean annual temperature is 47 degrees F. It ranges from more than 100 degrees F in summer to well below 0 degrees F in winter. The annual precipitation is about 19 inches, and most of it falls between April and September. Much of the precipitation occurs as short, violent thunderstorms during spring and summer. Hailstorms and tornadoes occur occasionally. The growing season averages between 130 and 135 days.

Because the climate is generally uniform throughout

the county, differences in the soils are a result of the relationship between the climate and the other soil-forming factors. For example, the amount of leaching is dependent not only on the amount of precipitation in an area but also on relief. The steeply sloping soils have greater runoff and less leaching than the nearly level soils that receive the same amount of rainfall. Rain, melting snow, and wind result in erosion, which can prevent the development of a thick surface, especially in the steeper areas.

The amount of moisture and the prevailing temperature during the growing season affect the amount of vegetation, which is the principal source of organic matter in the soils. These factors also affect the chemical processes and activities of micro-organisms that convert organic matter to humus. Alternate freezing and thawing and wetting and drying speed the mechanical and chemical weathering processes and also improve the physical condition of the soil.

Strong winds have influenced the formation of soils in the county by transferring soil material from one place to another and mixing, sorting, and thinning or thickening the surface layer, thus causing changes in the physical properties of the horizon. Hot winds in the summer have a serious drying effect on the soil, and high winds in the winter, which blow over the exposed soil, both contribute to the redistribution of soil material from place to place. The combination of high winds and short, intense rainfall has eroded many of the

unprotected soil surfaces in the county, especially on the moderately coarse and coarse soils, and has removed part or all of the organic matter.

Plant and Animal Life

After the parent material has been weathered and deposited, it is invaded by bacteria, fungi, and other simple forms of plant and animal life. In time, more complex forms of life develop. Plants and animals living on and in the soil produce organic matter, which influences the physical and chemical properties of the soil. For instance, prairie grasses grow and produce fibrous roots, which penetrate the soil to a depth of several feet. These roots transport water and soluble minerals, such as calcium, iron, phosphorus, nitrogen, and sulfur, to the surface, thus improving fertility. The roots also help improve soil structure and increase soil permeability and porosity, thus improving soil aeration.

As plants and animals decay, micro-organisms, such as bacteria, nematodes, fungi, and protozoa, act on them to form humus, which is a source of nutrients. Nitrogen-fixing bacteria in nodules on the roots of legumes take in nitrogen from the air. When these bacteria die, the nitrogen becomes available to plants. Earthworms, insects, and small burrowing animals mix the organic and mineral matter. This activity speeds soil development and increases friability. On poorly drained, poorly aerated soils, micro-organisms and earthworms act slowly because of a low oxygen supply. Thus, the organic matter from plants and animals decays more slowly than on the better drained soils.

As humus accumulates, the color of the surface layer gradually becomes darker and the physical and chemical characteristics change. The humus supplies nutrients to plants and other organisms, improves tilth and permeability, and increases the rate of water infiltration.

Human activities have a major effect on soil formation. Cropping sequences, terraces, irrigation, and summer fallow have changed the relationships among soil, water, and erosion that have existed for thousands of years. Removal of the grass cover has exposed the fertile surface layer to erosion. Terraces have reduced the amount of erosion and have increased chemical activity and weathering by concentrating the water supply in certain areas. Irrigation and summer fallow have increased the moisture supply and also the rates of chemical weathering and water infiltration.

Relief

Relief, or lay of the land, influences soil formation mainly through its effect on drainage, runoff, and plant growth. The slope, the shape of the surface, and the

permeability of the soil determine the rate of runoff, the internal drainage, and the moisture content of the soil. Internal drainage and the availability of moisture are important factors in the formation of soil horizons.

The nearly level to gently sloping soils on uplands are more strongly developed and have more distinct horizons than those of the steeper soils. They absorb more moisture and have less runoff, and water percolates deeper into the profile. Consequently, lime, nutrients, and clay particles are leached in these soils and more developed and distinct horizons form.

In upland depressions, runoff is slow and the soils receive runoff from the higher areas. Because of the extra moisture, these soils have a thick, dark surface layer and good horizon development. Lodgepole soils are an example.

In the steep areas where runoff is rapid and little moisture penetrates the soil, erosion removes the surface soil almost as fast as it forms. Lime and elements are not leached to so great a depth as they are in the less sloping soils. The soils on ridges and hilltops are more exposed to winds than those in the lower areas and therefore are more susceptible to moisture loss by evaporation. The steep soils show little profile development other than a slightly dark, thin surface layer.

The soils on bottom land have very little relief, but their landscape position influences their development. Some of these soils have a local seasonal high water table that affects the decay of organic matter, the soil temperature, and the degree of alkalinity. Other soils on bottom land are subject to flooding and to occasional deposition of sediments. All of these influences affect the kind and amount of vegetation and the development of the soil.

Time

Time is required for the formation of a mature soil. The length of time needed depends on the influence of the other four soil-forming factors. Mature soils have a thick, dark surface layer and a distinct subsoil. These soils have parent material that has been in place long enough to be altered by climate, relief, and plant and animal life. Mature soils have reached an equilibrium with their environment.

Most of the soils on bottom land are immature and do not have well developed horizons because new deposits of alluvium and colluvium are made before soil development can take place. The upland soils that have moderately steep and steep slopes have been in place long enough for horizons to form. Because of the slope, however, soil material erodes before well defined horizons can form.

The degree of profile development depends on the intensity of the soil-forming factors, the length of time that the factors have been active, and the nature of the

parent material. Differences in the length of time that the material has been in place are commonly proportional to the degree of horizon distinction.

References

- (1) American Association of State Highway and Transportation Officials. 1986. Standard specifications for highway materials and methods of sampling and testing. Ed. 14, 2 vols.
- (2) American Society for Testing and Materials. 1993. Standard classification of soils for engineering purposes. ASTM Stand. D 2487.
- (3) Mortlock, H.C., Louis A. Wolfanger, George W. Hearn, and L. Britton. 1920. Soil survey of Cheyenne County, Nebraska. U.S. Dep. Agric., Bur. of Soils.
- (4) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210.
- (5) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436.
- (6) United States Department of Agriculture. 1993. Soil survey manual. U.S. Dep. Agric. Handb. 18.

Glossary

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

AC soil. A soil having only an A and a C horizon.

Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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

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

Animal unit month. The amount of forage or feed required to carry one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9

High

9 to 12

Very high

more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

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

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

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

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

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Carrying capacity. The maximum stocking rate that can be used without damaging the vegetation or related resources.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity

but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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

Consistence, soil. 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.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

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

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

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

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. The total thickness of weathered soil material over bedrock. In this survey the classes of soil depth are shallow, less than 20 inches; moderately deep, 20 to 40 inches; deep, 40 to 60 inches; and very deep, more than 60 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much

of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

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 they are wet 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 saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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

Erosion. The wearing away of the land surface by

water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

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

Fast intake (in tables). The rapid movement of water into the soil.

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

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

Fine textured soil. Sandy clay, silty clay, or clay.

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.

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

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

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

Gravel. Rounded or angular fragments of rock up to 3

inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

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

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

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

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

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

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

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

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

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

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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

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

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in

production of crops. Methods of irrigation are:
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

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

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

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

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with

hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile.

Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid.....	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially

drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

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

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

Residuum (residual soil material). Unconsolidated,

weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

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

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic

criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

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

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the classes of slope are:

Nearly level.....	0 to 1 percent, 0 to 2 percent
Very gently sloping.....	1 to 3 percent
Gently sloping.....	3 to 6 percent
Strongly sloping.....	6 to 9 percent
Moderately steep.....	9 to 17 percent
Steep.....	17 to 30 percent
Very steep.....	30 to 60 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand.....	2.0 to 1.0
Coarse sand.....	1.0 to 0.5
Medium sand.....	0.5 to 0.25
Fine sand.....	0.25 to 0.10
Very fine sand.....	0.10 to 0.05
Silt.....	0.05 to 0.002
Clay.....	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant

and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or

undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress

roadbanks, lawns, and land affected by mining.

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

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION
(Recorded in the period 1951-84 at Sidney, Nebraska)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
<u>° F</u>	<u>° F</u>	<u>° F</u>	<u>° F</u>	<u>° F</u>	<u>° F</u>	<u>Units</u>	<u>In</u>	<u>In</u>	<u>In</u>	<u>In</u>	
January-----	38.0	11.3	24.7	64	-19	0	0.41	0.07	0.64	2	5.2
February-----	43.4	16.1	29.8	71	-12	0	.37	.04	.58	1	4.6
March-----	47.1	20.4	33.8	76	-7	7	1.27	.30	1.99	3	9.9
April-----	58.4	30.1	44.3	94	8	37	1.86	.76	2.66	5	6.7
May-----	68.3	40.6	54.5	90	25	171	3.48	1.39	5.02	7	1.2
June-----	79.7	50.2	65.0	99	35	450	3.37	1.38	4.80	7	.0
July-----	87.6	56.9	72.3	102	44	691	2.85	1.15	4.04	6	.0
August-----	85.9	55.1	70.5	100	42	636	1.99	.63	2.86	5	.0
September---	76.3	44.4	60.4	96	25	324	1.15	.21	1.82	3	.1
October-----	64.2	32.7	48.5	88	15	83	1.01	.26	1.59	2	2.6
November----	49.3	20.9	35.1	75	-3	0	.55	.10	.79	2	6.0
December----	40.4	13.8	27.1	69	-13	0	.45	.07	.71	2	5.1
Yearly:											
Average---	61.6	32.7	47.2	---	---	---	---	---	---	---	---
Extreme---	107	-30	---	103	-22	---	---	---	---	---	---
Total-----	---	---	---	---	---	2,399	18.76	15.29	22.47	45	41.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-84 at Sidney, Nebraska)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 5	May 20	May 31
2 years in 10 later than--	May 1	May 14	May 26
5 years in 10 later than--	Apr. 23	May 3	May 16
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 29	Sept. 19	Sept. 12
2 years in 10 earlier than--	Oct. 5	Sept. 24	Sept. 17
5 years in 10 earlier than--	Oct. 15	Oct. 4	Sept. 25

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-84 at Sidney, Nebraska)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	154	130	111
8 years in 10	161	138	118
5 years in 10	175	152	132
2 years in 10	189	167	146
1 year in 10	196	175	153

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

Map symbol	Soil name	Acres	Percent
Ao	Alliance loam, 0 to 1 percent slopes-----	22,780	3.0
AoB	Alliance loam, 1 to 3 percent slopes-----	67,310	8.8
AoC	Alliance loam, 3 to 6 percent slopes-----	14,590	1.9
AtB	Altvan loam, 1 to 3 percent slopes-----	11,190	1.5
AtC	Altvan loam, 3 to 6 percent slopes-----	11,120	1.5
AvD	Altvan-Dix complex, 3 to 9 percent slopes-----	15,490	2.0
Bb	Bankard loamy sand, 0 to 2 percent slopes-----	5,970	0.8
Bc	Bankard loamy fine sand, channeled-----	8,010	1.0
Be	Bayard fine sandy loam, 0 to 1 percent slopes-----	4,100	0.5
BeB	Bayard fine sandy loam, 1 to 3 percent slopes-----	12,840	1.7
BeC	Bayard fine sandy loam, 3 to 6 percent slopes-----	10,670	1.4
BeD	Bayard fine sandy loam, 6 to 9 percent slopes-----	4,270	0.6
BeE	Bayard fine sandy loam, 9 to 20 percent slopes-----	1,190	0.2
Bg	Bridget very fine sandy loam, 0 to 1 percent slopes-----	7,210	0.9
BgB	Bridget very fine sandy loam, 1 to 3 percent slopes-----	8,710	1.1
BgC	Bridget very fine sandy loam, 3 to 6 percent slopes-----	4,850	0.6
BgD	Bridget very fine sandy loam, 6 to 9 percent slopes-----	1,170	0.2
BuC	Busher fine sandy loam, 3 to 6 percent slopes-----	800	0.1
BxD	Busher-Tassel complex, 3 to 9 percent slopes-----	3,690	0.5
ByE	Busher-Tassel complex, 9 to 20 percent slopes-----	3,630	0.5
CcF	Canyon fine sandy loam, 6 to 30 percent slopes-----	17,380	2.3
CdG	Canyon-Rock outcrop complex, 11 to 60 percent slopes-----	15,060	2.0
CeE	Canyon-Bayard complex, 6 to 20 percent slopes-----	33,520	4.4
CtB	Creighton very fine sandy loam, 1 to 3 percent slopes-----	1,000	0.1
CtC	Creighton very fine sandy loam, 3 to 6 percent slopes-----	660	0.1
DhD	Dix gravelly loam, 3 to 11 percent slopes-----	11,810	1.5
DhG	Dix gravelly loam, 11 to 50 percent slopes-----	8,710	1.1
Du	Duroc loam, 0 to 1 percent slopes-----	63,040	8.2
DuB	Duroc loam, 1 to 3 percent slopes-----	13,770	1.8
Dv	Duroc loam, terrace, gravelly substratum, 0 to 1 percent slopes-----	710	0.1
Dx	Duroc silt loam, terrace, 0 to 1 percent slopes-----	7,320	1.0
DyE	Dwyer loamy fine sand, 9 to 17 percent slopes-----	530	0.1
ErE	Epping-Mitchell complex, 3 to 20 percent slopes-----	2,670	0.3
Gd	Glenberg fine sandy loam, 0 to 2 percent slopes-----	7,690	1.0
Go	Goshen silt loam, 0 to 1 percent slopes-----	7,290	1.0
JmB	Jayem fine sandy loam, 1 to 3 percent slopes-----	4,580	0.6
JmC	Jayem fine sandy loam, 3 to 6 percent slopes-----	6,210	0.8
Jo	Johnstown loam, 0 to 1 percent slopes-----	6,290	0.8
Ke	Keith loam, 0 to 1 percent slopes-----	4,660	0.6
KeB	Keith loam, 1 to 3 percent slopes-----	70,950	9.3
KeC	Keith loam, 3 to 6 percent slopes-----	6,380	0.8
Ku	Kuma loam, 0 to 1 percent slopes-----	96,316	12.6
Lm	Las loam, 0 to 1 percent slopes-----	3,490	0.5
Lw	Las Animas loam, 0 to 2 percent slopes-----	800	0.1
Ly	Lodgepole silt loam, 0 to 1 percent slopes-----	1,770	0.2
Mc	McCook very fine sandy loam, 0 to 1 percent slopes-----	2,340	0.3
MkC	Mitchell very fine sandy loam, 3 to 6 percent slopes-----	1,280	0.2
MkD	Mitchell very fine sandy loam, 6 to 9 percent slopes-----	1,120	0.1
MkE	Mitchell very fine sandy loam, 9 to 20 percent slopes-----	510	0.1
Pg	Pits, sand and gravel-----	330	*
ReG	Rock outcrop-Epping complex, 11 to 60 percent slopes-----	880	0.1
RhG	Rock outcrop-Tassel complex, 20 to 60 percent slopes-----	790	0.1
Ro	Rosebud loam, 0 to 1 percent slopes-----	4,680	0.6
RoB	Rosebud loam, 1 to 3 percent slopes-----	23,810	3.1
RoC	Rosebud loam, 3 to 6 percent slopes-----	12,260	1.6
RsD	Rosebud-Canyon complex, 3 to 9 percent slopes-----	15,690	2.0
Sb	Satanta loam, gravelly substratum, 0 to 1 percent slopes-----	3,130	0.4
SbB	Satanta loam, gravelly substratum, 1 to 3 percent slopes-----	13,480	1.8
SbC	Satanta loam, gravelly substratum, 3 to 6 percent slopes-----	5,620	0.7
SnC	Sidney loam, 3 to 6 percent slopes-----	3,740	0.5
SoD	Sidney-Canyon complex, 3 to 9 percent slopes-----	54,410	7.1
TbF	Tassel-Busher complex, 3 to 30 percent slopes-----	4,630	0.6

See footnote at end of table.

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

Map symbol	Soil name	Acres	Percent
TcG	Tassel-Busher-Rock outcrop complex, 11 to 60 percent slopes-----	1,580	0.2
UyB	Ulysses loam, 1 to 3 percent slopes-----	1,500	0.2
UyC	Ulysses loam, 3 to 6 percent slopes-----	740	0.1
VdD	Valent loamy fine sand, 6 to 9 percent slopes-----	660	0.1
	Water areas more than 40 acres in size-----	122	*
	Total-----	765,498	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
Ao	Alliance loam, 0 to 1 percent slopes (where irrigated)
AoB	Alliance loam, 1 to 3 percent slopes (where irrigated)
AoC	Alliance loam, 3 to 6 percent slopes (where irrigated)
AtB	Altvan loam, 1 to 3 percent slopes (where irrigated)
AtC	Altvan loam, 3 to 6 percent slopes (where irrigated)
Be	Bayard fine sandy loam, 0 to 1 percent slopes (where irrigated)
BeB	Bayard fine sandy loam, 1 to 3 percent slopes (where irrigated)
BeC	Bayard fine sandy loam, 3 to 6 percent slopes (where irrigated)
Bg	Bridget very fine sandy loam, 0 to 1 percent slopes (where irrigated)
BgB	Bridget very fine sandy loam, 1 to 3 percent slopes (where irrigated)
BgC	Bridget very fine sandy loam, 3 to 6 percent slopes (where irrigated)
BuC	Busher fine sandy loam, 3 to 6 percent slopes (where irrigated)
CtB	Creighton very fine sandy loam, 1 to 3 percent slopes (where irrigated)
CtC	Creighton very fine sandy loam, 3 to 6 percent slopes (where irrigated)
Du	Duroc loam, 0 to 1 percent slopes (where irrigated)
DuB	Duroc loam, 1 to 3 percent slopes (where irrigated)
Dv	Duroc loam, terrace, gravelly substratum, 0 to 1 percent slopes (where irrigated)
Dx	Duroc silt loam, terrace, 0 to 1 percent slopes (where irrigated)
Gd	Glenberg fine sandy loam, 0 to 2 percent slopes (where irrigated)
Go	Goshen silt loam, 0 to 1 percent slopes (where irrigated)
JmB	Jayem fine sandy loam, 1 to 3 percent slopes (where irrigated)
JmC	Jayem fine sandy loam, 3 to 6 percent slopes (where irrigated)
Jo	Johnstown loam, 0 to 1 percent slopes (where irrigated)
Ke	Keith loam, 0 to 1 percent slopes (where irrigated)
KeB	Keith loam, 1 to 3 percent slopes (where irrigated)
KeC	Keith loam, 3 to 6 percent slopes (where irrigated)
Ku	Kuma loam, 0 to 1 percent slopes (where irrigated)
Lm	Las loam, 0 to 1 percent slopes (where irrigated)
Mc	McCook very fine sandy loam, 0 to 1 percent slopes (where irrigated)
Ro	Rosebud loam, 0 to 1 percent slopes (where irrigated)
RoB	Rosebud loam, 1 to 3 percent slopes (where irrigated)
RoC	Rosebud loam, 3 to 6 percent slopes (where irrigated)
Sb	Satanta loam, gravelly substratum, 0 to 1 percent slopes (where irrigated)
SbB	Satanta loam, gravelly substratum, 1 to 3 percent slopes (where irrigated)
SbC	Satanta loam, gravelly substratum, 3 to 6 percent slopes (where irrigated)
SnC	Sidney loam, 3 to 6 percent slopes (where irrigated)
UyB	Ulysses loam, 1 to 3 percent slopes (where irrigated)
UyC	Ulysses loam, 3 to 6 percent slopes (where irrigated)

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS

(Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability		Corn		Winter wheat		Dry beans		Millet		Alfalfa hay		
	N	I	N	I	N	I	N	I	N	I	N	I	
			Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons
Ao----- Alliance	IIc	I	---	145	43	---	---	40	27	---	---	---	5.6
AoB----- Alliance	IIe	IIe	---	140	41	---	---	38	25	---	---	---	5.3
AoC----- Alliance	IIIe	IIIe	---	130	36	---	---	34	21	---	---	---	4.7
AtB----- Altvan	IIIe	IIIe	---	125	34	---	---	33	18	---	---	---	4.2
AtC----- Altvan	IVe	IVe	---	110	28	---	---	28	15	---	---	---	3.6
AvD----- Altvan-Dix	IVe	IVe	---	95	23	---	---	23	12	---	---	---	3.1
Bb----- Bankard	IVe	IVe	---	100	22	---	---	24	14	---	---	---	3.3
Bc----- Bankard	VIw	---	---	---	---	---	---	---	---	---	---	---	---
Be----- Bayard	IIe	IIe	---	140	41	---	---	40	26	---	---	---	5.4
BeB----- Bayard	IIIe	IIe	---	135	37	---	---	37	24	---	---	---	5.0
BeC----- Bayard	IVe	IIIe	---	125	34	---	---	32	19	---	---	---	4.4
BeD----- Bayard	IVe	IVe	---	115	29	---	---	27	15	---	---	---	3.7
BeE----- Bayard	VIe	---	---	---	---	---	---	---	---	---	---	---	---
Bg----- Bridget	IIc	IIe	---	145	42	---	---	40	27	---	---	---	5.8
BgB----- Bridget	IIe	IIe	---	140	40	---	---	38	25	---	---	---	5.4
BgC----- Bridget	IIIe	IIIe	---	130	35	---	---	34	20	---	---	---	4.7
BgD----- Bridget	IVe	IVe	---	115	30	---	---	28	16	---	---	---	4.0
BuC----- Busher	IIIe	IIIe	---	120	33	---	---	31	19	---	---	---	3.5
BxD----- Busher-Tassel	IVe	IVe	---	100	27	---	---	25	15	---	---	---	---

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Corn		Winter wheat		Dry beans		Millet		Alfalfa hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons
ByE----- Busher-Tassel	VIe	---	---	---	---	---	---	---	---	---	---	---
CcF----- Canyon	VIIs	---	---	---	---	---	---	---	---	---	---	---
CdG*----- Canyon-Rock outcrop	VIIs	---	---	---	---	---	---	---	---	---	---	---
CeE----- Canyon-Bayard	VIIs	---	---	---	---	---	---	---	---	---	---	---
CtB----- Creighton	IIe	IIe	---	135	39	---	---	36	24	---	---	5.4
CtC----- Creighton	IIIe	IIIe	---	120	34	---	---	32	---	---	---	4.7
DhD----- Dix	VIIs	---	---	---	---	---	---	---	---	---	---	---
DhG----- Dix	VIIs	---	---	---	---	---	---	---	---	---	---	---
Du----- Duroc	IIC	I	---	150	47	---	---	40	---	---	---	6.0
DuB----- Duroc	IIe	IIe	---	140	45	---	---	38	---	---	---	5.5
Dv----- Duroc	IIIC	I	---	140	41	---	---	40	27	---	---	5.8
Dx----- Duroc	IIIC	I	---	140	43	---	---	40	---	---	---	5.8
DyE----- Dwyer	VIe	---	---	---	---	---	---	---	---	---	---	---
ErE----- Epping-Mitchell	VIIs	---	---	---	---	---	---	---	---	---	---	---
Gd----- Glenberg	IIIe	IIe	32	135	36	---	---	34	21	---	---	5.0
Go----- Goshen	IIC	I	---	145	46	---	---	40	30	---	---	6.0
JmB----- Jayem	IIIe	IIe	---	130	35	---	---	34	19	---	---	5.0
JmC----- Jayem	IVe	IIIe	---	120	30	---	---	30	15	---	---	4.3
Jo----- Johnstown	IIC	I	45	145	43	---	---	40	28	---	2.5	5.6
Ke----- Keith	IIC	I	---	145	44	---	---	42	25	---	1.7	6.0

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Corn		Winter wheat		Dry beans		Millet		Alfalfa hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons
KeB----- Keith	IIe	IIe	---	140	42	---	---	38	26	---	---	5.3
KeC----- Keith	IIIe	IIIe	---	130	37	---	---	34	22	---	---	4.7
Ku----- Kuma	IIC	I	---	146	45	---	---	40	29	---	---	5.8
Lm----- Las	IVw	IIw	---	135	28	---	---	35	21	---	---	6.0
Lw----- Las Animas	Vw	---	---	---	---	---	---	---	---	---	---	---
Ly----- Lodgepole	IIIw	IVw	75	90	22	---	19	25	15	---	---	3.8
Mc----- McCook	IIC	IIe	45	140	40	---	---	40	27	---	---	5.8
MkC----- Mitchell	IIIe	IIIe	---	125	34	---	---	34	19	---	---	4.6
MkD----- Mitchell	IVe	IVe	---	105	29	---	---	26	15	---	1.6	3.9
MkE----- Mitchell	VIe	---	---	---	---	---	---	---	---	---	---	---
Pg*----- Pits	VIIIIs	---	---	---	---	---	---	---	---	---	---	---
ReG----- Rock outcrop- Epping	VIIIs	---	---	---	---	---	---	---	---	---	---	---
RhG----- Rock outcrop- Tassel	VIIIs	---	---	---	---	---	---	---	---	---	---	---
Ro----- Rosebud	IIIc	I	---	135	38	---	---	35	21	---	---	5.2
RoB----- Rosebud	IIIe	IIIe	---	130	36	---	---	33	19	---	---	4.7
RoC----- Rosebud	IVe	IIIe	---	110	31	---	---	28	15	---	---	4.0
RsD----- Rosebud-Canyon	IVe	---	---	---	28	---	---	---	14	---	---	---
Sb----- Satanta	IIC	I	---	145	40	---	---	40	27	---	---	5.6
SbB----- Satanta	IIe	IIe	---	140	38	---	---	38	24	---	---	5.3
SbC----- Satanta	IIIe	IIIe	---	125	32	---	---	30	19	---	---	4.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Corn		Winter wheat		Dry beans		Millet		Alfalfa hay		
	N	I	N	I	N	I	N	I	N	I	N	I	
			<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Tons</u>	<u>Tons</u>
SnC----- Sidney	IIIe	IIIe	---	125	32	---	---	---	30	17	---	---	4.2
SoD----- Sidney-Canyon	IVe	---	---	---	27	---	---	---	---	14	---	---	---
TbF----- Tassel-Busher	VIe	---	---	---	---	---	---	---	---	---	---	---	---
TcG*----- Tassel-Busher- Rock outcrop	VIIe	---	---	---	---	---	---	---	---	---	---	---	---
UyB----- Ulysses	IIe	IIe	---	120	36	50	---	---	---	---	---	---	5.0
UyC----- Ulysses	IIIe	IIIe	---	105	31	57	---	---	---	---	---	---	4.4
VdD----- Valent	VIe	IVe	---	100	---	---	---	---	---	---	---	---	3.3

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(All soils are assigned to nonirrigated capability subclasses (N). Only potentially irrigable soils are assigned to irrigated subclasses (I). Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I (N)	---	---	---	---	---
(I)	216,216	---	---	---	---
II (N)	393,876	180,820	---	---	213,056
(I)	218,970	215,480	3,490	---	---
III (N)	125,510	111,030	1,770	---	12,710
(I)	102,800	102,800	---	---	---
IV (N)	95,225	91,735	3,490	---	---
(I)	77,285	75,515	1,770	---	---
V (N)	800	---	800	---	---
VI (N)	132,515	24,091	8,010	100,414	---
VII (N)	9,934	---	---	9,934	---
VIII(N)	7,509	---	---	7,509	---

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Ao, AoB, AoC----- Alliance	Silty-----	Favorable	2,500	Blue grama-----	20
		Normal	1,700	Western wheatgrass-----	20
		Unfavorable	1,000	Needleandthread-----	20
				Buffalograss-----	5
				Little bluestem-----	5
				Sedge-----	5
				Green needlegrass-----	5
				Big bluestem-----	5
AtB, AtC----- Altvan	Silty-----	Favorable	2,900	Little bluestem-----	15
		Normal	2,500	Blue grama-----	15
		Unfavorable	2,100	Western wheatgrass-----	15
				Needleandthread-----	15
				Big bluestem-----	10
				Buffalograss-----	5
				Threadleaf sedge-----	5
				Sidecoats grama-----	5
AvD*: Altvan-----	Silty-----	Favorable	2,900	Little bluestem-----	15
		Normal	2,500	Blue grama-----	15
		Unfavorable	2,100	Western wheatgrass-----	15
				Needleandthread-----	15
				Big bluestem-----	10
				Buffalograss-----	5
				Threadleaf sedge-----	5
				Sidecoats grama-----	5
Dix-----	Shallow to Gravel-----	Favorable	700	Blue grama-----	25
		Normal	600	Fendler threawn-----	10
		Unfavorable	400	Needleandthread-----	10
				Sand bluestem-----	5
				Little bluestem-----	5
				Buffalograss-----	5
				Prairie sandreed-----	5
Bb----- Bankard	Sandy Lowland-----	Favorable	2,300	Prairie sandreed-----	30
		Normal	2,100	Sand bluestem-----	20
		Unfavorable	1,800	Little bluestem-----	20
				Needleandthread-----	10
				Blue grama-----	5
Bc----- Bankard	Shallow to Gravel-----	Favorable	900	Blue grama-----	30
		Normal	700	Needleandthread-----	10
		Unfavorable	400	Fendler threawn-----	10
				Prairie sandreed-----	5
				Sand bluestem-----	5
				Sand dropseed-----	5
				Sedge-----	5
				Little bluestem-----	5
				Buffalograss-----	5

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Be, BeB, BeC, BeD, BeE----- Bayard	Sandy-----	Favorable	2,300	Prairie sandreed-----	30
		Normal	1,600	Blue grama-----	15
		Unfavorable	1,100	Needleandthread-----	15
				Sand bluestem-----	10
				Little bluestem-----	10
				Indian ricegrass-----	5
Threadleaf sedge-----	5				
Bg, BgB, BgC, BgD-- Bridget	Silty-----	Favorable	2,500	Needleandthread-----	20
		Normal	1,700	Blue grama-----	20
		Unfavorable	1,000	Western wheatgrass-----	20
				Threadleaf sedge-----	10
				Buffalograss-----	5
				Little bluestem-----	5
				Big bluestem-----	5
Sidecoats grama-----	5				
BuC----- Busher	Sandy-----	Favorable	2,300	Prairie sandreed-----	30
		Normal	1,600	Needleandthread-----	15
		Unfavorable	1,200	Blue grama-----	15
				Sand bluestem-----	10
				Little bluestem-----	10
				Threadleaf sedge-----	5
Indian ricegrass-----	5				
BxD*, ByE*: Busher-----	Sandy-----	Favorable	2,300	Prairie sandreed-----	30
		Normal	1,600	Needleandthread-----	15
		Unfavorable	1,200	Blue grama-----	15
				Sand bluestem-----	10
				Little bluestem-----	10
				Threadleaf sedge-----	5
Indian ricegrass-----	5				
Tassel-----	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Needleandthread-----	10
				Threadleaf sedge-----	10
				Sand bluestem-----	5
Sidecoats grama-----	5				
Bluegrass-----	5				
CcF----- Canyon	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Threadleaf sedge-----	10
				Needleandthread-----	10
				Sidecoats grama-----	5
Sand bluestem-----	5				
Bluegrass-----	5				

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
CdG*: Canyon-----	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Threadleaf sedge-----	10
				Needleandthread-----	10
				Sideoats grama-----	5
				Sand bluestem-----	5
				Bluegrass-----	5
Rock outcrop.					
CeE*: Canyon-----	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Threadleaf sedge-----	10
				Needleandthread-----	10
				Sideoats grama-----	5
				Sand bluestem-----	5
				Bluegrass-----	5
Bayard-----	Sandy-----	Favorable	2,300	Prairie sandreed-----	30
		Normal	1,600	Blue grama-----	15
		Unfavorable	1,100	Needleandthread-----	15
				Sand bluestem-----	10
				Little bluestem-----	10
				Indian ricegrass-----	5
				Threadleaf sedge-----	5
CtB, CtC----- Creighton	Silty-----	Favorable	2,500	Blue grama-----	25
		Normal	1,700	Needleandthread-----	20
		Unfavorable	1,000	Western wheatgrass-----	20
				Threadleaf sedge-----	10
				Buffalograss-----	10
				Green needlegrass-----	5
DhD, DhG----- Dix	Shallow to Gravel-----	Favorable	700	Blue grama-----	25
		Normal	600	Fendler threeawn-----	10
		Unfavorable	400	Needleandthread-----	10
				Sand dropseed-----	10
				Sand bluestem-----	5
				Little bluestem-----	5
				Buffalograss-----	5
				Prairie sandreed-----	5
Du, DuB----- Duroc	Silty-----	Favorable	3,300	Big bluestem-----	15
		Normal	2,500	Needleandthread-----	15
		Unfavorable	1,700	Western wheatgrass-----	15
				Blue grama-----	10
				Green needlegrass-----	10
				Little bluestem-----	10
				Threadleaf sedge-----	10
				Buffalograss-----	5

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Dv----- Duroc	Silty-----	Favorable	2,100	Blue grama-----	20
		Normal	1,700	Needleandthread-----	20
		Unfavorable	1,300	Green needlegrass-----	10
			Western wheatgrass-----	10	
			Threadleaf sedge-----	10	
			Big bluestem-----	5	
			Buffalograss-----	5	
Little bluestem-----	5				
Dx----- Duroc	Silty-----	Favorable	3,300	Big bluestem-----	15
		Normal	2,500	Needleandthread-----	15
		Unfavorable	1,700	Western wheatgrass-----	15
			Blue grama-----	10	
			Green needlegrass-----	10	
			Little bluestem-----	10	
			Threadleaf sedge-----	10	
Buffalograss-----	5				
DyE----- Dwyer	Sands-----	Favorable	2,300	Prairie sandreed-----	30
		Normal	1,600	Sand bluestem-----	20
		Unfavorable	1,000	Needleandthread-----	15
			Little bluestem-----	15	
			Blue grama-----	10	
ErE*: Epping-----	Shallow Limy-----	Favorable	1,000	Blue grama-----	20
		Normal	700	Needleandthread-----	15
		Unfavorable	500	Threadleaf sedge-----	10
			Sideoats grama-----	10	
			Western wheatgrass-----	10	
			Little bluestem-----	10	
			Buffalograss-----	5	
Prairie sandreed-----	5				
Mitchell-----	Limy Upland-----	Favorable	2,000	Blue grama-----	20
		Normal	1,300	Sideoats grama-----	15
		Unfavorable	700	Needleandthread-----	10
			Threadleaf sedge-----	10	
			Little bluestem-----	10	
			Western wheatgrass-----	10	
			Buffalograss-----	5	
Prairie sandreed-----	5				
Gd----- Glenberg	Sandy Lowland-----	Favorable	2,800	Little bluestem-----	20
		Normal	2,100	Prairie sandreed-----	20
		Unfavorable	1,300	Sand bluestem-----	20
			Needleandthread-----	10	
			Blue grama-----	10	
Switchgrass-----	5				
Go----- Goshen	Silty-----	Favorable	3,300	Blue grama-----	20
		Normal	2,900	Western wheatgrass-----	20
		Unfavorable	2,500	Little bluestem-----	15
			Buffalograss-----	10	
			Needleandthread-----	10	
			Big bluestem-----	5	
Sideoats grama-----	5				
Sedge-----	5				

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
JmB, JmC Jayem	Sandy	Favorable	2,300	Prairie sandreed	20
		Normal	1,600	Blue grama	15
		Unfavorable	1,100	Needleandthread	15
			Little bluestem	10	
			Threadleaf sedge	10	
			Sand bluestem	10	
			Fringed sagebrush	5	
			Sand dropseed	5	
			Western wheatgrass	5	
			Indian ricegrass	5	
Jo Johnstown	Silty	Favorable	4,000	Big bluestem	20
		Normal	3,600	Little bluestem	20
		Unfavorable	3,300	Blue grama	10
			Western wheatgrass	10	
			Switchgrass	5	
			Indiangrass	5	
Ke, KeB, KeC Keith	Silty	Favorable	3,300	Blue grama	20
		Normal	2,500	Needleandthread	20
		Unfavorable	1,700	Western wheatgrass	15
			Little bluestem	10	
			Buffalograss	5	
			Sedge	5	
			Big bluestem	5	
			Sideoats grama	5	
Ku Kuma	Silty	Favorable	3,300	Blue grama	25
		Normal	2,900	Western wheatgrass	20
		Unfavorable	2,500	Buffalograss	10
			Needlegrass	10	
			Sedge	5	
Lm Las	Subirrigated	Favorable	5,500	Big bluestem	25
		Normal	5,300	Indiangrass	15
		Unfavorable	5,000	Little bluestem	15
			Prairie cordgrass	10	
			Switchgrass	10	
			Sedge	10	
Lw Las Animas	Wetland	Favorable	5,000	Prairie cordgrass	30
		Normal	4,500	Bluejoint reedgrass	15
		Unfavorable	4,000	Northern reedgrass	15
			Slender wheatgrass	10	
			Sedge	10	
			Plains bluegrass	5	
Ly Lodgepole	Clayey Overflow	Favorable	1,200	Western wheatgrass	40
		Normal	1,000	Blue grama	15
		Unfavorable	700	Green needlegrass	15
			Buffalograss	10	
			Sedge	10	

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Mc----- McCook	Silty Lowland-----	Favorable	2,800	Western wheatgrass-----	30
		Normal	2,000	Needleandthread-----	15
		Unfavorable	1,500	Blue grama-----	15
				Sedge-----	10
				Big bluestem-----	5
				Little bluestem-----	5
				Sideoats grama-----	5
				Buffalograss-----	5
MkC, MkD, MkE----- Mitchell	Limy Upland-----	Favorable	2,000	Blue grama-----	20
		Normal	1,300	Sideoats grama-----	15
		Unfavorable	700	Needleandthread-----	10
				Threadleaf sedge-----	10
				Little bluestem-----	10
				Western wheatgrass-----	10
				Buffalograss-----	5
				Prairie sandreed-----	5
ReG*: Rock outcrop.	Shallow Limy-----	Favorable	1,000	Blue grama-----	20
		Normal	700	Needleandthread-----	15
		Unfavorable	500	Threadleaf sedge-----	10
				Sideoats grama-----	10
				Western wheatgrass-----	10
				Little bluestem-----	10
				Buffalograss-----	5
				Prairie sandreed-----	5
RhG*: Rock outcrop.	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Needleandthread-----	10
				Threadleaf sedge-----	10
				Sand bluestem-----	5
				Sideoats grama-----	5
				Bluegrass-----	5
Ro----- Rosebud	Silty-----	Favorable	2,500	Blue grama-----	25
		Normal	1,700	Needleandthread-----	20
		Unfavorable	1,000	Western wheatgrass-----	20
				Threadleaf sedge-----	10
				Green needlegrass-----	10
				Buffalograss-----	5
RoB, RoC----- Rosebud	Silty-----	Favorable	3,300	Needleandthread-----	15
		Normal	2,500	Blue grama-----	15
		Unfavorable	1,700	Western wheatgrass-----	15
				Little bluestem-----	10
				Sideoats grama-----	10
				Green needlegrass-----	10
				Big bluestem-----	5
				Threadleaf sedge-----	5
				Buffalograss-----	5

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
RsD*: Rosebud-----	Silty-----	Favorable	3,300	Needleandthread-----	15
		Normal	2,500	Blue grama-----	15
		Unfavorable	1,700	Western wheatgrass-----	15
				Little bluestem-----	10
				Sideoats grama-----	10
				Green needlegrass-----	10
				Big bluestem-----	5
				Threadleaf sedge-----	5
				Buffalograss-----	5
Canyon-----	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Threadleaf sedge-----	10
				Needleandthread-----	10
				Sideoats grama-----	5
				Sand bluestem-----	5
				Bluegrass-----	5
Sb, SbB, SbC----- Satanta	Silty-----	Favorable	2,100	Blue grama-----	20
		Normal	1,700	Needleandthread-----	20
		Unfavorable	1,300	Western wheatgrass-----	10
				Buffalograss-----	5
				Green needlegrass-----	5
				Little bluestem-----	5
				Sand dropseed-----	5
				Sideoats grama-----	5
		Sedge-----	5		
SnC----- Sidney	Silty-----	Favorable	2,200	Western wheatgrass-----	25
		Normal	1,500	Needleandthread-----	25
		Unfavorable	1,000	Blue grama-----	20
				Sedge-----	5
				Buffalograss-----	5
SoD*: Sidney-----	Silty-----	Favorable	2,200	Western wheatgrass-----	25
		Normal	1,500	Needleandthread-----	25
		Unfavorable	1,000	Blue grama-----	20
				Sedge-----	5
				Buffalograss-----	5
Canyon-----	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Threadleaf sedge-----	10
				Needleandthread-----	10
				Sideoats grama-----	5
				Sand bluestem-----	5
				Bluegrass-----	5
TbF*: Tassel-----	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Needleandthread-----	10
				Threadleaf sedge-----	10
				Sand bluestem-----	5
		Sideoats grama-----	5		
		Bluegrass-----	5		

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
TbF*: Busher-----	Sandy-----	Favorable	3,000	Prairie sandreed-----	25
		Normal	2,300	Sand bluestem-----	20
		Unfavorable	1,700	Little bluestem-----	20
				Needleandthread-----	10
				Blue grama-----	10
				Threadleaf sedge-----	5
TcG*: Tassel-----	Shallow Limy-----	Favorable	1,000	Blue grama-----	25
		Normal	700	Little bluestem-----	15
		Unfavorable	500	Western wheatgrass-----	15
				Needleandthread-----	10
				Threadleaf sedge-----	10
				Sand bluestem-----	5
				Sideoats grama-----	5
				Bluegrass-----	5
Busher-----	Savannah-----	Favorable	3,000	Prairie sandreed-----	25
		Normal	2,300	Sand bluestem-----	20
		Unfavorable	1,700	Little bluestem-----	20
				Needleandthread-----	10
				Blue grama-----	10
				Threadleaf sedge-----	5
Rock outcrop.					
UyB, UyC----- Ulysses	Silty-----	Favorable	2,500	Western wheatgrass-----	20
		Normal	1,700	Blue grama-----	20
		Unfavorable	1,000	Needleandthread-----	20
				Sedge-----	10
				Sideoats grama-----	5
				Little bluestem-----	5
				Buffalograss-----	5
				Green needlegrass-----	5
VdD----- Valent	Sands-----	Favorable	3,000	Sand bluestem-----	25
		Normal	2,600	Prairie sandreed-----	20
		Unfavorable	2,000	Little bluestem-----	10
				Needleandthread-----	10
				Switchgrass-----	10
				Blue grama-----	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Ao, AoB, AoC----- Alliance	American plum, lilac, Siberian peashrub.	Rocky Mountain juniper, hackberry, Russian-olive.	Eastern redcedar, ponderosa pine, Austrian pine, Scotch pine, jack pine.	Siberian elm-----	---
AtB, AtC----- Altvan	Skunkbush sumac, lilac, Siberian peashrub, Peking cotoneaster.	Eastern redcedar, Rocky Mountain juniper, Russian-olive, hackberry, green ash.	Ponderosa pine, Siberian elm, honeylocust.	---	---
AvD*: Altvan-----	Skunkbush sumac, lilac, Siberian peashrub, Peking cotoneaster.	Eastern redcedar, Rocky Mountain juniper, Russian-olive, hackberry, green ash.	Ponderosa pine, Siberian elm, honeylocust.	---	---
Dix.					
Bb----- Bankard	American plum, skunkbush sumac.	Siberian peashrub, Russian-olive, hackberry.	Eastern redcedar, honeylocust, green ash, ponderosa pine.	Siberian elm-----	---
Bc----- Bankard	---	Eastern redcedar, Rocky Mountain juniper.	Ponderosa pine, Austrian pine, jack pine.	---	---
Be, BeB----- Bayard	American plum, skunkbush sumac, Siberian peashrub.	Eastern redcedar, Rocky Mountain juniper, lilac.	Ponderosa pine, Russian mulberry, green ash, hackberry, honeylocust.	Siberian elm-----	---
BeC----- Bayard	American plum, skunkbush sumac, lilac, Siberian peashrub.	Eastern redcedar, Russian mulberry, Rocky Mountain juniper.	Ponderosa pine, green ash, hackberry, honeylocust.	Siberian elm-----	---
BeD----- Bayard	American plum, skunkbush sumac, Siberian peashrub.	Eastern redcedar, Rocky Mountain juniper, lilac.	Ponderosa pine, Russian mulberry, green ash, hackberry, honeylocust.	Siberian elm-----	---
BeE----- Bayard	---	Eastern redcedar, Austrian pine, jack pine.	Ponderosa pine, Scotch pine.	---	---
Bg, BgB, BgC, BgD- Bridget	Skunkbush sumac, lilac, American plum.	Hackberry, Rocky Mountain juniper, Russian-olive, Siberian peashrub.	Ponderosa pine, green ash, eastern redcedar, honeylocust.	Siberian elm-----	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BuC----- Busher	Lilac, American plum, Siberian peashrub, skunkbush sumac.	Eastern redcedar, Rocky Mountain juniper, Russian-olive.	Ponderosa pine, green ash, honeylocust, hackberry.	Siberian elm-----	---
BxD*: Busher-----	Lilac, American plum, Siberian peashrub, skunkbush sumac.	Eastern redcedar, Rocky Mountain juniper, Russian-olive.	Ponderosa pine, green ash, honeylocust, hackberry.	Siberian elm-----	---
Tassel.					
ByE*: Busher-----	---	Eastern redcedar, Rocky Mountain juniper, Austrian pine, jack pine.	Ponderosa pine----	---	---
Tassel.					
CcF. Canyon					
CdG*: Canyon.					
Rock outcrop.					
CeE*: Canyon.					
Bayard-----	---	Eastern redcedar, Austrian pine, jack pine.	Ponderosa pine, Scotch pine.	---	---
CtB, CtC----- Creighton	Lilac, American plum, skunkbush sumac.	Rocky Mountain juniper, Russian-olive, hackberry, Siberian peashrub.	Ponderosa pine, green ash, eastern redcedar, honeylocust.	Siberian elm-----	---
DhD, DhG. Dix					
Du----- Duroc	Amur honeysuckle, lilac, American plum.	---	Rocky Mountain juniper, ponderosa pine, honeylocust, green ash, Russian-olive, eastern redcedar, hackberry.	Siberian elm-----	Eastern cottonwood.
DuB----- Duroc	Lilac, American plum.	Rocky Mountain juniper, Siberian peashrub, skunkbush sumac, hackberry.	Ponderosa pine, honeylocust, eastern redcedar, Scotch pine, green ash.	Siberian elm-----	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Dv----- Duroc	American plum, Amur honeysuckle, lilac, skunkbush sumac.	Russian-olive, Rocky Mountain juniper, Siberian peashrub, common chokecherry.	Ponderosa pine, honeylocust, green ash.	Siberian elm-----	---
Dx----- Duroc	Amur honeysuckle, lilac, American plum.	---	Rocky Mountain juniper, ponderosa pine, honeylocust, green ash, Russian-olive, eastern redcedar, hackberry.	Siberian elm-----	Eastern cottonwood.
DyE----- Dwyer	---	Eastern redcedar, Rocky Mountain juniper, ponderosa pine, Scotch pine.	---	---	---
ErE*: Epping.					
Mitchell-----	Siberian peashrub, silver buffaloberry, skunkbush sumac.	Eastern redcedar, Rocky Mountain juniper, ponderosa pine, Russian-olive, hackberry, honeylocust, green ash.	Siberian elm-----	---	---
Gd----- Glenberg	American plum, fragrant sumac.	Siberian peashrub	Eastern redcedar, Rocky Mountain juniper, ponderosa pine, hackberry, green ash, bur oak, Russian-olive.	Black locust-----	Eastern cottonwood.
Go----- Goshen	Lilac, American plum.	Tatarian honeysuckle.	Eastern redcedar, blue spruce, ponderosa pine, green ash, hackberry, Russian-olive.	Honeylocust, Siberian elm.	Eastern cottonwood.
JmB, JmC----- Jayem	Siberian peashrub, skunkbush sumac, common chokecherry, Amur honeysuckle, lilac.	Eastern redcedar, Russian-olive, Rocky Mountain juniper.	Siberian elm, ponderosa pine, green ash, honeylocust.	---	---
Jo----- Johnstown	Skunkbush sumac, Peking cotoneaster, American plum.	Eastern redcedar, Siberian peashrub.	Ponderosa pine, bur oak, Russian- olive, honeylocust, green ash, hackberry.	Siberian elm-----	--

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Ke, KeB, KeC----- Keith	Common chokecherry, American plum, lilac.	Hackberry, Manchurian crabapple, Russian-olive, green ash, Rocky Mountain juniper, Siberian peashrub.	Ponderosa pine, honeylocust.	Siberian elm-----	---
Ku----- Kuma	Fragrant sumac, lilac, Amur honeysuckle.	Russian-olive, common chokecherry.	Eastern redcedar, green ash, ponderosa pine, honeylocust, bur oak.	Siberian elm-----	---
Lm----- Las	Lilac, American plum.	Amur honeysuckle	Russian-olive, eastern redcedar, Rocky Mountain juniper, ponderosa pine, hackberry, green ash.	Siberian elm, honeylocust.	Eastern cottonwood.
Lw. Las Animas					
Ly----- Lodgepole	Lilac, American plum, common chokecherry.	---	Eastern redcedar, ponderosa pine, honeylocust, hackberry, green ash, Russian mulberry.	Silver maple, golden willow.	---
Mc----- McCook	American plum, lilac.	---	Eastern redcedar, honeylocust, Rocky Mountain juniper, hackberry, ponderosa pine, green ash, Russian-olive.	Siberian elm-----	Eastern cottonwood.
MkC, MkD, Mke----- Mitchell	Siberian peashrub, silver buffaloberry, skunkbush sumac.	Eastern redcedar, Rocky Mountain juniper, ponderosa pine, Russian-olive, hackberry, honeylocust, green ash.	Siberian elm-----	---	---
Pg*. Pits					
ReG*: Rock outcrop.					
Epping.					
RhG*: Rock outcrop.					

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
RhG*: Tassel.					
Ro----- Rosebud	Siberian peashrub, skunkbush sumac, Peking cotoneaster.	Eastern redcedar, Rocky Mountain juniper, hackberry, Russian-olive, green ash.	Honeylocust, Siberian elm, ponderosa pine.	---	---
RoB, RoC----- Rosebud	Skunkbush sumac, Siberian peashrub, lilac, Peking cotoneaster.	Eastern redcedar, Rocky Mountain juniper, Russian-olive, hackberry, green ash.	Ponderosa pine, Siberian elm, honeylocust.	---	---
RsD*: Rosebud-----	Skunkbush sumac, Siberian peashrub, lilac, Peking cotoneaster.	Eastern redcedar, Rocky Mountain juniper, Russian-olive, hackberry, green ash.	Ponderosa pine, Siberian elm, honeylocust.	---	---
Canyon.					
Sb, SbB, SbC----- Satanta	Amur honeysuckle, fragrant sumac, lilac.	Russian-olive, common chokecherry.	Honeylocust, green ash, ponderosa pine, hackberry, eastern redcedar, bur oak.	Siberian elm-----	---
SnC----- Sidney	Skunkbush sumac, silver buffaloberry, lilac.	Russian-olive, Rocky Mountain juniper, Siberian peashrub.	Eastern redcedar, ponderosa pine, Siberian elm, honeylocust, hackberry, green ash.	---	---
SoD*: Sidney-----	Skunkbush sumac, silver buffaloberry, lilac.	Russian-olive, Rocky Mountain juniper, Siberian peashrub.	Eastern redcedar, ponderosa pine, Siberian elm, honeylocust, hackberry, green ash.	---	---
Canyon.					
TbF*: Tassel.					
Busher-----	---	Eastern redcedar, Rocky Mountain juniper, Austrian pine, jack pine.	Ponderosa pine----	---	---
TcG*: Tassel.					
Busher.					

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
TcG*: Rock outcrop.					
UyB, UyC----- Ulysses	Fragrant sumac, Amur honeysuckle, lilac.	Eastern redcedar, common chokecherry.	Honeylocust, ponderosa pine, Russian-olive, green ash, bur oak.	Siberian elm-----	---
VdD----- Valent	---	Eastern redcedar, Rocky Mountain juniper, Austrian pine, jack pine.	Ponderosa pine----	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe")

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Ao----- Alliance	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
AoB, AoC----- Alliance	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
AtB, AtC----- Altvan	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
AvD*: Altvan-----	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
Dix-----	Slight-----	Slight-----	Severe: slope.	Slight.
Bb----- Bankard	Severe: flooding.	Moderate: too sandy.	Moderate: too sandy, flooding.	Moderate: too sandy.
Bc----- Bankard	Severe: flooding.	Moderate: flooding, too sandy.	Severe: flooding.	Moderate: too sandy, flooding.
Be----- Bayard	Slight-----	Slight-----	Moderate: small stones.	Slight.
BeB, BeC----- Bayard	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
BeD----- Bayard	Slight-----	Slight-----	Severe: slope.	Slight.
BeE----- Bayard	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Bg----- Bridget	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
BgB, BgC----- Bridget	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
BgD----- Bridget	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
BuC----- Busher	Slight-----	Slight-----	Moderate: slope.	Slight.
BxD*: Busher-----	Slight-----	Slight-----	Severe: slope.	Slight.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
BxD*: Tassel-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
ByE*: Busher-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Tassel-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
CcF----- Canyon	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
CdG*: Canyon-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
CeE*: Canyon-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Bayard-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
CtB, CtC----- Creighton	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
DhD----- Dix	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.
DhG----- Dix	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Du----- Duroc	Slight-----	Slight-----	Slight-----	Slight.
DuB----- Duroc	Slight-----	Slight-----	Moderate: slope.	Slight.
Dv, Dx----- Duroc	Slight-----	Slight-----	Slight-----	Slight.
DyE----- Dwyer	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
ErE*: Epping-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Mitchell-----	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
Gd----- Glenberg	Severe: flooding.	Slight-----	Moderate: small stones.	Slight.
Go----- Goshen	Severe: flooding.	Slight-----	Slight-----	Slight.
JmB, JmC----- Jayem	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
Jo----- Johnstown	Slight-----	Slight-----	Slight-----	Slight.
Ke----- Keith	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
KeB, KeC----- Keith	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
Ku----- Kuma	Slight-----	Slight-----	Slight-----	Slight.
Lm----- Las	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight.
Lw----- Las Animas	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
Ly----- Lodgepole	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.
Mc----- McCook	Severe: flooding.	Slight-----	Slight-----	Slight.
MkC----- Mitchell	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
MkD----- Mitchell	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.
MkE----- Mitchell	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Pg*----- Pits	Severe: flooding, slope, small stones.	Severe: slope, too sandy, small stones.	Severe: slope, small stones, too sandy.	Severe: too sandy.
ReG*: Rock outcrop-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Epping-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
RhG*: Rock outcrop-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Tassel-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Ro----- Rosebud	Moderate: dusty.	Moderate: dusty.	Slight-----	Moderate: dusty.
RoB, RoC----- Rosebud	Moderate: dusty.	Moderate: dusty.	Moderate: slope, depth to rock.	Moderate: dusty.
RsD*: Rosebud-----	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
Canyon-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Sb----- Satanta	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
SbB, SbC----- Satanta	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
SnC----- Sidney	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
SoD*: Sidney-----	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.
Canyon-----	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
TbF*: Tassel-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
TbF*: Busher-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
TcG*: Tassel-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Busher-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Rock outcrop-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
UyB, UyC----- Ulysses	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
VdD----- Valent	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--				
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
Ao, AoB, AoC----- Alliance	Good	Good	Good	Good	Good	Good	Very poor.	Poor	Good	Good	Poor	Good.
AtB----- Altvan	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
AtC----- Altvan	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
AvD*: Altvan-----	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
Dix-----	Poor	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Bb----- Bankard	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Poor.
Bc----- Bankard	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Be----- Bayard	Good	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
BeB, BeC----- Bayard	Fair	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Fair	Very poor.	Fair.
BeD----- Bayard	Fair	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Fair	Very poor.	Fair.
BeE----- Bayard	Poor	Fair	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
Bg, BgB----- Bridget	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
BgC, BgD----- Bridget	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
BuC----- Busher	Fair	Good	Good	Fair	Poor	Good	Very poor.	Very poor.	Good	Fair	Very poor.	Good.
BxD*: Busher-----	Fair	Good	Good	Fair	Poor	Good	Very poor.	Very poor.	Good	Fair	Very poor.	Good.
Tassel-----	Poor	Poor	Poor	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Poor.
ByE*: Busher-----	Poor	Fair	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Tassel-----	Poor	Poor	Poor	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Poor.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
CcF----- Canyon	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
CdG*: Canyon-----	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Rock outcrop-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
CeE*: Canyon-----	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Bayard-----	Poor	Fair	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
CtB----- Creighton	Good	Good	Fair	Good	Good	Fair	Poor	Poor	Good	Good	Poor	Fair.
CtC----- Creighton	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor.	Fair	Good	Poor	Fair.
DhD----- Dix	Poor	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
DhG----- Dix	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Du, DuB----- Duroc	Good	Good	Fair	Good	Good	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
Dv----- Duroc	Good	Good	Good	---	---	Good	Poor	Very poor.	Good	---	Very poor.	Good.
Dx----- Duroc	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
DyE----- Dwyer	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
ErE*: Epping-----	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Mitchell-----	Poor	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Gd----- Glenberg	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
Go----- Goshen	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
JmB, JmC----- Jayem	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Jo----- Johnstown	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Fair	Very poor.	Good.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
Ke, KeB----- Keith	Good	Good	Good	Fair	Fair	Good	Very poor.	Very poor.	Good	Fair	Very poor.	Good.
KeC----- Keith	Fair	Good	Good	Fair	Fair	Good	Very poor.	Very poor.	Good	Fair	Very poor.	Good.
Ku----- Kuma	Good	Good	Fair	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
Lm----- Las	Fair	Fair	Fair	---	---	Fair	Fair	Fair	Fair	---	Fair	Fair.
Lw----- Las Animas	Very poor.	Poor	Fair	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Fair.
Ly----- Lodgepole	Poor	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good	Poor.
Mc----- McCook	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
MkC, MkD----- Mitchell	Fair	Good	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Fair.
MkE----- Mitchell	Poor	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Pg*----- Pits	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Fair	Very poor.	Very poor.	Poor	Poor.
ReG*: Rock outcrop-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Epping-----	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
RhG*: Rock outcrop-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Tassel-----	Very poor.	Very poor.	Poor	Fair	Fair	Poor	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Poor.
Ro----- Rosebud	Fair	Good	Fair	---	Good	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
RoB----- Rosebud	Good	Good	Fair	---	Good	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
RoC----- Rosebud	Fair	Good	Fair	---	Good	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
RsD*: Rosebud-----	Fair	Good	Fair	---	Good	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Canyon-----	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
Sb, SbB, SbC----- Satanta	Good	Good	Fair	---	---	Good	Poor	Very poor.	Good	---	Very poor.	Fair.
SnC----- Sidney	Fair	Good	Good	Fair	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
SoD*: Sidney-----	Fair	Good	Good	Fair	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
Canyon-----	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
TbF*: Tassel-----	Poor	Poor	Poor	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.	Poor.
Busher-----	Poor	Fair	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
TcG*: Tassel-----	Very poor.	Very poor.	Poor	Fair	Fair	Poor	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Poor.
Busher-----	Poor	Fair	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Rock outcrop-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
UyB----- Ulysses	Good	Good	Fair	Good	Good	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
UyC----- Ulysses	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
VdD----- Valent	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ao, AoB----- Alliance	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: frost action.	Slight.
AoC----- Alliance	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Slight.
AtB----- Altvan	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
AtC----- Altvan	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
AvD*: Altvan-----	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
Dix-----	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
Bb----- Bankard	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
Bc----- Bankard	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Be, BeB----- Bayard	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action.	Slight.
BeC, BeD----- Bayard	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Slight.
BeE----- Bayard	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Bg, BgB----- Bridget	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: low strength.	Slight.
BgC, BgD----- Bridget	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength.	Slight.
BuC----- Busher	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
BxD*: Busher-----	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
Tassel-----	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: depth to rock.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ByE*: Busher-----	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Tassel-----	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: depth to rock.
CcF----- Canyon	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
CdG*: Canyon-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
CeE*: Canyon-----	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: depth to rock.
Bayard-----	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
CtB----- Creighton	Slight-----	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
CtC----- Creighton	Slight-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
DhD----- Dix	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: droughty.
DhG----- Dix	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Du, DuB----- Duroc	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
Dv----- Duroc	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell.	Severe: low strength.	Slight.
Dx----- Duroc	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
DyE----- Dwyer	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ErE*: Epping-----	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, shrink-swell, slope.	Severe: depth to rock.
Mitchell-----	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Gd----- Glenberg	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: droughty.
Go----- Goshen	Slight-----	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
JmB----- Jayem	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
JmC----- Jayem	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
Jo----- Johnstown	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Ke, KeB----- Keith	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: low strength, frost action.	Slight.
KeC----- Keith	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength, frost action.	Slight.
Ku----- Kuma	Slight-----	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell.	Severe: low strength.	Slight.
Lm----- Las	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Lw----- Las Animas	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
Ly----- Lodgepole	Severe: cutbanks cave, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
Mc----- McCook	Slight-----	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
MkC, MkD----- Mitchell	Slight-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
MkE----- Mitchell	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pg*----- Pits	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope.	Severe: small stones, droughty, slope.
ReG*: Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Epping-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
RhG*: Rock outcrop-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Tassel-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Ro, RoB----- Rosebud	Moderate: depth to rock.	Slight-----	Moderate: depth to rock.	Slight-----	Moderate: frost action.	Moderate: depth to rock.
RoC----- Rosebud	Moderate: depth to rock.	Slight-----	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: depth to rock.
RsD*: Rosebud-----	Moderate: depth to rock.	Slight-----	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: depth to rock.
Canyon-----	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: depth to rock.
Sb, SbB----- Satanta	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell.	Severe: low strength.	Slight.
SbC----- Satanta	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
SnC----- Sidney	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Slight.
SoD*: Sidney-----	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Slight.
Canyon-----	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: depth to rock.
TbF*: Tassel-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TbF*: Busher-----	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TcG*: Tassel-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Busher-----	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
UyB----- Ulysses	Slight-----	Slight: shrink-swell.	Slight: shrink-swell.	Slight: shrink-swell.	Slight: shrink-swell, frost action.	Slight.
UyC----- Ulysses	Slight-----	Slight: shrink-swell.	Slight: shrink-swell.	Moderate: shrink-swell, slope.	Slight: shrink-swell, frost action.	Slight.
VdD----- Valent	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ao----- Alliance	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock.	Severe: depth to rock.	Slight-----	Fair: depth to rock.
AoB, AoC----- Alliance	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Slight-----	Fair: depth to rock.
AtB, AtC----- Altvan	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight-----	Poor: seepage, too sandy.
AvD*: Altvan-----	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight-----	Poor: seepage, too sandy.
Dix-----	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Bb, Bc----- Bankard	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, too sandy.	Severe: flooding.	Poor: seepage, too sandy.
Be, BeB, BeC----- Bayard	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
BeD----- Bayard	Slight-----	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Good.
BeE----- Bayard	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
Bg----- Bridget	Moderate: percs slowly.	Moderate: seepage.	Slight-----	Slight-----	Good.
BgB, BgC----- Bridget	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
BgD----- Bridget	Moderate: percs slowly.	Severe: slope.	Slight-----	Slight-----	Good.
BuC----- Busher	Moderate: depth to rock.	Severe: seepage.	Severe: depth to rock.	Slight-----	Fair: depth to rock, thin layer.
BxD*: Busher-----	Moderate: depth to rock.	Severe: seepage.	Severe: depth to rock.	Slight-----	Fair: depth to rock, thin layer.

See footnote at end of table.

TABLE 13.--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
BxD*: Tassel-----	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock.	Slight-----	Poor: depth to rock.
ByE*: Busher-----	Moderate: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock.	Moderate: slope.	Fair: depth to rock, slope, thin layer.
Tassel-----	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
CcF----- Canyon	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
CdG*: Canyon-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
CeE*: Canyon-----	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Bayard-----	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
CtB, CtC----- Creighton	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
DhD----- Dix	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
DhG----- Dix	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Du----- Duroc	Moderate: percs slowly.	Moderate: seepage.	Slight-----	Slight-----	Good.
DuB----- Duroc	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
Dv----- Duroc	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----	Fair: thin layer.

See footnote at end of table.

TABLE 13.--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
Dx----- Duroc	Moderate: percs slowly.	Moderate: seepage.	Slight-----	Slight-----	Good.
DyE----- Dwyer	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy.	Moderate: slope.	Poor: seepage, too sandy.
ErE*: Epping-----	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Mitchell-----	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Gd----- Glenberg	Moderate: flooding.	Severe: seepage.	Severe: too sandy.	Moderate: flooding.	Poor: too sandy.
Go----- Goshen	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
JmB, JmC----- Jayem	Slight-----	Severe: seepage.	Moderate: too sandy.	Slight-----	Good.
Jo----- Johnstown	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----	Fair: too clayey, thin layer.
Ke----- Keith	Moderate: percs slowly.	Moderate: seepage.	Slight-----	Slight-----	Good.
KeB, KeC----- Keith	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
Ku----- Kuma	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Lm----- Las	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness, thin layer.
Lw----- Las Animas	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Ly----- Lodgepole	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Mc----- McCook	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.

See footnote at end of table.

TABLE 13.--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
MkC----- Mitchell	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
MkD----- Mitchell	Moderate: percs slowly.	Severe: slope.	Slight-----	Slight-----	Good.
MkE----- Mitchell	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Pg*----- Pits	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
ReG*: Rock outcrop-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Epping-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
RhG*: Rock outcrop-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Tassel-----	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Ro, RoB, RoC----- Rosebud	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: depth to rock.
RsD*: Rosebud-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: depth to rock.
Canyon-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: depth to rock.
Sb----- Satanta	Moderate: percs slowly.	Moderate: seepage.	Slight-----	Slight-----	Good.
SbB, SbC----- Satanta	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
SnC----- Sidney	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, thin layer.

See footnote at end of table.

TABLE 13.--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
SoD*: Sidney-----	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, thin layer.
Canyon-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: depth to rock.
TbF*: Tassel-----	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Busher-----	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
TcG*: Tassel-----	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Busher-----	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
UyB, UyC----- Ulysses	Slight: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
VdD----- Valent	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy.	Moderate: slope.	Poor: seepage, too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ao, AoB, AoC----- Alliance	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
AtB, AtC----- Altvan	Good-----	Probable-----	Probable-----	Fair: small stones, area reclaim, thin layer.
AvD*: Altvan-----	Good-----	Probable-----	Probable-----	Fair: small stones, area reclaim, thin layer.
Dix-----	Good-----	Probable-----	Probable-----	Poor: area reclaim, too sandy, small stones.
Bb, Bc----- Bankard	Good-----	Probable-----	Improbable: too sandy.	Poor: area reclaim, too sandy.
Be, BeB, BeC, BeD----- Bayard	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
BeE----- Bayard	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
Bg, BgB, BgC, BgD----- Bridget	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
BuC----- Busher	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
BxD*: Busher-----	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
Tassel-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
ByE*: Busher-----	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
Tassel-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CcF----- Canyon	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
CdG*: Canyon-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop-----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
CeE*: Canyon-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Bayard-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
CtB, CtC----- Creighton	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
DhD----- Dix	Good-----	Probable-----	Probable-----	Poor: area reclaim, too sandy, small stones.
DhG----- Dix	Poor: slope.	Probable-----	Probable-----	Poor: area reclaim, too sandy, small stones.
Du, DuB----- Duroc	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Dv----- Duroc	Good-----	Probable-----	Probable-----	Fair: too clayey, area reclaim.
Dx----- Duroc	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
DyE----- Dwyer	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.
ErE*: Epping-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Mitchell-----	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Gd----- Glenberg	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Go----- Goshen	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
JmB, JmC----- Jayem	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
Jo----- Johnstown	Good-----	Probable-----	Probable-----	Good.
Ke, KeB, KeC----- Keith	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ku----- Kuma	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Lm----- Las	Fair: wetness.	Probable-----	Improbable: too sandy.	Fair: too clayey.
Lw----- Las Animas	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ly----- Lodgepole	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Mc----- McCook	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
MkC, MkD----- Mitchell	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
MkE----- Mitchell	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Pg*----- Pits	Fair: slope.	Probable-----	Probable-----	Poor: area reclaim, too sandy, small stones.
ReG*: Rock outcrop-----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Epping-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
RhG*: Rock outcrop-----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Tassel-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Ro, RoB, RoC----- Rosebud	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RsD*: Rosebud-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, small stones.
Canyon-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Sb, SbB, SbC----- Satanta	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
SnC----- Sidney	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
SoD*: Sidney-----	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Canyon-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
TbF*: Tassel-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Busher-----	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
TcG*: Tassel-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Busher-----	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop-----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
UyB, UyC----- Ulysses	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
VdD----- Valent	Good-----	Probable-----	Improbable: too sandy.	Poor: too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ao, AoB----- Alliance	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Too arid, erodes easily.
AoC----- Alliance	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Slope-----	Erodes easily	Too arid, erodes easily.
AtB----- Altvan	Severe: seepage.	Severe: seepage.	Deep to water	Favorable-----	Too sandy-----	Too arid.
AtC----- Altvan	Severe: seepage.	Severe: seepage.	Deep to water	Slope-----	Too sandy-----	Too arid.
AvD*: Altvan-----	Severe: seepage.	Severe: seepage.	Deep to water	Slope-----	Too sandy-----	Too arid.
Dix-----	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing.	Too arid, droughty.
Bb, Bc----- Bankard	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Too arid, droughty, rooting depth.
Be, BeB----- Bayard	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing---	Soil blowing---	Too arid.
BeC, BeD----- Bayard	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing---	Too arid.
BeE----- Bayard	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.
Bg, BgB----- Bridget	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing---	Erodes easily, soil blowing.	Too arid, erodes easily.
BgC, BgD----- Bridget	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Erodes easily, soil blowing.	Too arid, erodes easily.
BuC----- Busher	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing---	Too arid.
BxD*: Busher-----	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing---	Too arid.
Tassel-----	Severe: depth to rock.	Slight-----	Deep to water	Slope, soil blowing, depth to rock.	Depth to rock	Too arid.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
ByE*: Busher-----	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.
Tassel-----	Severe: depth to rock, slope.	Slight-----	Deep to water	Slope, fast intake, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
CcF----- Canyon	Severe: depth to rock, slope.	Slight-----	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock.	Too arid, slope.
CdG*: Canyon-----	Severe: depth to rock, slope.	Slight-----	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock.	Too arid, slope.
Rock outcrop-----	Severe: depth to rock, slope.	Severe: area reclaim.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
CeE*: Canyon-----	Severe: depth to rock, slope.	Slight-----	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock.	Too arid, slope.
Bayard-----	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.
CtB----- Creighton	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing---	Erodes easily, soil blowing.	Too arid, erodes easily.
CtC----- Creighton	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Erodes easily, soil blowing.	Too arid, erodes easily.
DhD----- Dix	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty.	Too sandy-----	Too arid, droughty.
DhG----- Dix	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, too sandy.	Too arid, slope, droughty.
Du, DuB----- Duroc	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
Dv----- Duroc	Severe: seepage.	Severe: piping.	Deep to water	Favorable-----	Favorable-----	Favorable.
Dx----- Duroc	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
DyE----- Dwyer	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Too arid, slope, droughty.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
ErE*:						
Epping-----	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
Mitchell-----	Severe: slope.	Severe: piping.	Deep to water	Slope, soil blowing, erodes easily.	Slope, erodes easily, soil blowing.	Too arid, slope, erodes easily.
Gd----- Glenberg	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing.	Too sandy-----	Too arid, droughty.
Go----- Goshen	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
JmB----- Jayem	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing---	Soil blowing---	Too arid.
JmC----- Jayem	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing---	Too arid.
Jo----- Johnstown	Severe: seepage.	Severe: thin layer.	Deep to water	Favorable-----	Favorable-----	Favorable.
Ke, KeB----- Keith	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Too arid, erodes easily.
KeC----- Keith	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope-----	Erodes easily	Too arid, erodes easily.
Ku----- Kuma	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
Lm----- Las	Severe: seepage.	Severe: piping.	Flooding-----	Wetness, flooding.	Wetness-----	Favorable.
Lw----- Las Animas	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, droughty, rooting depth.	Wetness-----	Wetness, droughty, rooting depth.
Ly----- Lodgepole	Severe: seepage.	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Mc----- McCook	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing---	Soil blowing---	Favorable.
MkC, MkD----- Mitchell	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing, erodes easily.	Erodes easily, soil blowing.	Too arid, erodes easily.
MkE----- Mitchell	Severe: slope.	Severe: piping.	Deep to water	Slope, soil blowing, erodes easily.	Slope, erodes easily, soil blowing.	Too arid, slope, erodes easily.
Pg*----- Pits	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy.	Slope, droughty, rooting depth.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
ReG*: Rock outcrop-----	Severe: depth to rock, slope.	Severe: area reclaim.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Epping-----	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Too arid, slope, erodes easily.
RhG*: Rock outcrop-----	Severe: depth to rock, slope.	Severe: area reclaim.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Tassel-----	Severe: depth to rock, slope.	Slight-----	Deep to water	Slope, fast intake, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Ro, RoB----- Rosebud	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Depth to rock	Depth to rock	Too arid, depth to rock.
RoC----- Rosebud	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Depth to rock	Too arid, depth to rock.
RsD*: Rosebud-----	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Depth to rock	Too arid, depth to rock.
Canyon-----	Severe: depth to rock.	Slight-----	Deep to water	Slope, depth to rock.	Depth to rock	Too arid.
Sb, SbB----- Satanta	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Favorable-----	Too arid.
SbC----- Satanta	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope-----	Favorable-----	Too arid.
SnC----- Sidney	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Slope-----	Favorable-----	Too arid.
SoD*: Sidney-----	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Slope-----	Favorable-----	Too arid.
Canyon-----	Severe: depth to rock.	Slight-----	Deep to water	Slope, depth to rock.	Depth to rock	Too arid.
TbF*: Tassel-----	Severe: depth to rock, slope.	Slight-----	Deep to water	Slope, fast intake, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
TbF*: Busher-----	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.
TcG*: Tassel-----	Severe: depth to rock, slope.	Slight-----	Deep to water	Slope, fast intake, soil blowing.	Slope, depth to rock, soil blowing.	Too arid, slope, depth to rock.
Busher-----	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Too arid, slope.
Rock outcrop----	Severe: depth to rock, slope.	Severe: area reclaim.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
UyB----- Ulysses	Moderate: seepage.	Severe: piping.	Deep to water	Favorable-----	Erodes easily	Too arid, erodes easily.
UyC----- Ulysses	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope-----	Erodes easily	Too arid, erodes easily.
VdD----- Valent	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Too arid, slope, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
Ao, AoB, AoC----- Alliance	0-9	Loam-----	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-40	2-15
	9-21	Silty clay loam, silt loam, clay loam.	CL	A-7, A-6	0	100	100	90-100	70-100	30-50	15-25
	21-52	Silt loam, very fine sandy loam, loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	60-90	20-40	2-15
	52-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
AtB, AtC----- Altvan	0-11	Loam-----	ML, CL-ML	A-4	0	100	100	85-95	60-75	20-30	2-10
	11-21	Clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-100	60-80	25-40	5-15
	21-30	Loam, silt loam	ML, CL-ML	A-4	0	85-100	80-100	70-95	55-75	25-35	2-10
	30-34	Fine sandy loam	SM	A-4	0	85-100	80-100	60-85	35-50	20-25	NP-5
	34-60	Gravelly sand, gravelly coarse sand, coarse sand.	SP-SM	A-1	0	60-95	55-90	25-60	5-10	---	NP
AvD*: Altvan-----	0-7	Loam-----	ML, CL-ML	A-4	0	100	100	85-95	60-75	20-30	2-10
	7-26	Clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-100	60-80	25-40	5-15
	26-33	Loam, silt loam	ML, CL-ML	A-4	0	85-100	80-100	70-95	55-75	25-35	2-10
	33-37	Fine sandy loam	SM	A-4	0	85-100	80-100	60-85	35-50	20-25	NP-5
	37-60	Gravelly sand, gravelly coarse sand, coarse sand.	SP-SM	A-1	0	60-95	55-90	25-60	5-10	---	NP
Dix-----	0-18	Sandy loam-----	SM, ML, SC, SC-SM	A-2, A-4, A-1	0	95-100	75-100	40-80	20-55	<30	NP-10
	18-60	Gravelly loamy coarse sand, very gravelly sand, very gravelly loamy coarse sand.	SP, SP-SM, SM, GP	A-1, A-2, A-3	0	40-90	30-85	15-60	4-25	---	NP
Bb----- Bankard	0-6	Loamy sand-----	SM	A-2	0	95-100	90-100	50-90	15-35	---	NP
	6-60	Stratified loamy fine sand to gravelly coarse sand.	SP, SP-SM, SM	A-2, A-3, A-1	0	90-100	50-100	20-75	0-20	---	NP
Bc----- Bankard	0-11	Loamy fine sand	SM	A-2	0	95-100	90-100	50-90	15-35	<20	NP-5
	11-20	Stratified loamy fine sand to sand.	SM, SP-SM	A-2	0	95-100	75-100	60-80	10-25	<20	NP-5
	20-60	Stratified loamy fine sand to gravelly coarse sand.	SP, SP-SM, SM	A-2, A-3, A-1	0	90-100	50-100	20-75	0-20	<20	NP-5

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Be, BeB, BeC, BeD, BeE----- Bayard	0-12	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0	90-100	80-100	45-85	25-55	20-40	3-10
	12-60	Fine sandy loam, loamy very fine sand, very fine sandy loam.	ML, SM, SC-SM, CL-ML	A-2, A-4	0	90-100	80-100	55-95	30-65	20-40	3-10
Bg, BgB, BgC, BgD----- Bridget	0-13	Very fine sandy loam.	ML, CL-ML, CL, SM	A-4	0	95-100	95-100	75-100	45-65	20-35	2-15
	13-19	Very fine sandy loam, silt loam.	ML, CL-ML, CL	A-4	0	95-100	95-100	85-100	80-100	20-35	2-15
	19-60	Very fine sandy loam, silt loam, loam.	ML, CL-ML, CL	A-4	0	95-100	95-100	85-100	80-100	20-35	2-15
BuC----- Busher	0-11	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	80-100	30-60	<25	NP-5
	11-56	Loamy very fine sand, fine sandy loam, very fine sandy loam.	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	75-100	30-65	<25	NP-5
	56-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
BxD*: Busher-----	0-19	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	80-100	30-60	<25	NP-5
	19-45	Loamy very fine sand, fine sandy loam, very fine sandy loam.	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	75-100	30-65	<25	NP-5
	45-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tassel-----	0-5	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4, A-2	0	95-100	90-100	55-100	25-55	<25	NP-8
	5-17	Fine sandy loam, sandy loam, loamy very fine sand.	ML, CL-ML, SM, SC-SM	A-4, A-2	0	95-100	80-100	65-95	25-60	<25	NP-8
	17-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
ByE*: Busher-----	0-16	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	80-100	30-60	<25	NP-5
	16-42	Loamy very fine sand, fine sandy loam, very fine sandy loam.	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	75-100	30-65	<25	NP-5
	42-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ByE*: Tassel-----	0-6	Loamy very fine sand.	SM, ML, CL-ML, SC-SM	A-4, A-2	0	95-100	90-100	75-95	30-65	<25	NP-8
	6-18	Fine sandy loam, sandy loam, loamy very fine sand.	ML, CL-ML, SM, SC	A-4, A-2	0	95-100	80-100	60-95	25-60	<25	NP-8
	18-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
CcF----- Canyon	0-6	Fine sandy loam	SM, SC, SC-SM, ML	A-4, A-2	0-5	90-100	75-100	45-95	20-95	15-30	NP-10
	6-11	Very fine sandy loam, loam, gravelly loam.	ML, SM, SC, GM	A-4, A-6, A-2	0-5	60-100	50-100	40-95	30-75	20-40	NP-15
	11-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
CdG*: Canyon-----	0-5	Fine sandy loam	SM, SC, SC-SM, ML	A-4, A-2	0-5	90-95	75-95	45-95	20-95	15-30	NP-10
	5-14	Very fine sandy loam, loam, gravelly loam.	ML, SM, SC, GM	A-4, A-6, A-2	0-5	60-95	50-95	40-95	30-75	20-40	NP-15
	14-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CeE*: Canyon-----	0-6	Fine sandy loam	SM, SC, SC-SM, ML	A-4, A-2	0-5	90-95	75-95	45-95	20-95	15-30	NP-10
	6-11	Very fine sandy loam, loam, gravelly loam.	ML, SM, SC, GM	A-4, A-6, A-2	0-5	60-95	50-95	40-95	30-75	20-40	NP-15
	11-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Bayard-----	0-12	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0	90-100	80-100	45-85	25-55	20-40	3-10
	12-60	Fine sandy loam, loamy very fine sand, very fine sandy loam.	ML, SM, SC-SM, CL-ML	A-2, A-4	0	90-100	80-100	55-95	30-65	20-40	3-10
CtB, CtC----- Creighton	0-10	Very fine sandy loam.	ML, CL-ML	A-4	0	100	90-100	85-100	50-65	<25	NP-5
	10-30	Very fine sandy loam, loam.	ML, CL-ML, CL	A-4	0	100	90-100	85-100	60-80	<30	NP-10
	30-60	Very fine sandy loam, loam.	ML, CL-ML, CL	A-4	0	100	90-100	85-100	60-80	<30	NP-10

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
DhD, DhG----- Dix	0-11	Gravelly loam----	SM, GM	A-4, A-2	0	50-80	50-75	40-70	30-50	<35	NP-10
	11-19	Gravelly loamy coarse sand, very gravelly sand, very gravelly loamy coarse sand.	SP, SP-SM, SM, GP	A-1, A-2, A-3	0	40-90	30-85	15-60	4-20	---	NP
	19-60	Very gravelly coarse sand, very gravelly sand, gravelly coarse sand.	SP, GP, SP-SM, GP-GM	A-1	0-5	30-60	25-50	10-35	0-10	---	NP
Du, DuB----- Duroc	0-6	Loam-----	CL, CL-ML	A-6, A-4	0	100	95-100	85-100	60-100	25-35	5-15
	6-19	Loam, silt loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-100	70-100	25-35	5-15
	19-60	Loam, silt loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-100	70-100	25-35	5-15
Dv----- Duroc	0-10	Loam-----	ML	A-4	0	100	100	85-100	60-90	25-35	2-10
	10-29	Clay loam, loam	CL	A-6	0	100	95-100	80-100	60-80	25-40	11-25
	29-49	Loam-----	ML, CL-ML	A-4	0	100	95-100	75-100	55-75	20-30	2-10
	49-60	Gravelly sand----	SP, SP-SM	A-1	0	55-80	50-75	25-45	0-10	---	NP
Dx----- Duroc	0-8	Silt loam-----	CL, CL-ML	A-6, A-4	0	100	100	90-100	70-100	25-35	5-15
	8-41	Loam, silt loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-100	70-100	25-35	5-15
	41-60	Loam, silt loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-100	70-100	25-35	5-15
DyE----- Dwyer	0-4	Loamy fine sand	SM	A-2	0	100	100	65-80	20-35	<25	NP
	4-60	Loamy sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2	0	85-100	75-100	50-80	5-35	---	NP
ErE*: Epping-----	0-5	Loam-----	ML, CL, CL-ML	A-4, A-6	0	100	95-100	75-100	55-80	15-35	2-15
	5-13	Loam, silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	90-100	75-100	60-95	15-35	2-15
	13-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Mitchell-----	0-4	Very fine sandy loam.	ML, CL-ML, CL	A-4	0	100	100	85-100	65-95	20-35	NP-10
	4-60	Loam, very fine sandy loam, silt loam.	ML, CL-ML	A-4	0	100	95-100	85-100	60-100	20-35	NP-15
Gd----- Glenberg	0-6	Fine sandy loam	SM, SC-SM	A-4, A-2	0	95-100	85-100	60-80	30-45	15-25	NP-7
	6-60	Stratified fine sand to loam.	SM, SC-SM	A-2, A-4	0	90-100	75-100	50-70	25-40	15-20	NP-5
Go----- Goshen	0-12	Silt loam-----	CL, CL-ML, ML	A-4, A-6	0	100	95-100	90-100	70-95	20-40	3-20
	12-44	Silty clay loam, loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	85-95	25-40	8-22
	44-60	Silt loam, loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	20-35	4-15

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
JmB, JmC----- Jayem	0-19	Fine sandy loam	SM	A-4, A-2	0	100	85-100	55-95	25-50	<25	NP-5
	19-30	Fine sandy loam, very fine sandy loam.	ML, SM	A-4, A-2	0	100	85-100	70-95	25-60	<25	NP-5
	30-60	Fine sandy loam, very fine sandy loam, loamy very fine sand.	ML, SM	A-4, A-2	0	100	85-100	70-95	25-60	<25	NP-5
Jo----- Johnstown	0-9	Loam-----	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	70-100	20-40	3-18
	9-22	Clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	80-95	30-50	15-30
	22-46	Silty clay loam, silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	50-95	20-40	5-20
	46-60	Gravelly coarse sand, coarse sand, sand.	SM, SP-SM	A-1, A-2, A-3	0	60-100	50-95	25-70	5-15	---	NP
Ke, KeB, KeC----- Keith	0-10	Loam-----	CL, ML, CL-ML	A-4	0	100	100	85-100	80-100	20-35	2-10
	10-23	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	100	100	95-100	80-100	30-45	10-25
	23-60	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	20-35	2-12
Ku----- Kuma	0-7	Loam-----	ML	A-4	0	100	95-100	90-100	75-95	25-35	NP-10
	7-42	Silty clay loam, silt loam, loam.	CL	A-6, A-7	0	100	95-100	90-100	85-95	30-45	10-25
	42-60	Silt loam, loam, very fine sandy loam.	CL, CL-ML, ML	A-4, A-6	0	95-100	95-100	90-100	70-95	20-40	NP-20
Lm----- Las	0-4	Loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	50-85	20-40	5-20
	4-60	Clay loam, loam, sandy loam.	CL, CL-ML	A-6, A-4, A-7	0	100	95-100	95-100	50-85	22-45	5-25
Lw----- Las Animas	0-5	Loam-----	CL-ML	A-4	0	100	95-100	80-95	60-90	25-30	5-10
	5-60	Stratified very fine sandy loam to loamy fine sand.	SM, ML	A-2, A-4	0	95-100	90-100	55-90	25-55	20-25	NP-5
Ly----- Lodgepole	0-9	Silt loam-----	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-95	20-40	3-20
	9-47	Silty clay loam, silty clay, clay.	CH	A-7	0	100	100	90-100	85-95	50-65	25-40
	47-58	Silt loam, very fine sandy loam, loam.	CL, CL-ML, ML	A-4	0	100	100	90-100	60-90	20-35	3-10
	58-60	Sandy loam, fine sandy loam, loamy sand.	SM, ML	A-4, A-2	0	100	100	70-90	15-60	<20	NP

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Mc----- McCook	0-12	Very fine sandy loam.	ML, CL, CL-ML	A-4	0	100	100	85-100	50-80	15-25	NP-10
	12-60	Very fine sandy loam, silt loam, loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	80-100	50-100	15-45	NP-15
MkC, MkD, MkE---- Mitchell	0-5	Very fine sandy loam.	ML, CL-ML, CL	A-4	0	100	100	85-100	65-95	20-35	NP-10
	5-60	Loam, very fine sandy loam, silt loam.	ML, CL-ML	A-4	0	100	95-100	85-100	60-100	20-35	NP-15
Pg*----- Pits	0-60	Gravelly sand----	SP, SP-SM, SM, GP-GM	A-1, A-2, A-3	0-5	45-100	40-100	0-80	0-40	---	NP
ReG*: Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Epping-----	0-4	Loam-----	ML, CL, CL-ML	A-4, A-6	0	100	95-100	75-100	55-80	15-35	2-15
	4-10	Loam, silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	90-100	75-100	60-95	15-35	2-15
	10-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
RhG*: Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tassel-----	0-6	Loamy very fine sand.	SM, ML, CL-ML, SC-SM	A-4, A-2	0	95-100	90-100	75-95	30-65	<25	NP-8
	6-12	Fine sandy loam, sandy loam, loamy very fine sand.	ML, CL-ML, SM, SC	A-4, A-2	0	95-100	80-100	60-95	25-60	<25	NP-8
	12-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ro, RoB, RoC----- Rosebud	0-4	Loam-----	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	55-90	24-34	3-12
	4-15	Clay loam, loam	CL	A-6, A-7	0	95-100	90-100	80-100	60-95	30-50	12-26
	15-30	Sandy loam, very fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4, A-6, A-2	0	95-100	80-100	60-100	30-90	20-40	2-12
	30-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
RsD*: Rosebud-----	0-4	Loam-----	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	55-90	24-34	3-12
	4-17	Clay loam, loam	CL	A-6, A-7	0	95-100	90-100	80-100	60-85	30-50	12-26
	17-33	Sandy loam, very fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4, A-6, A-2	0	95-100	80-100	60-100	30-90	20-40	2-12
	33-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RsD*: Canyon-----	0-8	Loam-----	ML, CL, CL-ML, SM	A-4	0-5	90-95	75-95	50-95	40-75	15-30	2-10
	8-15	Very fine sandy loam, loam, gravelly loam.	ML, SM, SC, GM	A-4, A-6, A-2	0-5	60-95	50-95	40-95	30-75	20-40	NP-15
	15-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sb, SbB, SbC----- Satanta	0-10	Loam-----	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-95	55-75	20-35	2-15
	10-18	Clay loam, loam	CL	A-6, A-7-6	0	100	95-100	85-100	60-75	30-45	10-25
	18-56	Loam, fine sandy loam.	ML, CL-ML, SM, SC-SM	A-4, A-6, A-2	0	90-100	85-100	60-95	30-75	20-35	2-15
	56-60	Gravelly loamy sand, gravelly sandy loam.	SM, GM, SP-SM, GP-GM	A-1, A-2-4	0	55-80	50-75	25-50	10-30	---	NP
SnC----- Sidney	0-7	Loam-----	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	55-90	20-36	2-15
	7-19	Loam, very fine sandy loam, fine sandy loam.	CL-ML, CL, SC-SM, ML	A-4, A-6	0	95-100	85-100	65-100	35-85	20-40	2-15
	19-50	Loam, very fine sandy loam, fine sandy loam.	ML, CL, SM, SC	A-4, A-6	0	95-100	80-100	60-100	35-85	20-40	2-15
	50-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
SoD*: Sidney-----	0-7	Loam-----	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	55-90	20-36	2-15
	7-18	Loam, very fine sandy loam, fine sandy loam.	CL-ML, CL, SC-SM, ML	A-4, A-6	0	95-100	85-100	65-100	35-85	20-40	2-15
	18-50	Loam, very fine sandy loam, fine sandy loam.	ML, CL, SM, SC	A-4, A-6	0	95-100	80-100	60-100	35-85	20-40	2-15
	50-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Canyon-----	0-6	Loam-----	ML, CL, CL-ML, SM	A-4	0-5	90-95	75-95	50-95	40-75	15-30	2-10
	6-11	Very fine sandy loam, loam, gravelly loam.	ML, SM, SC, GM	A-4, A-6, A-2	0-5	60-95	50-95	40-95	30-75	20-40	NP-15
	11-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
TbF*: Tassel-----	0-6	Loamy very fine sand.	SM, ML, CL-ML, SC-SM	A-4, A-2	0	95-100	90-100	75-95	30-65	<25	NP-8
	6-13	Fine sandy loam, sandy loam, loamy very fine sand.	ML, CL-ML, SM, SC	A-4, A-2	0	95-100	80-100	60-95	25-60	<25	NP-8
	13-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
TbF*: Busher-----	0-18	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	80-100	30-60	<25	NP-5
	18-55	Loamy very fine sand, fine sandy loam, very fine sandy loam.	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	75-100	30-65	<25	NP-5
	55-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
TcG*: Tassel-----	0-8	Loamy very fine sand.	SM, ML, CL-ML, SC-SM	A-4, A-2	0	95-100	90-100	75-95	30-65	<25	NP-8
	8-14	Fine sandy loam, sandy loam, loamy very fine sand.	ML, CL-ML, SM, SC	A-4, A-2	0	95-100	80-100	60-95	25-60	<25	NP-8
	14-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Busher-----	0-10	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	80-100	30-60	<25	NP-5
	10-42	Loamy very fine sand, fine sandy loam, very fine sandy loam.	SM, ML, SC-SM, CL-ML	A-2, A-4	0	100	90-100	75-100	30-65	<25	NP-5
	42-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UyB, UyC----- Ulysses	0-12	Loam-----	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-35	3-15
	12-24	Loam, very fine sandy loam, silt loam.	CL, ML, CL-ML	A-4, A-6	0	100	100	85-100	50-85	25-40	4-15
	24-60	Loam, very fine sandy loam, silt loam.	CL, ML, CL-ML	A-4, A-6	0	100	100	85-100	50-85	25-40	4-15
VdD----- Valent	0-6	Loamy fine sand	SM, SP-SM	A-2	0	100	100	70-95	10-30	<25	NP-5
	6-60	Fine sand, loamy fine sand, loamy sand.	SM, SP-SM	A-2	0	100	95-100	75-90	10-30	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
Ao, AoB, AoC----- Alliance	0-9	15-20	1.25-1.45	0.6-2.0	0.20-0.22	6.6-7.8	<2	Low-----	0.28	5	5	2-4
	9-21	25-35	1.15-1.30	0.6-2.0	0.18-0.20	6.6-7.8	<2	Moderate	0.43			
	21-52	15-25	1.20-1.40	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low-----	0.43			
	52-60	---	---	0.2-0.6	---	---	---	---	---			
AtB, AtC----- Altvan	0-11	16-23	1.20-1.40	0.6-2.0	0.20-0.22	6.1-7.8	<2	Low-----	0.28	4	5	1-2
	11-21	20-35	1.30-1.50	0.6-2.0	0.17-0.19	6.6-8.4	<2	Moderate	0.32			
	21-30	18-25	1.25-1.50	0.6-2.0	0.15-0.19	7.4-8.4	<2	Low-----	0.32			
	30-34	8-15	1.30-1.50	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low-----	0.24			
	34-60	0-5	1.50-1.70	>20	0.02-0.04	7.4-8.4	<2	Low-----	0.10			
AvD*: Altvan-----	0-7	16-23	1.20-1.40	0.6-2.0	0.20-0.22	6.1-7.8	<2	Low-----	0.28	4	5	1-2
	7-26	20-35	1.30-1.50	0.6-2.0	0.17-0.19	6.6-8.4	<2	Moderate	0.32			
	26-33	18-25	1.25-1.50	0.6-2.0	0.15-0.19	7.4-8.4	<2	Low-----	0.32			
	33-37	8-15	1.30-1.50	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low-----	0.24			
	37-60	0-5	1.50-1.70	>20	0.02-0.04	7.4-8.4	<2	Low-----	0.10			
Dix-----	0-18	7-18	1.30-1.50	2.0-6.0	0.13-0.18	6.1-7.8	<2	Low-----	0.20	2	3	1-2
	18-60	2-10	1.70-1.90	6.0-20	0.04-0.07	6.6-8.4	<2	Low-----	0.05			
Bb----- Bankard	0-6	2-10	1.80-1.95	6.0-20	0.10-0.15	7.4-8.4	<2	Low-----	0.17	5	2	.5-1
	6-60	0-10	1.85-2.00	6.0-20	0.07-0.14	7.4-9.0	<2	Low-----	0.17			
Bc----- Bankard	0-11	2-10	1.80-1.95	6.0-20	0.10-0.15	7.4-8.4	<2	Low-----	0.17	5	2	.5-2
	11-20	0-10	1.85-2.00	6.0-20	0.07-0.15	7.4-8.4	<2	Low-----	0.17			
	20-60	0-10	1.85-2.00	6.0-20	0.07-0.14	7.4-8.4	<2	Low-----	0.17			
Be, BeB, BeC, BeD, BeE----- Bayard	0-12	5-18	1.30-1.50	2.0-6.0	0.13-0.18	6.6-7.8	<2	Low-----	0.20	5	3	1-3
	12-60	5-18	1.20-1.50	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.20			
Bg, BgB, BgC, BgD----- Bridget	0-13	5-18	1.30-1.50	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low-----	0.32	5	3	1-3
	13-19	5-18	1.40-1.60	0.6-2.0	0.16-0.24	7.4-8.4	<2	Low-----	0.43			
	19-60	5-18	1.40-1.60	0.6-2.0	0.16-0.24	7.4-8.4	<2	Low-----	0.43			
BuC----- Busher	0-11	5-15	1.30-1.50	2.0-6.0	0.15-0.18	6.1-7.8	<2	Low-----	0.20	5	3	1-2
	11-56	5-12	1.40-1.60	2.0-6.0	0.13-0.19	6.6-8.4	<2	Low-----	0.28			
	56-60	---	---	0.2-0.6	---	---	---	---	---			
BxD*: Busher-----	0-19	5-15	1.30-1.50	2.0-6.0	0.15-0.18	6.1-7.8	<2	Low-----	0.20	5	3	1-2
	19-45	5-12	1.40-1.60	2.0-6.0	0.13-0.19	6.6-8.4	<2	Low-----	0.28			
	45-60	---	---	0.2-0.6	---	---	---	---	---			
Tassel-----	0-5	5-12	1.30-1.50	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low-----	0.24	2	3	.5-3
	5-17	5-12	1.40-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24			
	17-60	---	---	0.2-0.6	---	---	---	---	---			
ByE*: Busher-----	0-16	5-15	1.30-1.50	2.0-6.0	0.15-0.18	6.1-7.8	<2	Low-----	0.20	5	3	1-2
	16-42	5-12	1.40-1.60	2.0-6.0	0.13-0.19	6.6-8.4	<2	Low-----	0.28			
	42-60	---	---	0.2-0.6	---	---	---	---	---			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
ByE*: Tassel-----	0-6	2-10	1.60-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24	2	2	.5-3
	6-18	5-12	1.40-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24			
	18-60	---	---	0.2-0.6	---	---	---	---	---			
CcF----- Canyon	0-6	5-15	1.30-1.50	2.0-6.0	0.13-0.18	7.4-8.4	<2	Low-----	0.24	2	3	.5-2
	6-11	12-25	1.45-1.70	0.6-2.0	0.13-0.18	7.4-8.4	<2	Low-----	0.20			
	11-60	---	---	0.2-0.6	---	---	---	---	---			
CdG*: Canyon-----	0-5	5-15	1.30-1.50	2.0-6.0	0.13-0.18	7.4-8.4	<2	Low-----	0.24	2	3	.5-2
	5-14	12-25	1.45-1.70	0.6-2.0	0.13-0.18	7.4-8.4	<2	Low-----	0.20			
	14-60	---	---	0.2-0.6	---	---	---	---	---			
Rock outcrop----	0-60	---	---	---	---	---	<2	---	---	---	8	---
CeE*: Canyon-----	0-6	5-15	1.30-1.50	2.0-6.0	0.13-0.18	7.4-8.4	<2	Low-----	0.24	2	3	.5-2
	6-11	12-25	1.45-1.70	0.6-2.0	0.13-0.18	7.4-8.4	<2	Low-----	0.20			
	11-60	---	---	0.2-0.6	---	---	---	---	---			
Bayard-----	0-12	5-18	1.30-1.50	2.0-6.0	0.13-0.18	6.6-7.8	<2	Low-----	0.20	5	3	1-3
	12-60	5-18	1.20-1.50	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.20			
CtB, CtC----- Creighton	0-10	5-15	1.25-1.35	0.6-2.0	0.15-0.17	6.1-7.8	<2	Low-----	0.32	5	3	1-3
	10-30	5-18	1.30-1.40	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low-----	0.43			
	30-60	5-18	1.30-1.40	0.6-2.0	0.15-0.17	7.9-9.0	0-2	Low-----	0.43			
DhD, DhG----- Dix	0-11	5-20	1.60-1.80	0.6-2.0	0.12-0.18	6.1-7.8	<2	Low-----	0.15	2	8	1-2
	11-19	2-10	1.70-1.90	6.0-20	0.04-0.06	6.6-8.4	<2	Low-----	0.05			
	19-60	0-3	1.70-2.00	>20	0.02-0.04	6.6-8.4	<2	Low-----	0.05			
Du, DuB----- Duroc	0-6	15-20	1.20-1.45	0.6-2.0	0.12-0.22	6.6-7.8	<2	Moderate	0.28	5	5	1-3
	6-19	18-27	1.40-1.65	0.6-2.0	0.12-0.20	6.6-7.8	<2	Moderate	0.43			
	19-60	18-27	1.40-1.65	0.6-2.0	0.12-0.20	7.9-9.0	<2	Moderate	0.43			
Dv----- Duroc	0-10	15-25	1.20-1.40	0.6-2.0	0.20-0.24	6.6-7.8	<2	Low-----	0.28	5	5	1-3
	10-29	20-35	1.20-1.50	0.6-2.0	0.17-0.19	6.6-7.8	<2	Moderate	0.28			
	29-49	10-25	1.30-1.50	0.6-2.0	0.17-0.19	7.4-9.0	<2	Low-----	0.32			
	49-60	0-5	1.50-1.70	>20	0.03-0.06	7.4-9.0	<2	Low-----	0.10			
Dx----- Duroc	0-8	15-20	1.20-1.45	0.6-2.0	0.14-0.23	6.6-7.8	<2	Moderate	0.32	5	5	1-3
	8-41	18-27	1.40-1.65	0.6-2.0	0.12-0.20	6.6-7.8	<2	Moderate	0.43			
	41-60	18-27	1.40-1.65	0.6-2.0	0.12-0.20	7.9-9.0	<2	Moderate	0.43			
DyE----- Dwyer	0-4	3-8	1.35-1.45	6.0-20	0.10-0.12	6.6-8.4	<2	Low-----	0.17	5	2	1-2
	4-60	1-8	1.45-1.55	6.0-20	0.06-0.11	7.4-8.4	<2	Low-----	0.17			
ErE*: Epping-----	0-5	10-20	1.20-1.45	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low-----	0.37	2	4L	.5-2
	5-13	10-20	1.20-1.45	0.6-2.0	0.12-0.20	7.4-8.4	<2	Low-----	0.43			
	13-60	---	---	0.06-0.2	---	---	---	---	---			
Mitchell-----	0-4	10-20	1.30-1.60	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-----	0.43	5	3	.5-2
	4-60	8-18	1.20-1.60	0.6-2.0	0.16-0.22	7.4-8.4	<2	Low-----	0.43			
Gd----- Glenberg	0-6	8-20	1.30-1.50	2.0-6.0	0.16-0.18	7.4-8.4	<2	Low-----	0.24	5	3	.5-2
	6-60	8-15	1.50-1.60	2.0-6.0	0.07-0.16	7.4-8.4	<2	Low-----	0.28			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter Pct
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					
Go----- Goshen	0-12	16-25	1.20-1.40	0.6-2.0	0.20-0.24	6.1-7.8	<2	Low-----	0.32	5	5	2-4
	12-44	25-35	1.30-1.50	0.6-2.0	0.17-0.22	6.6-8.4	<2	Moderate	0.43			
	44-60	15-27	1.20-1.40	0.6-2.0	0.17-0.22	7.4-8.4	<2	Low-----	0.43			
JmB, JmC----- Jayem	0-19	5-15	1.20-1.35	2.0-6.0	0.13-0.15	6.6-7.8	<2	Low-----	0.20	5	3	1-3
	19-30	5-18	1.30-1.45	2.0-6.0	0.13-0.15	6.6-7.8	<2	Low-----	0.32			
	30-60	5-18	1.30-1.50	2.0-6.0	0.13-0.15	6.6-7.8	<2	Low-----	0.32			
Jo----- Johnstown	0-9	20-27	1.30-1.50	0.6-2.0	0.20-0.24	5.6-7.3	<2	Moderate	0.28	5	6	2-4
	9-22	27-35	1.40-1.50	0.6-2.0	0.15-0.20	6.1-7.8	<2	Moderate	0.32			
	22-46	15-32	1.30-1.50	0.6-2.0	0.17-0.22	6.6-8.4	<2	Moderate	0.43			
	46-60	2-5	1.50-1.70	>6.0	0.02-0.04	6.6-7.8	<2	Low-----	0.10			
Ke, KeB, KeC----- Keith	0-10	14-20	1.25-1.45	0.6-2.0	0.20-0.23	6.1-7.3	<2	Low-----	0.28	5	5	2-4
	10-23	18-35	1.10-1.20	0.6-2.0	0.18-0.22	6.6-7.8	<2	Moderate	0.43			
	23-60	8-20	1.30-1.40	0.6-2.0	0.20-0.22	7.4-8.4	<2	Low-----	0.43			
Ku----- Kuma	0-7	15-27	1.20-1.30	0.6-2.0	0.18-0.21	6.1-8.4	<2	Low-----	0.32	5	5	2-4
	7-42	18-35	1.25-1.35	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate	0.37			
	42-60	10-30	1.40-1.50	0.6-2.0	0.16-0.18	7.9-9.0	<2	Low-----	0.32			
Lm----- Las	0-4	15-27	1.30-1.45	0.6-2.0	0.17-0.22	7.4-8.4	0-4	Moderate	0.32	5	4L	.5-1
	4-60	18-35	1.30-1.50	0.2-0.6	0.15-0.19	7.4-8.4	0-4	Moderate	0.32			
Lw----- Las Animas	0-5	15-25	1.35-1.55	0.6-2.0	0.15-0.20	7.4-8.4	<4	Low-----	0.32	5	4L	.5-2
	5-60	8-18	1.55-1.75	2.0-6.0	0.06-0.12	7.4-8.4	<4	Low-----	0.24			
Ly----- Lodgepole	0-9	16-25	1.20-1.40	0.6-2.0	0.22-0.24	6.1-7.8	<2	Low-----	0.37	3	6	2-4
	9-47	35-50	1.25-1.50	<0.06	0.13-0.18	6.1-7.8	<2	High-----	0.28			
	47-58	8-27	1.30-1.50	0.6-2.0	0.22-0.24	6.6-8.4	<2	Low-----	0.43			
	58-60	5-20	1.40-1.50	2.0-6.0	0.10-0.18	6.6-8.4	<2	Low-----	0.17			
Mc----- McCook	0-12	10-18	1.20-1.50	0.6-2.0	0.17-0.19	7.4-8.4	<2	Low-----	0.32	5	3	1-3
	12-60	10-18	1.20-1.50	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-----	0.32			
MkC, MkD, MkE----- Mitchell	0-5	10-20	1.30-1.60	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-----	0.43	5	3	.5-2
	5-60	8-18	1.20-1.60	0.6-2.0	0.16-0.22	7.4-8.4	<2	Low-----	0.43			
Pg*----- Pits	0-60	0-8	1.70-2.00	>6.0	0.02-0.09	6.6-8.4	<2	Low-----	0.10	2	8	<.5
ReG*: Rock outcrop-----	0-60	---	---	---	---	---	<2	---	---	---	8	---
Epping-----	0-4	10-20	1.20-1.45	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low-----	0.37	2	4L	.5-2
	4-10	10-20	1.20-1.45	0.6-2.0	0.12-0.20	7.4-8.4	<2	Low-----	0.43			
	10-60	---	---	0.06-0.2	---	---	---	---	---			
RhG*: Rock outcrop-----	0-60	---	---	---	---	---	<2	---	---	---	8	---
Tassel-----	0-6	2-10	1.60-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24	2	2	.5-3
	6-12	5-12	1.40-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24			
	12-60	---	---	0.2-0.6	---	---	---	---	---			
Ro, RoB, RoC----- Rosebud	0-4	8-20	1.20-1.45	0.6-2.0	0.22-0.24	6.6-8.4	<2	Low-----	0.28	4	5	2-4
	4-15	23-35	1.15-1.30	0.6-2.0	0.15-0.17	6.6-8.4	<2	Moderate	0.28			
	15-30	15-26	1.30-1.50	0.6-2.0	0.11-0.17	7.4-9.0	<2	Low-----	0.28			
	30-60	---	---	0.2-0.6	---	---	---	---	---			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
RsD*:												
Rosebud-----	0-4	8-20	1.20-1.45	0.6-2.0	0.22-0.24	6.6-8.4	<2	Low-----	0.28	4	5	2-4
	4-17	23-35	1.15-1.30	0.6-2.0	0.15-0.17	6.6-8.4	<2	Moderate	0.28			
	17-33	15-26	1.30-1.50	0.6-2.0	0.11-0.17	7.4-9.0	<2	Low-----	0.28			
	33-60	---	---	0.2-0.6	---	---	---	---	---			
Canyon-----	0-8	10-20	1.25-1.45	0.6-2.0	0.20-0.22	7.4-8.4	<2	Low-----	0.32	2	4L	.5-2
	8-15	12-25	1.45-1.70	0.6-2.0	0.13-0.18	7.4-8.4	<2	Low-----	0.20			
	15-60	---	---	0.2-0.6	---	---	---	---	---			
Sb, SbB, SbC-----	0-10	10-25	1.30-1.40	0.6-2.0	0.20-0.22	6.1-7.8	<2	Low-----	0.28	5	6	1-2
Satanta	10-18	18-35	1.35-1.45	0.6-2.0	0.17-0.19	6.6-7.8	<2	Moderate	0.28			
	18-56	10-27	1.30-1.50	0.6-2.0	0.12-0.18	7.4-8.4	<2	Low-----	0.28			
	56-60	2-15	1.50-1.70	6.0-20	0.02-0.04	7.4-8.4	<2	Low-----	0.10			
SnC-----	0-7	10-20	1.20-1.40	0.6-2.0	0.20-0.24	6.6-8.4	<2	Low-----	0.28	5	4L	1-3
Sidney	7-19	5-20	1.15-1.30	0.6-2.0	0.15-0.19	7.4-8.4	<2	Low-----	0.28			
	19-50	5-20	1.20-1.50	0.6-2.0	0.12-0.19	7.4-9.0	<2	Low-----	0.28			
	50-60	---	---	0.2-0.6	---	---	---	---	---			
SoD*:												
Sidney-----	0-7	10-20	1.20-1.40	0.6-2.0	0.20-0.24	6.6-8.4	<2	Low-----	0.28	5	4L	1-3
	7-18	5-20	1.15-1.30	0.6-2.0	0.15-0.19	7.4-8.4	<2	Low-----	0.28			
	18-50	5-20	1.20-1.50	0.6-2.0	0.12-0.19	7.4-9.0	<2	Low-----	0.28			
	50-60	---	---	0.2-0.6	---	---	---	---	---			
Canyon-----	0-6	10-20	1.25-1.45	0.6-2.0	0.20-0.22	7.4-8.4	<2	Low-----	0.32	2	4L	.5-2
	6-11	12-25	1.45-1.70	0.6-2.0	0.13-0.18	7.4-8.4	<2	Low-----	0.20			
	11-60	---	---	0.2-0.6	---	---	---	---	---			
TbF*:												
Tassel-----	0-6	2-10	1.60-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24	2	2	.5-3
	6-13	5-12	1.40-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24			
	13-60	---	---	0.2-0.6	---	---	---	---	---			
Busher-----	0-18	5-15	1.30-1.50	2.0-6.0	0.15-0.18	6.1-7.8	<2	Low-----	0.20	5	3	1-2
	18-55	5-12	1.40-1.60	2.0-6.0	0.13-0.19	6.6-8.4	<2	Low-----	0.28			
	55-60	---	---	0.2-0.6	---	---	---	---	---			
TcG*:												
Tassel-----	0-8	2-10	1.60-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24	2	2	.5-3
	8-14	5-12	1.40-1.70	2.0-6.0	0.12-0.18	7.4-8.4	<2	Low-----	0.24			
	14-60	---	---	0.2-0.6	---	---	---	---	---			
Busher-----	0-10	5-15	1.30-1.50	2.0-6.0	0.15-0.18	6.1-7.8	<2	Low-----	0.20	5	3	1-2
	10-42	5-12	1.40-1.60	2.0-6.0	0.13-0.19	6.6-8.4	<2	Low-----	0.28			
	42-60	---	---	0.2-0.6	---	---	---	---	---			
Rock outcrop----	0-60	---	---	---	---	---	<2	---	---	---	8	---
UyB, UyC-----	0-12	15-20	1.20-1.40	0.6-2.0	0.20-0.22	6.6-7.8	<2	Low-----	0.28	5	5	1-3
Ulysses	12-24	18-27	1.20-1.40	0.6-2.0	0.10-0.19	7.4-8.4	<2	Low-----	0.43			
	24-60	18-27	1.20-1.40	0.6-2.0	0.10-0.19	7.9-8.4	<2	Low-----	0.43			
VdD-----	0-6	3-10	1.55-1.65	6.0-20	0.07-0.12	6.6-7.8	<2	Low-----	0.17	5	2	.5-1
Valent	6-60	2-8	1.60-1.70	6.0-20	0.05-0.10	6.6-7.8	<2	Low-----	0.15			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL AND WATER FEATURES

("Flooding," "water table," and terms such as "rare," "very brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Ao, AoB, AoC----- Alliance	B	None-----	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate	Low.
AtB, AtC----- Altvan	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Low.
AvD*: Altvan-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Low.
Dix-----	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
Bb----- Bankard	A	Occasional	Very brief	Mar-Aug	>6.0	---	---	>60	---	Low-----	Moderate	Low.
Bc----- Bankard	A	Frequent----	Very brief	Mar-Aug	>6.0	---	---	>60	---	Low-----	Low-----	Low.
Be, BeB, BeC, BeD, BeE----- Bayard	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Low.
Bg, BgB, BgC, BgD- Bridget	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Low.
BuC----- Busher	B	None-----	---	---	>6.0	---	---	40-60	Soft	Low-----	Low-----	Low.
BxD*, ByE*: Busher-----	B	None-----	---	---	>6.0	---	---	40-60	Soft	Low-----	Low-----	Low.
Tassel-----	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.
CcF----- Canyon	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.
CdG*: Canyon-----	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.
Rock outcrop----	D	None-----	---	---	>6.0	---	---	0	Soft	---	---	---
CeE*: Canyon-----	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
CeE*: Bayard-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Low.
CtB, CtC----- Creighton	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
DhD, DhG----- Dix	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
Du, DuB----- Duroc	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
Dv----- Duroc	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Low.
Dx----- Duroc	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
DyE----- Dwyer	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
ErE*: Epping-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	Low-----	Low.
Mitchell-----	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
Gd----- Glenberg	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Low.
Go----- Goshen	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
JmB, JmC----- Jayem	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Moderate	Low.
Jo----- Johnstown	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Ke, KeB, KeC----- Keith	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Ku----- Kuma	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
Lm----- Las	C	Occasional	Very brief	Apr-Sep	2.0-3.0	Apparent	Mar-Jun	>60	---	Moderate	High-----	Moderate.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Lw----- Las Animas	D	Frequent---	Long-----	Mar-Aug	0-1.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Moderate.
Ly----- Lodgepole	D	None-----	---	---	0-1.0	Perched	Mar-Jul	>60	---	High-----	High-----	Low.
Mc----- McCook	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
MkC, MkD, MkE----- Mitchell	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
Pg*----- Pits	A	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	Low-----	Low.
ReG*: Rock outcrop-----	D	None-----	---	---	>6.0	---	---	0	Soft	---	---	---
Epping-----	D	None-----	---	---	>6.0	---	---	10-20	Soft	Low-----	Low-----	Low.
RhG*: Rock outcrop-----	D	None-----	---	---	>6.0	---	---	0	Soft	---	---	---
Tassel-----	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.
Ro, RoB, RoC----- Rosebud	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
RsD*: Rosebud-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Low.
Canyon-----	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.
Sb, SbB, SbC----- Satanta	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Low.
SnC----- Sidney	B	None-----	---	---	>6.0	---	---	40-60	Soft	Moderate	High-----	Low.
SoD*: Sidney-----	B	None-----	---	---	>6.0	---	---	40-60	Soft	Moderate	High-----	Low.
Canyon-----	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.
TbF*: Tassel-----	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					<u>Ft</u>			<u>In</u>				
TbF*: Busher-----	B	None-----	---	---	>6.0	---	---	40-60	Soft	Low-----	Low-----	Low.
TcG*: Tassel-----	D	None-----	---	---	>6.0	---	---	6-20	Soft	Low-----	Low-----	Low.
Busher-----	B	None-----	---	---	>6.0	---	---	40-60	Soft	Low-----	Low-----	Low.
Rock outcrop----	D	None-----	---	---	>6.0	---	---	0	Soft	---	---	---
UyB, UyC----- Ulysses	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	Moderate	Low.
VdD----- Valent	A	None-----	---	---	>6.0	---	---	>60	---	Low-----	Moderate	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--ENGINEERING INDEX TEST DATA

(LL means liquid limit; PI, plasticity index; and NP, nonplastic)

Soil name, report number, horizon, and depth in inches	Classifi- cation		Grain-size distribution						LL	PI	Specific gravity
			Percentage passing sieve--				Percentage smaller than--				
	AASHTO*	Uni- fied	No. 4	No. 10	No. 40	No. 200	.05 mm	.002 mm	Pct		
Alliance loam**: (S83NE-033-044)											
Ap----- 0 to 6	A-4(8)	CL	100	99	97	86	70	21	31	10	2.56
Bt1----- 9 to 17	A-7-6 (13)	CL	100	100	99	94	79	29	42	21	2.59
C----- 27 to 47	A-4(8)	ML	100	99	96	81	63	11	27	4	2.62
Alliance loam**: (S85NE-033-054)											
Ap----- 0 to 7	A-4(8)	CL- ML	100	100	98	88	70	20	28	5	2.61
Bt1----- 7 to 13	A-6(11)	CL	100	100	99	94	85	29	39	18	2.62
C----- 33 to 45	A-4(8)	ML	100	99	98	90	80	11	26	2	2.64
Canyon fine sandy loam**: (S84NE-033-117)											
A----- 0 to 3	A-4(2)	SM	99	98	86	46	34	6	31	2	2.56
C----- 6 to 11	A-4(1)	SM	100	99	86	41	33	10	34	NP	2.59
Duroc loam**: (S81NE-033-044)											
Ap----- 0 to 6	A-4(7)	CL- ML	100	100	98	70	54	14	25	4	2.58
A3----- 19 to 33	A-6(10)	CL	100	100	100	90	75	27	38	16	2.59
AC----- 49 to 57	A-6(9)	CL	100	100	100	90	79	19	35	13	2.62
Jayem fine sandy loam**: (S81NE-033-049)											
Ap----- 0 to 5	A-2-4 (0)	SM	100	100	92	31	17	6	18	NP	2.63
AC----- 20 to 30	A-2-4 (1)	SM	100	100	89	25	13	3	18	NP	2.67
C1----- 30 to 54	A-4(1)	SM	100	100	94	41	21	4	19	1	2.66
Kuma loam**: (S84NE-033-120)											
Ap----- 0 to 7	A-4(8)	CL	100	100	100	91	75	20	33	10	2.57
Bt1----- 11 to 19	A-6(10)	CL	100	100	99	91	79	20	36	14	2.57
C1----- 29 to 38	A-4(8)	CL- ML	100	100	100	91	75	12	29	5	2.58

See footnotes at end of table.

TABLE 19.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classifi- cation		Grain-size distribution						LL	PI	Specific gravity
			Percentage passing sieve--				Percentage smaller than--				
	AASHTO*	Uni- fied	No. 4	No. 10	No. 40	No. 200	.05 mm	.002 mm	Pct		
Kuma loam**: (S85NE-033-051)											
Ap----- 0 to 7	A-4(8)	ML	100	100	100	91	77	15	25	NP	2.62
Bt----- 7 to 14	A-6(10)	CL	100	100	100	92	79	24	34	14	2.64
Btbl--- 14 to 24	A-4(8)	CL	100	100	100	91	78	20	33	10	2.65
C2----- 56 to 74	A-4(8)	ML	100	100	100	90	73	7	25	1	2.66
Rosebud loam**: (S83NE-033-042)											
Ap----- 0 to 6	A-6(9)	CL	100	100	95	82	66	18	34	13	2.59
Bt2---- 10 to 13	A-7-6 (16)	CL	100	100	99	92	82	34	48	25	2.67
C----- 18 to 23	A-6(10)	CL	99	98	93	81	71	19	38	14	2.66
Rosebud loam**: (S85NE-033-055)											
Ap----- 0 to 4	A-4(7)	ML	100	100	94	72	59	8	26	1	2.64
Bt2---- 9 to 15	A-6(10)	CL	100	100	96	84	73	23	36	15	2.65
Bk2---- 20 to 30	A-4(8)	CL	100	99	95	83	72	18	32	9	2.65

* The group index number is computed by the modified system.

** Locations of the sampled pedons are as follows:

- Alliance loam (S83NE-033-044), 2,000 feet east and 150 feet south of the northwest corner of sec. 27, T. 15 N., R. 52 W.
- Alliance loam (S85NE-033-054), 1,300 feet east and 370 feet south of the northwest corner of sec. 27, T. 15 N., R. 52 W.
- Canyon fine sandy loam, 2,050 feet east and 150 feet south of the northwest corner of sec. 19, T. 14 N., R. 51 W.
- Duroc loam, 1,200 feet south and 220 feet east of the northwest corner of sec. 18, T. 16 N., R. 48 W.
- Jayem fine sandy loam, 300 feet west and 200 feet south of the northeast corner of sec. 25, T. 16 N., R. 49 W.
- Kuma loam (S84NE-033-120), 700 feet south and 150 feet west of the northeast corner of sec. 27, T. 16 N., R. 50 W.
- Kuma loam (S85NE-033-051), 2,300 feet west and 275 feet south of the northeast corner of sec. 26, T. 16 N., R. 50 W.
- Rosebud loam (S83NE-033-042), 300 feet east and 100 feet north of the southwest corner of sec. 17, T. 13 N., R. 52 W.
- Rosebud loam (S85NE-033-055), 425 feet north and 75 feet west of the southeast corner of sec. 36, T. 14 N., R. 53 W.

TABLE 20.--CLASSIFICATION OF THE SOILS

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

Soil name	Family or higher taxonomic class
Alliance-----	Fine-silty, mixed, mesic Aridic Argiustolls
Altvan-----	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aridic Argiustolls
Bankard-----	Sandy, mixed, mesic Ustic Torrifluvents
Bayard-----	Coarse-loamy, mixed, mesic Torriorthentic Haplustolls
Bridget-----	Coarse-silty, mixed, mesic Torriorthentic Haplustolls
Busher-----	Coarse-loamy, mixed, mesic Aridic Haplustolls
Canyon-----	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Creighton-----	Coarse-loamy, mixed, mesic Aridic Haplustolls
Dix-----	Sandy-skeletal, mixed, mesic Torriorthentic Haplustolls
Duroc-----	Fine-silty, mixed, mesic Pachic Haplustolls
Dwyer-----	Mixed, mesic Ustic Torripsamments
Epping-----	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
*Glenberg-----	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Goshen-----	Fine-silty, mixed, mesic Pachic Argiustolls
Jayem-----	Coarse-loamy, mixed, mesic Aridic Haplustolls
Johnstown-----	Fine-silty, mixed, mesic Pachic Argiustolls
Keith-----	Fine-silty, mixed, mesic Aridic Argiustolls
Kuma-----	Fine-silty, mixed, mesic Pachic Argiustolls
Las-----	Fine-loamy, mixed (calcareous), mesic Aquic Ustifluvents
Las Animas-----	Coarse-loamy, mixed (calcareous), mesic Typic Fluvaquents
*Lodgepole-----	Fine, montmorillonitic, mesic Typic Argiaquolls
McCook-----	Coarse-silty, mixed, mesic Fluventic Haplustolls
*Mitchell-----	Coarse-silty, mixed (calcareous), mesic Ustic Torriorthents
Rosebud-----	Fine-loamy, mixed, mesic Aridic Argiustolls
Satanta-----	Fine-loamy, mixed, mesic Aridic Argiustolls
Sidney-----	Coarse-loamy, mixed, mesic Torriorthentic Haplustolls
Tassel-----	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Ulysses-----	Fine-silty, mixed, mesic Aridic Haplustolls
Valent-----	Mixed, mesic Ustic Torripsamments

Interpretive Groups

INTERPRETIVE GROUPS

(Dashes indicate that the soil was not assigned to the interpretive group)

Map symbol and soil name	Land capability*		Prime farmland**	Range site	Windbreak suitability group
	N	I			
Ao----- Alliance	IIc-1	I-4	Yes	Silty-----	3
AoB----- Alliance	IIe-1	IIe-4	Yes	Silty-----	3
AoC----- Alliance	IIIe-1	IIIe-4	Yes	Silty-----	3
AtB----- Altvan	IIIe-1	IIIe-7	Yes	Silty-----	6G
AtC----- Altvan	IVe-1	IVe-7	Yes	Silty-----	6G
AvD----- Altvan----- Dix-----	IVe-1	IVe-7	---	Silty----- Shallow to Gravel----	6G 10
Bb----- Bankard	IVe-5	IVe-11	---	Sandy Lowland-----	7
Bc----- Bankard	VIw-7	---	---	Shallow to Gravel----	10
Be----- Bayard	IIe-3	IIe-8	Yes	Sandy-----	5
BeB----- Bayard	IIIe-3	IIe-8	Yes	Sandy-----	5
BeC----- Bayard	IVe-3	IIIe-8	Yes	Sandy-----	5
BeD----- Bayard	IVe-3	IVe-8	---	Sandy-----	5
BeE----- Bayard	VIe-3	---	---	Sandy-----	7
Bg----- Bridget	IIc-1	IIe-6	Yes	Silty-----	3
BgB----- Bridget	IIe-3	IIe-6	Yes	Silty-----	3
BgC----- Bridget	IIIe-3	IIIe-6	Yes	Silty-----	3
BgD----- Bridget	IVe-3	IVe-6	---	Silty-----	3
BuC----- Busher	IIIe-3	IIIe-8	Yes	Sandy-----	5
BxD----- Busher----- Tassel-----	IVe-3	IVe-8	---	Sandy----- Shallow Limy-----	5 10

See footnotes at end of table.

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability*		Prime farmland**	Range site	Windbreak suitability group
	N	I			
ByE----- Busher----- Tassel-----	VIe-3	---	---	Sandy----- Shallow Limy-----	7 10
CcF----- Canyon	VIIs-4	---	---	Shallow Limy-----	10
CdG----- Canyon----- Rock outcrop.	VIIIs-4	---	---	Shallow Limy-----	10
CeE----- Canyon----- Bayard-----	VIIs-4	---	---	Shallow Limy----- Sandy-----	10 10
CtB----- Creighton	IIe-3	IIe-6	Yes	Silty-----	3
CtC----- Creighton	IIIe-3	IIIe-6	Yes	Silty-----	3
DhD----- Dix	VIIs-4	---	---	Shallow to Gravel---	10
DhG----- Dix	VIIIs-4	---	---	Shallow to Gravel---	10
Du----- Duroc	IIC-1	I-6	Yes	Silty-----	1
DuB----- Duroc	IIe-1	IIe-6	Yes	Silty-----	3
Dv----- Duroc	IIIc-1	I-6	Yes	Silty-----	3
Dx----- Duroc	IIIc-1	I-6	Yes	Silty-----	1
DyE----- Dwyer	VIe-5	---	---	Sands-----	7
ErE----- Epping----- Mitchell-----	VIIs-4	---	---	Shallow Limy----- Limy Upland-----	10 8
Gd----- Glenberg	IIIe-3	IIe-8	Yes	Sandy Lowland-----	1L
Go----- Goshen	IIC-1	I-4	Yes	Silty-----	1
JmB----- Jayem	IIIe-3	IIe-8	Yes	Sandy-----	5
JmC----- Jayem	IVe-3	IIIe-8	Yes	Sandy-----	5
Jo----- Johnstown	IIC-1	I-4	Yes	Silty-----	3

See footnotes at end of table.

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability*		Prime farmland**	Range site	Windbreak suitability group
	N	I			
Ke----- Keith	IIC-1	I-4	Yes	Silty-----	3
KeB----- Keith	IIe-1	IIe-4	Yes	Silty-----	3
KeC----- Keith	IIIe-1	IIIe-4	Yes	Silty-----	3
Ku----- Kuma	IIC-1	I-4	Yes	Silty-----	3
Lm----- Las	IVw-4	IIw-6	Yes	Subirrigated-----	2S
Lw----- Las Animas	Vw-7	---	---	Wetland-----	10
Ly----- Lodgepole	IIIw-2	IVw-2	---	Clayey Overflow-----	10
Mc----- McCook	IIC-1	IIe-5	Yes	Silty Lowland-----	1L
MkC----- Mitchell	IIIe-3	IIIe-6	---	Limy Upland-----	8
MkD----- Mitchell	IVe-3	IVe-6	---	Limy Upland-----	8
MkE----- Mitchell	VIe-3	---	---	Limy Upland-----	8
Pg----- Pits	VIIIIs-8	---	---	---	---
ReG----- Rock outcrop. Epping-----	VIIIs-4	---	---	Shallow Limy-----	10
RhG----- Rock outcrop. Tassel-----	VIIIs-4	---	---	Shallow Limy-----	10
Ro----- Rosebud	IIIC-1	I-4	Yes	Silty-----	6R
RoB----- Rosebud	IIIe-1	IIIe-4	Yes	Silty-----	6R
RoC----- Rosebud	IVe-1	IIIe-4	Yes	Silty-----	6R
RsD----- Rosebud----- Canyon-----	IVe-1	---	---	Silty----- Shallow Limy-----	6R 10
Sb----- Satanta	IIC-1	I-4	Yes	Silty-----	3

See footnotes at end of table.

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability*		Prime farmland**	Range site	Windbreak suitability group
	N	I			
SbB----- Satanta	IIE-1	IIE-4	Yes	Silty-----	3
SbC----- Satanta	IIIe-1	IIIe-4	Yes	Silty-----	3
SnC----- Sidney	IIIe-1	IIIe-6	Yes	Silty-----	3
SoD----- Sidney----- Canyon-----	IVe-1	---	---	Silty----- Shallow Limy-----	3 10
TbF----- Tassel----- Busher-----	VIIs-4	---	---	Shallow Limy----- Sandy-----	10 10
TcG----- Tassel----- Busher----- Rock outcrop.	VIIIs-4	---	---	Shallow Limy----- Savannah-----	10 10
UyB----- Ulysses	IIE-1	IIE-6	Yes	Silty-----	3
UyC----- Ulysses	IIIe-1	IIIe-6	Yes	Silty-----	3
VdD----- Valent	VIe-5	IVe-11	---	Sands-----	7

* A complex is treated as a single management unit in the land capability and prime farmland columns. The N column is for nonirrigated soils; the I column is for irrigated soils.

** Where irrigated.

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