

# classification of the soils

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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. In table 14, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

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

**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 Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

**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 Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that have an aquic 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 *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

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

mineral content, temperature regime, 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-loamy, mixed, nonacid, mesic Typic Haplaquents.

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

## 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 (4). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (5). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

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

### Absher series

The Absher series consists of deep, moderately well drained soils that formed in alluvium. These soils are on fans and terraces on uplands at an elevation of 2,300 to 3,600 feet. Slopes are 0 to 4 percent. The average annual precipitation is 10 to 15 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 100 to 125 days.

Typical pedon of Absher clay loam, in native grass, 1,700 feet east and 400 feet north of the SW corner of sec. 31, T. 37 N., R. 20 E.

A2—0 to 2 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; moderate thin platy

structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine and very fine pores; many unstained silt and sand grains; vesicular surface crust about 1/4 inch thick on surface; neutral; abrupt smooth boundary.

B21t—2 to 5 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium columnar structure; extremely hard, very firm, sticky and plastic; common to many fine roots mainly along faces of peds with few roots in matrix; few very fine pores; light gray coating of unstained grains of silt and sand on top of columns; common thin continuous clay films on faces of peds; mildly alkaline; clear wavy boundary.

B22t—5 to 11 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium angular blocky; extremely hard, very firm, sticky and plastic; common fine roots mainly along faces of peds; few fine pores; common thin continuous clay films on faces of peds; moderately alkaline; gradual wavy boundary.

B3cacs—11 to 20 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium angular and subangular blocky; very hard, firm, sticky and plastic; common to few fine roots; common fine and very fine pores; few fine soft masses of lime; few seams and crystals of gypsum; strongly effervescent; strongly alkaline; gradual wavy boundary.

C1cs—20 to 40 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few fine roots; common fine threads and crystals of gypsum; strongly effervescent; strongly alkaline; gradual wavy boundary.

C2—40 to 60 inches; light olive brown (2.5Y 5/4) clay loam with thin lenses of loam and silty clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine seams of gypsum; strongly effervescent; moderately alkaline.

In cultivated areas, the surface layer is clay loam. The B horizon is clay or silty clay. The depth to accumulated gypsum ranges from 10 to 15 inches. The C horizon is moderately alkaline to strongly alkaline. The C horizon, to a depth of 40 inches, is 35 to 50 percent clay. Below 40 inches the texture is clay loam, clay, or silty clay.

### Assinniboine series

The Assinniboine series consists of deep, well drained soils that formed in alluvium or eolian material. These soils are on glaciated uplands at an elevation of 2,500 to 3,500 feet. Slopes are 0 to 4 percent. The average annual precipitation is 10 to 14 inches, and the average

annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Assinniboine fine sandy loam, in an area of abandoned cropland, 2,200 feet west and 1,000 feet north of the SE corner of sec. 7, T. 36 N., R. 20 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, dark brown (10YR 3/3) moist; moderate medium granular structure parting to weak very fine granular; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; neutral; clear smooth boundary.

B1—5 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to weak medium subangular blocky; hard, very friable, slightly sticky and slightly plastic; common fine roots; many medium and fine pores; neutral; clear smooth boundary.

B21t—9 to 18 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; many medium and fine pores; few patchy clay films on vertical faces of peds; neutral; clear wavy boundary.

B22t—18 to 21 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to weak medium subangular blocky; hard, very friable, slightly sticky and slightly plastic; common very fine roots; common medium and fine pores; few patchy clay films on vertical faces of peds; mildly alkaline; clear smooth boundary.

C1ca—21 to 32 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots; few fine soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2ca—32 to 60 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common fine threads and soft masses of lime; violently effervescent; moderately alkaline.

The depth to carbonates ranges from 14 to 22 inches. The substratum is mainly sandy loam or fine sandy loam. In some pedons there are thin lenses of loamy sand below a depth of 30 inches. Also, in some pedons, instead of a B1 horizon there is a B3 horizon.

### Attewan series

The Attewan series consists of deep, well drained soils that formed in alluvium. These soils are on upland terraces at an elevation of 2,400 to 3,600 feet. Slopes

are 0 to 4 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Attewan loam, in a cultivated field, 2,000 feet south and 900 feet west of NE corner of sec. 29, T. 37 N., R. 26 E.

- Ap—0 to 6 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; 5 percent pebbles, by volume; neutral; clear smooth boundary.
- B2t—6 to 15 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium prismatic structure parting to strong fine and medium angular blocky; hard, friable, sticky and plastic; many fine roots; common fine and very fine pores; dark grayish brown (10YR 3/2) common thin clay films on faces of peds; 5 percent pebbles, by volume; mildly alkaline; clear smooth boundary.
- B3ca—15 to 20 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium angular and subangular blocky; hard, very friable, slightly sticky and plastic; common fine roots; many fine and very fine pores; 5 percent pebbles, by volume; common light gray (2.5Y 7/2) soft masses and threads of lime; violently effervescent; moderately alkaline; gradual wavy boundary.
- C1ca—20 to 25 inches; light brownish gray (2.5Y 6/2) light clay loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse prismatic structure; hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; 10 percent pebbles, by volume; many soft masses of lime and lime coats on pebbles; violently effervescent; moderately alkaline; gradual wavy boundary.
- IIC2—25 to 60 inches; grayish brown (2.5Y 5/2) very gravelly loamy sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, about 60 percent pebbles and a few cobbles, by volume; lime crusts on underside of pebbles in upper part; strongly effervescent; moderately alkaline.

The combined thickness of the A and B horizons ranges from 12 to 20 inches. The B horizon is brown or grayish brown. It is mostly clay loam, but in some pedons it is sandy clay loam. The IIC horizon is very gravelly loamy sand or very gravelly sand. The depth to the IIC horizon ranges from 20 to 40 inches.

### Barkof series

The Barkof series consists of moderately deep, well drained soils that formed in material that weathered from clayey shale. These soils are on uplands at an elevation

of 2,500 to 4,400 feet. They are underlain by platy shale at a depth of 20 to 40 inches. Slopes are 2 to 25 percent. The average annual precipitation is 13 to 18 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 100 to 120 days.

Typical pedon of Barkof clay, in native grass, 150 feet west and 30 feet south of the NE corner of sec. 14, T. 26 N., R. 23 E.

- A1—0 to 7 inches; dark grayish brown (2.5Y 4/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine granular structure; very hard, very firm, sticky and very plastic; a 1/8-inch crust forms on the surface when the soil material is dry; many very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.
- B2—7 to 24 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium and coarse subangular blocky; very hard, very firm, sticky and very plastic; many very fine roots in upper part decreasing to few very fine roots in the lower part; few very fine pores; few distinct slickensides; strongly effervescent; strongly alkaline; gradual smooth boundary.
- B3—24 to 28 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; weak medium prismatic structure; very hard, very firm, sticky and very plastic; few fine roots; about 20 percent weathered shale chips, by volume; slightly effervescent; moderately alkaline; gradual wavy boundary.
- Cr—28 to 60 inches; gray (5Y 5/1) platy shale that rubs to clay and clay loam, dark gray (5Y 4/1) moist; few fine roots in upper few inches; slightly effervescent; moderately alkaline.

The A horizon is dark grayish brown, grayish brown, or olive gray. The A horizon is mildly or moderately alkaline, and the B horizon is moderately or strongly alkaline. There are a few distinct slickensides or pressure faces in the B2 horizon. In some C horizons, threads and soft masses of gypsum range from few to common.

### Bascovy series

The Bascovy series consists of moderately deep, well drained soils that formed in material that weathered from clayey shale. These soils are on uplands at an elevation of 2,400 to 3,600 feet. They are underlain by platy shale at a depth of 20 to 40 inches. Slopes are 2 to 8 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Bascovy clay, in native grass, 2,340 feet north and 150 feet west of the SE corner of sec. 17, T. 25 N., R. 21 E.

- A1—0 to 6 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium

and fine subangular blocky structure; extremely hard, firm, very sticky and very plastic; common fine and medium roots; few fine pores; thin light brownish gray (2.5Y 6/2) vesicular crust 1/4 inch thick on the surface; few vertical cracks less than 1/2 inch wide; slightly effervescent in spots; moderately alkaline; clear smooth boundary.

B21—6 to 10 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; moderate medium and fine subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few fine roots; few fine pores; few vertical cracks less than 1/4 inch wide; mildly alkaline; gradual smooth boundary.

B22cs—10 to 15 inches; olive gray (5Y 5/2) clay, olive gray (5Y 5/2) moist; moderate medium and fine subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few fine roots; few fine pores; few vertical cracks; few pressure faces or slickensides; few fine seams of gypsum; neutral; gradual wavy boundary.

C1—15 to 23 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; weak medium and fine subangular blocky structure; extremely hard, very firm, very sticky and very plastic; very few fine pores; few fine roots; about 15 percent shale chips, by volume, increasing with depth; medium acid; wavy boundary.

C2r—23 to 60 inches; olive gray and olive brown platy shale that rubs to clay texture; medium acid.

The surface to a depth of 1/4 inch to 1 inch is either a thin vesicular crust or it has fine granular structure. Clay content of the soil above the shale ranges from 45 to 60 percent. The C horizon contains a few fine threads or common soft masses of segregated gypsum crystals. The platy shale is neutral to strongly acid.

## Bearpaw series

The Bearpaw series consists of deep, well drained soils that formed in glacial till. These soils are on glaciated uplands at an elevation of 2,600 to 3,800 feet. Slopes are 0 to 8 percent. The average annual precipitation is 13 to 17 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 100 to 125 days.

Typical pedon of Bearpaw clay loam, in native grass, 1,320 feet west and 1,200 feet south of the NE corner of sec. 8, T. 28 N., R. 22 E.

A1—0 to 3 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium granular structure parting to moderate fine and very fine granular; slightly hard, very friable, sticky and nonplastic; many fine roots; neutral; clear smooth boundary.

B1—3 to 5 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to

moderate fine subangular blocky; hard, friable, sticky and slightly plastic; many fine roots; common fine pores; mildly alkaline; clear smooth boundary.

B21t—5 to 10 inches; dark grayish brown (2.5Y 4/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; strong medium and fine prismatic structure parting to moderate medium and fine angular blocky; very hard, friable, sticky and plastic; common to many fine and very fine roots; few to common fine and very fine pores; common thin continuous clay films on faces of peds; 5 percent pebbles, by volume; mildly alkaline; clear smooth boundary.

B22t—10 to 16 inches; grayish brown (10YR 5/2) clay loam, (10YR 4/2) moist; strong medium and fine prismatic structure parting to strong medium and fine angular blocky; very hard, friable, sticky and plastic; common fine and very fine roots; few to common fine and very fine pores; dark grayish brown (10YR 4/2) coats on faces of peds; common thin continuous clay films on faces of peds; 5 percent pebbles, by volume; mildly alkaline; clear wavy boundary.

B3tca—16 to 23 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium angular and subangular blocky; very hard, friable, sticky and plastic; common to few fine and very fine roots; few to common fine pores; few thin clay films on vertical faces of peds; 5 percent pebbles, by volume; few to common fine and medium soft masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—23 to 39 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; very hard, friable, sticky and plastic; few very fine roots; common fine pores; 5 percent pebbles, by volume; common to many fine and medium soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—39 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and plastic; few very fine roots in the upper part; 5 percent pebbles, by volume; few to common fine and medium soft masses of lime; strongly effervescent; strongly alkaline.

The B2t horizon is heavy clay loam or light clay. It has moderate or strong grades of prismatic and blocky structure. Color ranges from dark brown to grayish brown. The C horizon has few or common threads and soft masses of gypsum in the lower part of some pedons. Depth to carbonates ranges from 10 to 18 inches.

### Beaverell series

The Beaverell series consists of deep, well drained soils that formed in alluvium. The underlying material below a depth of 10 to 20 inches is very gravelly sand. Beaverell soils are on terraces in uplands at an elevation of 2,400 to 3,600 feet. Slopes are 0 to 4 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Beaverell gravelly loam, in native grass, 30 feet north and 1,000 feet west of the SE corner of sec. 15, T. 35 N., R. 23 E.

- A1—0 to 3 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine granular structure parting to weak very fine granular; slightly hard, very friable, slightly sticky and nonplastic; many fine and very fine roots; many fine and medium pores; about 15 percent pebbles, by volume; neutral; clear smooth boundary.
- B21t—3 to 9 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium and fine angular blocky; hard, friable, sticky and slightly plastic; many fine and very fine roots; common fine and very fine pores; few thin discontinuous clay films on faces of peds; about 35 percent pebbles, by volume; neutral; clear smooth boundary.
- B22t—9 to 11 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; many medium and fine pores; few thin discontinuous clay films on faces of peds; about 50 percent pebbles, by volume; lime coats on undersides of larger pebbles; neutral; clear wavy boundary.
- IIC1ca—11 to 17 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common very fine roots; about 60 percent pebbles, by volume; lime coats on undersides of pebbles; strongly effervescent; mildly alkaline; gradual wavy boundary.
- IIC2—17 to 60 inches; brown (10YR 5/3) very gravelly sand, dark brown (10YR 4/3) moist; single grain, loose, nonsticky and nonplastic; about 60 percent pebbles, by volume; lime coats on undersides of pebbles; strongly effervescent; mildly alkaline.

The A horizon is brown or grayish brown. Depth to carbonates ranges from 6 to 12 inches. The combined thickness of the A and B horizons ranges from 10 to 14 inches. The upper part of the C horizon is gravelly or very gravelly loam, sandy loam, or loamy sand. The Cca horizon that consists of gravelly loam has a greater concentration of accumulated lime than that which

consists of very gravelly loamy sand. Depth to the IIC2 horizon is 10 to 20 inches.

### Beaverton series

The Beaverton series consists of deep, well drained soils that formed in alluvium. These soils are on fans and terraces on uplands at an elevation of 2,800 to 4,200 feet. The underlying material, below a depth of 10 to 20 inches, is very gravelly loamy sand or very gravelly sand. Slopes are 2 to 8 percent. The average annual precipitation is 13 to 18 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Beaverton gravelly loam, in native grass, 300 feet east and 2,600 feet south of the NW corner of sec. 26, T. 27 N., R. 19 E.

- A1—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; very soft, very friable, nonsticky and nonplastic; many fine roots; about 20 percent fine pebbles, by volume; mildly alkaline; clear smooth boundary.
- B2t—3 to 10 inches; dark brown (10YR 4/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong fine angular blocky; hard, friable, slightly sticky and slightly plastic; many fine roots; few fine pores; few thin clay films on faces of peds; 20 percent fine pebbles, by volume; mildly alkaline; clear smooth boundary.
- C1ca—10 to 20 inches; light gray (10YR 7/2) very gravelly light clay loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and nonplastic; common fine roots in upper part decreasing to few in lower part of horizon; few fine pores; about 35 percent pebbles, by volume; violently effervescent; about 40 percent calcium carbonate equivalent of fine-earth fraction; moderately alkaline; gradual wavy boundary.
- IIC2ca—20 to 60 inches; grayish brown (2.5Y 4/2) very gravelly loamy sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; 55 percent pebbles, by volume; effervescent; moderately alkaline.

Depth to carbonates ranges from 7 to 10 inches. The color of the B horizon is dark grayish brown or brown. The lower part of the C horizon is very gravelly sand or very gravelly loamy sand.

### Belain series

The Belain series consists of moderately deep, well drained soils that formed in material that weathered from igneous rock. These soils are on uplands and mountains at an elevation of 3,000 to 6,000 feet. They are underlain

by bedrock at a depth of 20 to 40 inches. Slopes are 2 to 45 percent. The average annual precipitation is 14 to 19 inches. The average annual temperature is 40 to 44 degrees F., and the growing season is 90 to 110 days.

Typical pedon of Belain loam, in native grass, 400 feet west and 300 feet south of the NE corner of sec. 29, T. 27 N., R. 18 E.

- A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine roots; 5 percent subrounded pebbles, by volume; mildly alkaline; clear smooth boundary.
- B21—4 to 11 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine pores; 10 percent angular pebbles, by volume; mildly alkaline; clear wavy boundary.
- B22—11 to 15 inches; dark brown (10YR 4/3) gravelly light loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine pores; 20 percent angular pebbles, by volume; mildly alkaline; gradual wavy boundary.
- C1—15 to 22 inches; brown (10YR 5/3) gravelly light loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; many fine pores; 30 percent angular pebbles and angular cobbles, by volume; mildly alkaline; gradual wavy boundary.
- C2—22 to 28 inches; brown (10YR 5/3) very gravelly light loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots; many fine pores; 40 percent angular pebbles and angular cobbles, by volume; few lime coats on undersides of coarse fragments; mildly alkaline; abrupt irregular boundary.
- R—28 inches; igneous bedrock; fractured upper few inches; few lime coats on rocks.

The mollic epipedon is 10 to 14 inches thick. The color of the B horizon ranges from dark brown to grayish brown. The C horizon is gravelly or very gravelly loam or very gravelly sandy loam. Hard rock is at a depth of 20 to 40 inches. A Cca horizon is present in some pedons.

### Benz series

The Benz series consists of deep, well drained soils that formed in alluvium. These soils are on fans and terraces in valleys and on uplands at an elevation of

2,300 to 3,600 feet. Slopes are 0 to 4 percent. The average annual precipitation is 10 to 17 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Benz loam, in native grass, 1,500 feet west and 2,500 feet south of the NE corner of sec. 16, T. 31 N., R. 23 E.

- A1—0 to 1/2 inch; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive crust; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; many fine pores; common unstained silt and sand grains; moderately alkaline; clear smooth boundary.
- A12—1/2 inch to 3 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; common unstained silt and sand grains; common fine and very fine roots; common fine and very fine pores; slightly effervescent; moderately alkaline; clear wavy boundary.
- C1—3 to 13 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine pores; slightly effervescent; strongly alkaline; clear wavy boundary.
- C2cs—13 to 41 inches; grayish brown (2.5Y 5/2) stratified loam with thin lenses of fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak platy structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine and very fine pores; few fine threads of gypsum; slightly effervescent; strongly alkaline; clear wavy boundary.
- C3—41 to 60 inches; grayish brown (2.5Y 5/2) stratified loam and clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and slightly plastic; few very fine roots; common very fine pores; slightly effervescent; very strongly alkaline.

The A horizon is light brownish gray, grayish brown, or brown. Its surface has a thin, slightly hard vesicular crust. If cultivated, the A horizon is hard when dry. The A horizon is neutral to strongly alkaline. The C horizon is strongly alkaline or very strongly alkaline.

### Bowdoin series

The Bowdoin series consists of deep, moderately well drained soils that formed in alluvium. These soils are on flood plains and terraces in valleys at an elevation of 2,300 to 2,500 feet. Slopes are 0 to 2 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 42 to 46 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Bowdoin clay, in abandoned cropland, 900 feet west and 500 feet south of the NE corner of sec. 36, T. 31 N., R. 25 E.

- Ap—0 to 6 inches; gray (5Y 5/1) clay, olive gray (5Y 4/2) moist; weak fine subangular blocky structure; the surface in the uppermost 1/2 inch separates to strong coarse granules; extremely hard, very firm, very sticky and very plastic; common fine roots; slightly effervescent; moderately alkaline; abrupt wavy boundary.
- C1—6 to 34 inches; gray (5Y 5/1) clay, olive gray (5Y 4/2) moist; massive; extremely hard, very firm, very sticky and very plastic; common fine roots in the upper part and few fine roots in the lower part; few very fine and fine pores; when dry, cracks about 1 inch wide appear in the upper part; few fine threads of gypsum in the lower part; slightly effervescent; moderately alkaline; clear wavy boundary.
- C2—34 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, very firm, very sticky and very plastic; few to common fine threads and soft medium masses of gypsum; few fine light olive brown (2.5Y 5/6) mottles; slightly effervescent; moderately alkaline.

The A horizon is olive gray or grayish brown. Few to many threads and soft masses of gypsum and salts occur in the C horizon. Exchangeable sodium ranges from 15 to 30 percent in the C horizon. In some profiles, there are thin strata of silt loam or silty clay loam at a depth below 40 inches.

### Cabba series

The Cabba series consists of shallow, well drained soils that formed in material that weathered from soft sedimentary beds. These soils are on uplands at an elevation of 3,200 to 4,500 feet. They are underlain by soft sedimentary beds at a depth of 10 to 20 inches. Slopes are 8 to 45 percent. The average annual precipitation is 14 to 18 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Cabba loam, in native grass, 1,200 feet south and 200 feet east of the NW corner of sec. 23, T. 26 N., R. 23 E.

- A1—0 to 3 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine granular structure; soft, very friable, slightly sticky and nonplastic; many medium and very fine roots; mildly alkaline; clear smooth boundary.
- C1—3 to 8 inches; olive (5Y 5/3) loam, olive (5Y 4/3) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; many fine and very fine roots; common fine and medium pores; slightly effervescent; mildly alkaline; clear smooth boundary.

C2—8 to 12 inches; pale olive (5Y 6/3) loam, olive (5Y 5/3) moist; weak medium and thin platy structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few pores; 10 percent soft fine shale chips, by volume; slightly effervescent; mildly alkaline; clear wavy boundary.

C3r—12 to 60 inches; olive gray (5Y 5/2) and pale olive (5Y 6/3) platy soft siltstone that rubs to loam, silt loam, or clay loam; few to common fine roots in upper part.

The A1 horizon is brown, grayish brown, or dark grayish brown. The sedimentary beds are at a depth that ranges from 10 to 20 inches. They consist mainly of soft siltstone but include strata of soft sandstone and soft shale.

### Cabbart series

The Cabbart series consists of shallow, well drained soils that formed in material that weathered from soft sedimentary beds. These soils are on uplands at an elevation of 2,300 to 3,800 feet. They are underlain by soft sedimentary beds at a depth of 10 to 20 inches. Slopes are 2 to 60 percent. The average annual precipitation is 10 to 14 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Cabbart loam, in native grass, 700 feet south and 800 feet east of the NW corner of sec. 21, T. 27 N., R. 21 E.

- A1—0 to 4 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many medium and fine roots; common fine pores; slightly effervescent; mildly alkaline; clear smooth boundary.
- C1—4 to 12 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; strongly effervescent; moderately alkaline; gradual wavy boundary.
- C2r—12 to 60 inches; light brownish gray (2.5Y 6/2), and light olive brown (2.5Y 5/4) in thin layers, soft siltstone that rubs to loam, silt loam, or clay loam, grayish brown (2.5Y 5/2) moist; few fine roots in upper part; few fine soft threads of lime; strongly effervescent.

The A horizon is grayish brown to light olive brown. The C1 horizon is grayish brown, light yellowish brown, or light olive brown. Soft sedimentary beds are at a depth of 10 to 20 inches. They consist mainly of soft siltstone but include strata of soft sandstone and soft shale.

## Castner series

The Castner series consists of shallow, well drained soils that formed in material that weathered from hard sandstone and igneous rock. These soils are on uplands and mountains at an elevation of 3,000 to 6,000 feet. They are underlain by hard rock at a depth of 10 to 20 inches. Slopes are 8 to 60 percent. The average annual precipitation is 14 to 19 inches, and the average annual temperature is 40 to 44 degrees F. The growing season is 90 to 110 days.

Typical pedon of Castner gravelly loam, in native grass, 400 feet north and 2,000 feet east of the SW corner of sec. 1, T. 28 N., R. 20 E.

- A1—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; many fine pores; about 15 percent small angular pebbles, by volume; neutral; clear smooth boundary.
- C—6 to 13 inches; brown (10YR 5/3) very channery loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and nonplastic; common fine and medium roots; many fine pores; about 50 percent, by volume, angular gravel and 20 percent angular cobbles; mildly alkaline; gradual wavy boundary.
- R—13 inches; hard sandstone.

The A horizon is dark grayish brown or dark brown. Lime has accumulated in the lower part of the C horizons in some areas. The R horizon is hard sandstone or igneous rock.

## Chinook series

The Chinook series consists of deep, well drained soils that formed in alluvial or eolian material. These soils are on glaciated uplands at an elevation of 2,500 to 3,500 feet. Slopes are 2 to 12 percent. The average annual precipitation is 10 to 14 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Chinook fine sandy loam, in a cultivated field, 600 feet west and 1,000 feet south of the NE corner of sec. 25, T. 37 N., R. 19 E.

- Ap—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; many fine and medium pores; neutral; clear smooth boundary.
- B2—6 to 12 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable,

nonsticky and nonplastic; common fine roots; many fine and medium pores; neutral; gradual smooth boundary.

- B3—12 to 16 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium prismatic structure; soft, very friable, nonsticky and nonplastic; common fine roots; many fine and medium pores; mildly alkaline; gradual wavy boundary.
- C1ca—16 to 54 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots in upper part grading to few very fine roots in lower part; common fine and medium pores; strongly effervescent; moderately alkaline; clear wavy boundary.
- C2—54 to 60 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; very few very fine roots; many fine pores; few fine soft masses of lime; slightly effervescent; mildly alkaline.

The depth to carbonates ranges from 10 to 18 inches.

## Cozberg series

The Cozberg series consists of deep, well drained soils that formed in alluvial or eolian material. These soils are on outwash terraces on glaciated uplands at an elevation of 2,500 to 3,500 feet. Slopes are 0 to 4 percent. The average annual precipitation is 10 to 14 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Cozberg fine sandy loam, in a cultivated field, 1,000 feet south and 400 feet east of the NW corner of sec. 26, T. 35 N., R. 25 E.

- Ap—0 to 7 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine and medium pores; neutral; clear wavy boundary.
- B21—7 to 12 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine pores; neutral; clear wavy boundary.
- B22—12 to 20 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; moderate medium and coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and medium pores; mildly alkaline; clear wavy boundary.
- B3—20 to 26 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak coarse

prismatic structure; slightly hard, very friable, slightly sticky and nonplastic; few fine and very fine roots; common fine pores; 5 percent pebbles, by volume; few lime coats on pebbles; slightly effervescent; mildly alkaline; abrupt wavy boundary.

II C1ca—26 to 30 inches; light brownish gray (2.5Y 6/2) gravelly loamy sand, grayish brown (2.5Y 5/2) moist; single grain; loose; few fine and very fine roots; few fine and very fine pores; 20 percent pebbles, by volume; lime disseminated as large soft masses and as lime coats on pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

II C2—30 to 60 inches; pale brown (10YR 6/3) stratified loamy sand and strata of sand, brown (10YR 5/3) moist; single grain; loose; few very fine roots; common fine pores; 10 percent fine pebbles, by volume; strongly effervescent; moderately alkaline.

The mollic epipedon is 7 to 14 inches thick. Depth to carbonates ranges from 16 to 28 inches. The C horizon is mostly loamy sand, sand, or gravelly loamy sand.

### Creed series

The Creed series consists of deep, well drained soils that formed in alluvium. These soils are on uplands at an elevation of 2,400 to 3,800 feet. Slopes are 0 to 4 percent. The average annual precipitation is 10 to 15 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Creed loam, in native grass, 1,550 feet west and 2,630 feet south of the NE corner of sec. 12, T. 35 N., R. 20 E.

A1—0 to 5 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to weak fine and very fine granular; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; common fine pores; common unstained grains of sand; mildly alkaline; clear smooth boundary.

A2—5 to 6 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak thin platy structure parting to weak fine and very fine granular; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; common fine pores; many unstained grains of silt and sand; mildly alkaline; abrupt wavy boundary.

B21t—6 to 8 inches; grayish brown (2.5Y 5/2) light silty clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium columnar structure parting to strong medium and fine angular blocky; very hard, firm, very sticky and plastic; common fine roots along prism faces; common to few very fine pores; moderately thick and thin films of clay on faces of peds; light gray (10YR 7/2) skeletons on top of columns, and common unstained sand and silt grains on vertical faces of peds; mildly alkaline; clear wavy boundary.

B22t—8 to 12 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to strong medium and fine angular blocky; very hard, firm, very sticky and plastic; common fine roots; common to few very fine pores; thin continuous clay films; moderately alkaline; clear wavy boundary.

B3ca—12 to 16 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; common fine and very fine roots; common fine and very fine pores; thin discontinuous films of clay on vertical faces of peds; common soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—16 to 28 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; few to common fine and very fine roots; common fine and very fine pores; common soft masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

C2cs—28 to 60 inches; light brownish gray and light yellowish brown (2.5Y 6/2 and 2.5Y 6/4 mixed) silty clay loam and lenses of loam, dark grayish brown (2.5Y 4/2) moist; stratified; hard, friable, sticky and slightly plastic; few to common fine seams of gypsum; strongly effervescent; moderately alkaline.

Depth to carbonates ranges from 11 to 22 inches. The A horizon is 5 to 8 inches thick. The B horizon is silty clay loam, silty clay, or clay. The C horizon is silty clay loam or clay loam stratified with loam or sandy clay loam. There are few to many fine seams or soft masses of gypsum in the lower part of the C horizon.

### Delpoint series

The Delpoint series consists of moderately deep, well drained soils that formed in material that weathered from soft sedimentary beds. These soils are on uplands at an elevation of 2,300 to 3,800 feet. They are underlain by soft siltstone beds at a depth of 20 to 40 inches. Slopes are mostly 2 to 15 percent. The average annual precipitation is 10 to 14 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Delpoint loam, in native grass, 1,400 feet north and 10 feet west of the SE corner of sec. 20, T. 27 N., R. 21 E.

A1—0 to 4 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; common fine pores; mildly alkaline; clear smooth boundary.

B2—4 to 8 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many fine roots; common fine pores; slightly effervescent; mildly alkaline; clear smooth boundary.

B3ca—8 to 16 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; common fine pores; few fine soft masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—16 to 32 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse prismatic structure; hard, friable, slightly sticky and slightly plastic; few to common fine and very fine roots; few fine and very fine pores; few to common fine fragments of shale in the lower part; common medium soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2r—32 to 60 inches; grayish brown (2.5Y 5/2) and light yellowish brown (2.5Y 6/3) soft siltstone that rubs to loam, silt loam, or clay loam.

The A horizon is grayish brown, dark brown, or brown. The C horizon is grayish brown, brown, pale brown, or light yellowish brown or light brownish gray. The C horizon is silty clay loam, loam, or clay loam; it has a few soft masses of lime in some pedons. The depth to soft siltstone ranges from 20 to 40 inches. The soft sedimentary beds consist mainly of soft siltstone but include strata of soft sandstone and soft shale.

### Dilts series

The Dilts series consists of shallow, well drained soils that formed in clayey material that weathered from acid shale. These soils are on uplands at an elevation of 2,300 to 4,000 feet. They are underlain by shale at a depth of 10 to 20 inches. Slopes are 4 to 45 percent. The average annual precipitation is 12 to 15 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Dilts clay, in native grass, 1,050 feet north and 150 feet west of the SE corner of sec. 34, T. 25 N., R. 17 E.

A11—0 to 1/4 inch; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive crust; hard, friable, sticky and plastic; few fine roots; neutral; abrupt smooth boundary.

A12—1/4 inch to 3 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine granular structure; very hard, firm, sticky and plastic; few fine roots; common medium and fine pores; slightly acid; clear smooth boundary.

C1—3 to 7 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium and fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common fine and very fine pores; few fine seams and threads of gypsum; medium acid; gradual smooth boundary.

C2—7 to 16 inches; grayish brown (2.5Y 5/2) shaly clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; few fine roots; common very fine pores; about 30 percent weathered shale fragments, by volume; few threads and seams of gypsum in upper part; strongly acid; gradual wavy boundary.

C3r—16 to 60 inches; grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) platy shale that rubs to clay or clay loam; strongly acid.

In some pedons there is no thin vesicular crust. The Cr horizon ranges from medium acid to very strongly acid. The depth to this horizon ranges from 10 to 20 inches.

### Dimmick series

The Dimmick series consists of deep, very poorly drained soils that formed in clayey alluvium. These soils are in depressions or undrained small basins on glaciated uplands at an elevation of 2,500 to 3,800 feet. Slopes are 0 to 1 percent. The average annual precipitation is 12 to 16 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Dimmick clay, in native grass, 1,300 feet east and 1,150 feet south of NW corner of sec. 29, T. 37 N., R. 22 E.

O1—2 inches to 0; partially decomposed plant litter.

A11g—0 to 5 inches; gray (5Y 5/2) clay, very dark gray (5Y 3/1) moist; many very fine distinct yellowish brown (10YR 5/6) mottles; moderate medium and fine angular blocky structure; very hard, firm, very sticky and very plastic; many fine and medium roots; few fine pores; neutral; gradual smooth boundary.

A12g—5 to 22 inches; gray (5Y 5/1) clay, very dark gray (5Y 3/1) moist; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium and fine angular blocky structure; very hard, firm, very sticky and very plastic; common medium roots; common fine pores; mildly alkaline; gradual smooth boundary.

C1g—22 to 36 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; few medium faint olive brown (2.5Y 5/6) mottles; weak fine subangular blocky structure; very hard, firm, very sticky and very plastic; few roots; common fine pores; mildly alkaline; gradual wavy boundary.

C2g—36 to 60 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; few medium faint light olive brown (2.5Y 5/6) mottles; massive; hard, firm, very sticky and

very plastic; few very fine roots; few fine pores; slightly effervescent; mildly alkaline.

The A horizon is gray or dark gray. Depth to carbonates ranges from 30 to 66 inches. There are few faint to many distinct mottles throughout the pedon.

### Elloam series

The Elloam series consists of deep, well drained soils that formed in glacial till. These soils are on glaciated uplands at an elevation of 2,300 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 15 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Elloam clay loam, in native grass, 450 feet north and 150 feet east of the SW corner of sec. 36, T. 36 N., R. 19 E.

A2—0 to 3 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate very thin platy structure parting to moderate very fine granular; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; common very fine and fine pores; many unstained silt and sand grains; slightly acid; clear wavy boundary.

B21t—3 to 7 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; strong fine and medium columnar structure parting to moderate fine and medium angular blocky; very hard, firm, very sticky and very plastic; common very fine and fine roots along faces of peds; many very fine and fine tubular pores; many light gray (10YR 7/2) skeletons capping columns and on vertical faces of peds; common moderately thick films of clay on faces of peds; neutral; clear wavy boundary.

B22t—7 to 9 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate fine and medium angular blocky; very hard, firm, very sticky and very plastic; common fine and very fine roots on faces of peds; many fine and very fine tubular pores; common moderately thick films of clay on faces of peds and lining pores; moderately alkaline; clear wavy boundary.

B3ca—9 to 17 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular and angular blocky; very hard, friable, sticky and plastic; common very fine and fine roots; common fine and medium pores; 5 percent pebbles, by volume; few soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1ca—17 to 28 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure parting to weak

medium and coarse subangular blocky; very hard, friable, sticky and plastic; few very fine and fine roots; few fine and medium pores; 5 percent pebbles, by volume; many fine to coarse soft masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.

C2cacs—28 to 39 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; very hard, friable, sticky and plastic; few fine and very fine roots; few fine and medium pores; 5 percent pebbles, by volume; common soft masses of lime; common soft threads and fine masses of gypsum crystals; violently effervescent; moderately alkaline; gradual wavy boundary.

C3cacs—39 to 51 inches; olive (5Y 5/3) clay loam, olive gray (5Y 4/2) moist; massive; very hard, firm, sticky and plastic; few very fine and fine roots; few very fine and fine pores; 5 percent pebbles, by volume; many fine threads and crystals of gypsum; strongly effervescent; moderately alkaline; gradual wavy boundary.

C4cs—51 to 62 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and plastic; few very fine roots; few very fine and fine pores; 5 percent pebbles, by volume; slightly effervescent; moderately alkaline.

The A2 horizon is 1 to 4 inches thick. The B2t horizon is 35 to 45 percent clay; it has 10 to 20 percent exchangeable sodium. The C horizon has 15 to 25 percent exchangeable sodium. It is moderately or strongly alkaline.

### Ethridge series

The Ethridge series consists of deep, well drained soils that formed in alluvium. These soils are on fans and stream terraces on uplands at an elevation of 2,300 to 3,600 feet. Slopes are 0 to 4 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Ethridge silty clay loam, in cropland, 1,000 feet north and 10 feet east of the SW corner of sec. 1, T. 35 N., R. 20 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) silty clay loam, dark brown (10YR 3/3) moist; moderate fine granular structure; hard, friable, sticky and plastic; common fine roots; common unstained grains of silt and sand; neutral; clear wavy boundary.

B21t—6 to 13 inches; dark brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong medium and fine angular blocky; very hard, firm, very sticky and

plastic; common fine roots; common very fine pores; dark grayish brown (10YR 4/2) continuous thin films of clay on faces of peds; few unstained grains of sand on vertical faces of peds; mildly alkaline; clear wavy boundary.

B22tca—13 to 20 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to strong fine and medium angular and subangular blocky; very hard, firm, very sticky and plastic; common very fine roots; common very fine pores; continuous thin clay films; slightly effervescent; moderately alkaline; clear boundary.

C1ca—20 to 28 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; few fine roots; common fine and very fine pores; thin films of clay on vertical faces of peds; common fine soft masses of lime; strongly effervescent; moderately alkaline; clear boundary.

C2—28 to 42 inches; grayish brown (2.5Y 5/2) loam and thin lenses of sandy loam and silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, very friable, slightly sticky and slightly plastic; common very fine roots; common fine pores; few fine soft masses of lime; strongly effervescent; moderately alkaline; clear boundary.

C3cs—42 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; few very fine roots; few very fine pores; few and common fine seams of gypsum; strongly effervescent; moderately alkaline.

The A horizon in grassland is 1 to 3 inches thick and is loam or silt loam. The B horizon is grayish brown, brown, or dark brown silty clay loam or silty clay. The combined thickness of the A and B horizons is 14 to 24 inches. Stratification is common in the C horizon below a depth of 30 inches. The C horizon is moderately alkaline or strongly alkaline. Soft masses and threads or seams of gypsum are below a depth of 40 inches.

### Farnuf series

The Farnuf series consists of deep, well drained soils that formed in alluvium. These soils are on fans and stream terraces on uplands at an elevation of 2,500 to 4,500 feet. Slopes are 0 to 8 percent. The average annual precipitation is 13 to 18 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 100 to 120 days.

Typical pedon of Farnuf loam, in native grass, 600 feet east and 1,300 feet north of the SW corner of sec. 33, T. 29 N., R. 19 E.

A1—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate

medium and fine granular structure; hard, very friable, sticky and slightly plastic; many fine and very fine roots; common fine pores; neutral; clear wavy boundary.

B21t—5 to 13 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium and fine angular and subangular blocky; very hard, firm, sticky and plastic; many fine and very fine roots; many fine and very fine pores; common thin clay films; mildly alkaline; clear wavy boundary.

B22t—13 to 20 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium and fine angular and subangular blocky; very hard, firm, sticky and plastic; common fine and very fine roots; many fine and very fine pores; common thin clay films; mildly alkaline; clear wavy boundary.

B3ca—20 to 24 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; common fine and very fine roots; many fine and very fine pores; common soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—24 to 36 inches; pale brown (10YR 6/3) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and slightly plastic; few fine and very fine roots; many fine and very fine pores; many soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—36 to 60 inches; pale brown (10YR 6/3) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and slightly plastic; common soft masses of lime; violently effervescent; moderately alkaline.

The depth to carbonates ranges from 10 to 20 inches. The combined A and B horizons are 14 to 28 inches thick. The A horizon is dark grayish brown or dark brown. The B2 horizon is 28 to 35 percent clay. The C horizon in some pedons is 5 to 15 percent gravel and is stratified with thin lenses of silt loam, loam, and sandy clay loam.

### Gerdrum series

The Gerdrum series consists of deep, well drained soils that formed in alluvium. These soils are on terraces and fans on uplands at an elevation of 2,300 to 4,200 feet. Slopes are 0 to 4 percent. The average annual precipitation is 12 to 17 inches, and the average temperature is 41 to 45 degrees F. The growing season is 100 to 125 days.

Typical pedon of Gerdrum clay loam, in native grass, 1,740 feet north and 50 feet east of the SW corner of sec. 8, T. 25 N., R. 18 E.

- A1—0 to 2 inches; grayish brown (10YR 5/2) loam, dark brown (10YR 3/3) moist; weak thin platy structure parting to weak very fine granular; slightly hard, very friable, slightly sticky and nonplastic; common fine and very fine roots; many unstained silt and sand grains; soft very thin vesicular crust on surface; neutral; clear smooth boundary.
- A2—2 to 4 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; moderate thin platy structure; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; many very fine vesicular pores; many unstained sand and silt grains on cleavage plates; neutral; abrupt wavy boundary.
- B21t—4 to 7 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong fine and medium columnar structure parting to moderate medium and fine angular and subangular blocky; extremely hard, firm, sticky and plastic; few fine roots along faces of peds and few very fine roots in matrix; few very fine tubular pores; light gray (10YR 7/2) coats of unstained grains of sand and silt on top of columns; dark grayish brown (10YR 4/2) coats on vertical faces of peds; thin continuous clay films; mildly alkaline; clear smooth boundary.
- B22t—7 to 14 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong fine and medium prismatic structure parting to strong medium and fine angular blocky; extremely hard, firm, sticky and plastic; few fine and very fine roots along faces of peds and few very fine roots in matrix; few very fine tubular pores; dark grayish brown (10YR 4/2) coats on vertical faces of peds; thin continuous clay films; mildly alkaline; clear wavy boundary.
- B31tca—14 to 22 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium prismatic structure parting to moderate fine and medium angular and subangular blocky; very hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; thin discontinuous clay films on vertical faces of peds; common soft masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.
- B32cacs—22 to 36 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few very fine roots; few very fine pores; common soft masses of lime; common soft masses and seams of gypsum; violently effervescent; moderately alkaline; clear wavy boundary.
- C1cacs—36 to 46 inches; grayish brown (2.5Y 5/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, friable, slightly sticky and slightly plastic; very few very fine roots; very few very fine pores; few to common soft masses of lime; common soft masses and seams of

gypsum; violently effervescent; moderately alkaline; clear irregular boundary.

- IIc2ca—46 to 68 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; hard, very friable, slightly sticky and nonplastic; about 25 percent pebbles, by volume; lime disseminated throughout and as crusts on underside of coarse fragments and as seams; strongly effervescent; moderately alkaline.

The depth to carbonates ranges from 12 to 17 inches. In some pedons there is no A1 horizon. The B2t horizon is 40 to 60 percent clay.

### Glendive series

The Glendive series consists of deep, well drained soils that formed in alluvium. These soils are on flood plains and low stream terraces in valleys at an elevation of 2,300 to 3,500 feet. Slopes are 0 to 2 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 42 to 46 degrees F. The growing season is 105 to 125 days.

Typical pedon of Glendive fine sandy loam, in a cultivated field, 800 feet north and 500 feet east of the SW corner of sec. 21, T. 33 N., R. 18 E.

- Ap—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots and few medium roots; slightly effervescent; mildly alkaline; clear smooth boundary.
- C1—7 to 24 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots and few medium roots; common medium pores; slightly effervescent; mildly alkaline; clear wavy boundary.
- C2—24 to 27 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate thin platy structure; slightly hard, very friable, slightly sticky and nonplastic; few fine and medium roots; few fine pores; strongly effervescent; mildly alkaline; abrupt wavy boundary.
- C3—27 to 60 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium roots; few fine pores; strongly effervescent; mildly alkaline.

The A horizon is 6 to 8 inches thick. The C horizon is mostly fine sandy loam with strata of loamy sand and loam. The C horizon is mildly alkaline to strongly alkaline.

## Hanly series

The Hanly series consists of deep, well drained soils that formed in alluvium. These soils are on flood plains and stream terraces in valleys at an elevation of 2,300 to 3,500 feet. Slopes are 0 to 4 percent. The average annual precipitation is 11 to 14 inches. The average annual temperature is 42 to 46 degrees F. The growing season is 105 to 125 days.

Typical pedon of Hanly loamy fine sand, in native vegetation, 1,200 feet north and 2,400 feet east of the SW corner of sec. 21, T. 33 N., R. 18 E.

A1—0 to 3 inches; grayish brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; few coarse roots; thin litter of leaves and grass stems on surface; slightly effervescent; mildly alkaline; clear smooth boundary.

C1—3 to 28 inches; light brownish gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2) moist; single grain; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; strongly effervescent; mildly alkaline; clear irregular boundary.

C2—28 to 60 inches; light brownish gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2) moist; single grain; soft, very friable, nonsticky and nonplastic; few coarse roots; 2-inch lenses of fine sandy loam in upper part; strongly effervescent; mildly alkaline.

The A horizon is light brownish gray or grayish brown. The C horizon is mostly loamy fine sand with thin strata of sand and fine sandy loam.

## Harlem series

The Harlem series consists of deep, well drained or moderately well drained soils that formed in alluvium. These soils are on flood plains and stream terraces in valleys at an elevation of 2,300 to 2,700 feet. Slopes are 0 to 2 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 42 to 46 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Harlem silty clay loam, in irrigated cropland, 300 feet north and 2,490 feet west of the SE corner of sec. 21, T. 32 N., R. 23 E.

Ap—0 to 10 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine granular structure; very hard, firm, sticky and plastic; many fine and few medium roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

C1—10 to 24 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist;

moderate medium and fine subangular blocky structure; very hard, firm, sticky and plastic; many fine and few medium roots; many fine to coarse pores; few thin lenses of silt loam and silty clay; few fine crystals of salts; slightly effervescent; moderately alkaline; diffuse wavy boundary.

C2—24 to 46 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine granular structure; very hard, firm, sticky and plastic; common fine and few medium roots; common fine pores; thin lenses of silt loam and silty clay; few fine crystals of salts; moderately alkaline; clear wavy boundary.

C3—46 to 60 inches; brown (10YR 5/3) stratified silt loam and loam, thin lenses of fine sandy loam and silty clay loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine pores; strongly effervescent; moderately alkaline.

The A horizon is loam, silty clay loam, or silty clay. The 10- to 40-inch depth control section is mostly silty clay loam or silty clay. Below a depth of 30 inches, the C horizon is stratified with thin lenses that range in texture from fine sandy loam to silty clay.

## Harlem Variant

The Harlem Variant consists of deep, somewhat poorly drained, strongly saline and moderately sodium-affected soils that formed in alluvium. These soils are on flood plains and stream terraces in valleys at an elevation of 2,300 to 2,700 feet. Slopes are 0 to 2 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 42 to 46 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Harlem Variant silty clay loam, in irrigated cropland, 1,320 feet west and 2,000 feet north of the SE corner of sec. 10, T. 32 N., R. 21 E.

Ap—0 to 7 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; hard, friable, sticky and plastic; many fine roots and few medium roots; slightly effervescent; moderately alkaline; abrupt wavy boundary.

C1—7 to 28 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; many fine roots and few medium roots; common fine pores; few thin lenses of loam; few fine salt crystals; strongly effervescent; moderately alkaline; clear wavy boundary.

C2sa—28 to 44 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) mottles; massive; hard, friable, sticky and plastic; few fine

roots; common fine pores; common fine salt crystals; strongly effervescent; moderately alkaline; clear wavy boundary.

C3sa—44 to 60 inches; grayish brown (2.5Y 5/2) stratified silty clay loam, silt loam, and loam; dark grayish brown (2.5Y 4/2) moist; many medium distinct yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) mottles; stratified; hard, friable, sticky and slightly plastic; few fine pores; many fine seams and crystals of salts; strongly effervescent; moderately alkaline.

The 10- to 40-inch control section is 35 to 50 percent clay. The C horizon is moderately or strongly affected by sodium. Mottles occur at a depth of 24 to 40 inches. Depth to saturated soil or a water table ranges from 2 to 4 feet. The strata of loam, clay loam, or silty clay are at a depth below 40 inches. Reaction is moderately alkaline or strongly alkaline throughout the pedon.

### Havre series

The Havre series consists of deep, well drained soils that formed in alluvium. These soils are on flood plains and stream terraces in valleys at an elevation of 2,300 to 3,500 feet. Slopes are 0 to 2 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 42 to 46 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Havre loam, in irrigated cropland, 1,050 feet north and 2,640 feet east of the SW corner of sec. 33, T. 32 N., R. 23 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak granular structure; soft, very friable, slightly sticky and slightly plastic; slightly effervescent; moderately alkaline; abrupt wavy boundary.

C1—8 to 36 inches; light brownish gray (2.5Y 6/2) loam; thin lenses of fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common to many medium and fine pores; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—36 to 60 inches; light brownish gray (2.5Y 6/2) loam; thin lenses of fine sandy loam and silt loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few fine and very fine roots; common medium and fine pores; strongly effervescent; moderately alkaline.

The A horizon is loam or silty clay loam. The C horizon is mostly loam stratified with lenses that range from fine sandy loam to clay loam. These soils are mildly alkaline or moderately alkaline.

### Havre Variant

The Havre Variant consists of deep, somewhat poorly drained soils that are strongly saline and moderately affected by sodium. The soils formed in alluvium. These soils are on flood plains and stream terraces in valleys at an elevation of 2,300 to 2,700 feet. Slopes are 0 to 2 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 42 to 46 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Havre Variant silty clay loam, in irrigated cropland, 500 feet west and 1,350 feet south of the NW corner of sec. 2, T. 22 N., R. 20 E.

Ap—0 to 7 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; hard, very friable, sticky and slightly plastic; many fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C1—7 to 19 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, very friable, sticky and slightly plastic; many fine roots; common fine pores; few thin lenses of loam and fine sandy loam; few fine salt crystals; strongly effervescent; moderately alkaline; clear wavy boundary.

C2sa—19 to 38 inches; light brownish gray (2.5Y 6/2) loam; lenses of fine sandy loam and silty clay loam, grayish brown (2.5Y 5/2) moist; common fine distinct yellowish brown (2.5Y 5/4) and light brownish gray (2.5Y 6/2) mottles; stratified; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; common fine pores; common fine salt crystals; strongly effervescent; moderately alkaline; clear wavy boundary.

C3sa—38 to 60 inches; light brownish gray (2.5Y 6/2) loam; lenses of silt loam and fine sandy loam, grayish brown (2.5Y 5/2) moist; many medium distinct yellowish brown (2.5Y 5/4) and light gray (2.5Y 7/2) mottles; stratified; slightly hard, very friable, slightly sticky and slightly plastic; few fine pores; many fine seams and crystals of salt; strongly effervescent; moderately alkaline.

The A horizon is grayish brown or brown. The 10- to 40-inch control section on the average is 18 to 35 percent clay. The C horizon is moderately or strongly affected by sodium. Mottles are common below a depth of 24 to 40 inches. Depth to the seasonal water table or to saturated soil ranges from 2 to 4 feet. Reaction is moderately alkaline or strongly alkaline throughout the profile.

### Hedoes series

The Hedoes series consists of deep, well drained soils that formed in colluvium and alluvium from igneous rock.

These soils are on fans, terraces, and foot slopes on uplands and mountains at an elevation of 3,000 to 6,000 feet. Slopes are 2 to 45 percent. The average annual precipitation is 14 to 19 inches. The average annual temperature is 40 to 44 degrees F., and the growing season is 90 to 110 days.

Typical pedon of Hedoes loam, in a pasture, 100 feet east and 2,640 feet north of the SW corner of sec. 3, T. 25 N., R. 19 E.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and nonplastic; many medium and fine roots; neutral; clear smooth boundary.

B21—4 to 9 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and nonplastic; common fine roots; common fine and very fine pores; about 5 percent fine pebbles, by volume; mildly alkaline; clear wavy boundary.

B22—9 to 17 inches; dark brown (10YR 4/3) light loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine pores; about 5 percent pebbles, by volume; mildly alkaline; clear wavy boundary.

C1ca—17 to 34 inches; grayish brown (10YR 5/2) coarse sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine pores; 10 percent fine pebbles, by volume; common fine soft masses and seams of lime; strongly effervescent; moderately alkaline; gradual irregular boundary.

IIC2—34 to 60 inches; grayish brown (10YR 5/2) very gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; 50 percent pebbles, by volume; few cobbles; lime crusts on undersides of larger coarse fragments; strongly effervescent; moderately alkaline.

The A horizon is dark grayish brown, dark brown, or very dark grayish brown. The C horizon has few to many accumulations of soft masses of lime.

### Hillon series

The Hillon series consists of deep, well drained soils that formed in glacial till. These soils are on uplands at an elevation of 2,300 to 3,600 feet. Slopes are 8 to 45 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Hillon clay loam, in native grass, 1,440 feet north and 600 feet west of the SW corner of sec. 17, T. 37 N., R. 26 E.

A1—0 to 4 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak thin platy structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine pores; 5 percent pebbles, by volume; mildly alkaline; abrupt smooth boundary.

C1ca—4 to 12 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and plastic; common fine roots; few very fine pores; 5 percent pebbles, by volume; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—12 to 26 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure; hard, friable, sticky and plastic; common fine roots; few fine pores; 5 percent pebbles, by volume; common soft masses of lime; violently effervescent; moderately alkaline; gradual boundary.

C3—26 to 40 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few fine roots; few very fine pores; 5 percent pebbles, by volume; common soft masses of lime; strongly effervescent; moderately alkaline; gradual boundary.

C4—40 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak thick platy structure; hard, friable, sticky and plastic; 5 percent pebbles, by volume; strongly effervescent; moderately alkaline.

The A horizon is 2 to 4 inches thick. The C horizon is loam or clay loam; it is mildly alkaline to strongly alkaline.

### Joplin series

The Joplin series consists of deep, well drained soils that formed in glacial till. These soils are on glaciated uplands at an elevation of 2,400 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Joplin loam, in a cultivated field, 1,000 feet north and 700 feet west of the SE corner of sec. 27, T. 36 N., R. 23 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; medium fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine roots and pores; 5 percent gravel, by volume; neutral; clear boundary.

B2t—6 to 9 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular and angular blocky; hard, friable, slightly

- sticky and slightly plastic; common fine roots; common fine pores; mildly alkaline; clear boundary.
- B3ca—9 to 16 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine pores; strongly effervescent; few to common masses of lime; moderately alkaline; gradual boundary.
- C1ca—16 to 31 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine pores; strongly effervescent; common large masses of lime; moderately alkaline; gradual boundary.
- C2—31 to 60 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak thick platy structure; hard, friable, slightly sticky and slightly plastic; few very fine roots in upper part; few very fine pores; strongly effervescent; few masses of lime; moderately alkaline; gradual boundary.

The A horizon is loam or gravelly loam. The noncalcareous solum ranges from 6 to 10 inches in depth. The underlying material is loam or clay loam; some pedons have thin lenses of sandy clay loam below a depth of 30 inches.

### Judith series

The Judith series consists of deep, well drained soils that formed in alluvium. These soils are on terraces and fans on uplands at an elevation of 3,200 to 4,500 feet. Slopes are 2 to 15 percent. The average annual precipitation is 14 to 19 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 100 to 120 days.

Typical pedon of Judith loam, in native grass, 2,060 feet west and 1,660 feet north of the SE corner of sec. 1, T. 25 N., R. 23 E.

- A1—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and nonplastic; many fine roots in upper part and common fine roots in lower part; slightly effervescent; mildly alkaline; clear irregular boundary.
- B2ca—5 to 10 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak fine granular; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; common fine pores; 5 percent pebbles, by volume; violently effervescent; moderately alkaline; gradual wavy boundary.
- B3ca—10 to 33 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; weak medium

and coarse subangular blocky structure; hard, very friable, slightly sticky and nonplastic; few fine and very fine roots; few very fine pores; 10 to 15 percent lime coated pebbles, by volume; violently effervescent; moderately alkaline; clear wavy boundary.

- IIcCa—33 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine roots in upper part; few fine pores; 40 percent lime coated pebbles, by volume; violently effervescent; moderately alkaline.

The A horizon is dark grayish brown or dark brown. An AC horizon is present in some pedons. The Cca horizon consists of 40 to 60 percent calcium carbonate equivalent. Coarse fragments make up 35 to 60 percent of the volume below a depth of 30 inches. The C horizon is moderately alkaline or strongly alkaline.

### Kevin series

The Kevin series consists of deep, well drained soils that formed in glacial till. These soils are on uplands at an elevation of 2,300 to 3,600 feet. Slopes are 0 to 25 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Kevin clay loam, in native grass, 2,540 feet east and 400 feet north of the SW corner of sec. 5, T. 37 N., R. 26 E.

- A1—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; neutral; abrupt wavy boundary.
- B2t—3 to 8 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; strong medium prismatic structure parting to moderate medium angular and subangular blocky; very hard, firm, sticky and plastic; many roots; few fine roots; few fine pores; thin discontinuous clay films on vertical faces of peds; 5 percent pebbles, by volume; mildly alkaline; clear wavy boundary.
- B3ca—8 to 16 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; common fine roots; common fine pores; 5 percent pebbles, by volume; common masses of segregated lime; violently effervescent; mildly alkaline; gradual clear boundary.
- C1ca—16 to 30 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure parting to weak subangular blocky; very hard, firm, sticky and plastic; few fine roots; few fine pores; 5

percent pebbles, by volume; common soft masses of segregated lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—30 to 43 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak very coarse prismatic structure; very hard, firm, sticky and plastic; 5 percent pebbles, by volume; few soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C3—43 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse platy structure; very hard, firm, sticky and plastic; 5 percent pebbles, by volume; few masses of segregated lime; strongly effervescent; moderately alkaline.

Depth to carbonates ranges from 6 to 10 inches. The profile is less than 15 percent coarse fragments, by volume. Few to many masses of lime are present in the lower part of the B horizon and in the upper part of the C horizon.

### Korent series

The Korent series consists of deep, well drained soils that formed in alluvium. These soils are on flood plains and on low stream terraces at an elevation of 2,600 to 4,000 feet. Slopes are 0 to 2 percent. The average annual precipitation is 13 to 18 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 120 days.

Typical pedon of Korent loam, on hayland, 1,980 feet north and 1,980 feet east of the SW corner of sec. 17, T. 31 N., R. 18 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; granular structure; hard, friable, slightly sticky and slightly plastic; many fine continuous roots; slightly effervescent; mildly alkaline; clear wavy boundary.

C1—7 to 14 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; common fine roots; common fine pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—14 to 60 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 5/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine roots; few fine pores; strongly effervescent; moderately alkaline.

The surface layer, to a depth of 7 to 10 inches, is grayish brown, brown, or dark grayish brown. The C horizon is silt loam, sandy clay loam, or loam. Some pedons have thin strata of loamy sand, silty clay loam, and clay loam.

### Lardell series

The Lardell series consists of deep, somewhat poorly drained soils that are very strongly affected by salts and sodium. These soils formed in alluvium and are on flood plains and stream terraces in valleys at an elevation of 2,300 to 2,700 feet. Slopes are 0 to 2 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 42 to 46 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Lardell silty clay loam, in native grass, 1,980 feet north and 2,310 feet east of the SW corner of sec. 3, T. 32 N., R. 20 E.

Apsa—0 to 8 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; very hard, firm, sticky and slightly plastic; common fine roots and pores; many fine salt crystals; strongly alkaline; gradual smooth boundary.

C1sa—8 to 29 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; very hard, firm, sticky and slightly plastic; few fine and very fine roots; few fine pores; strata of dark grayish brown (10YR 4/2) moist clay loam 1 to 2 inches thick; many fine salt crystals when dry; strongly effervescent; strongly alkaline; clear smooth boundary.

C2sa—29 to 60 inches; light brownish gray (10YR 6/2) loam; thin lenses of silt loam and fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, sticky and slightly plastic; salts are disseminated throughout the horizon; strongly effervescent; strongly alkaline.

Strong accumulation of salts is at a depth of 0 to 20 inches. The C horizon is loam or silty clay loam stratified with thin lenses of fine sandy loam, loam, silt loam, and silty clay loam. Lardell soils are moderately alkaline to strongly alkaline. Electrical conductivity of the C horizon ranges from 16 to 50 mmhos/cm.

### Lihen series

The Lihen series consists of deep, well drained soils that formed in alluvial and eolian material. These soils are on terraces and uplands at an elevation of 2,400 to 3,000 feet. Slopes are 2 to 12 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Lihen loamy fine sand, in pasture, 2,340 feet west and 1,640 feet south of the NE corner of sec. 35, T. 33 N., R. 18 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine

- granular structure parting to single grain; soft, very friable, nonsticky and nonplastic; few to common roots; neutral; clear wavy boundary.
- A12—6 to 10 inches; dark brown (10YR 4/3) loamy fine sand, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; few to common fine roots; common fine pores; neutral; clear wavy boundary.
- AC—10 to 30 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few fine and very fine roots; few fine pores; slightly effervescent in the lower part; mildly alkaline; clear wavy boundary.
- Cca—30 to 60 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; 5 percent lime coated pebbles, by volume; strongly effervescent; moderately alkaline.

The A horizon is dark brown, brown, grayish brown, or dark grayish brown, and it is 10 to 30 inches thick. The C horizon is mostly loamy fine sand; some pedons have thin strata of sandy loam or loamy sand.

### Lisam series

The Lisam series consists of shallow, well drained soils that formed in clayey material that weathered from clayey shale. These soils are on uplands at an elevation of 2,300 to 4,000 feet. They are underlain by platy shale at a depth of 10 to 20 inches. Slopes are 4 to 45 percent. The average annual precipitation is 12 to 15 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Lisam clay, in native grass, 1,800 feet west and 500 feet north of the SE corner of sec. 31, T. 26 N., R. 20 E.

- A1—0 to 6 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; very hard, firm, very sticky and plastic; common fine and very fine roots and few medium roots; common fine pores; slightly effervescent; moderately alkaline; clear wavy boundary.
- C1—6 to 12 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky and plastic; few medium, fine and very fine roots; few fine and very fine pores; about 20 percent olive gray (5Y 4/2) partially weathered shale fragments, by volume; common fine soft masses of lime and fine threads of gypsum crystals; strongly effervescent; moderately alkaline; clear wavy boundary.

- C2—12 to 17 inches; olive gray (5Y 5/2) partially weathered shale and clay, olive gray (5Y 4/2) moist; weak medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; few fine pores; about 20 percent light yellowish brown (2.5Y 6/4) stains; common fine threads and soft masses of gypsum; slightly effervescent; moderately alkaline; clear wavy boundary.
- C3r—17 to 23 inches; olive gray (5Y 5/2) platy shale that rubs to clay, olive gray (5Y 4/2) moist; few very fine roots; pale olive (5Y 6/4) stains on some plate surfaces; few fine gypsum crystals; slightly effervescent in spots; moderately alkaline; gradual wavy boundary.
- C4r—23 to 60 inches; olive (5Y 5/3) platy shale that rubs to clay and clay loam texture, olive (5Y 4/3) moist; pale olive (5Y 6/4) stains on some plates; mildly alkaline.

Depth to soft platy shale ranges from 10 to 20 inches. The A horizon, in places, has a thin vesicular crust on the surface. The A and C horizons range from grayish brown to olive.

### Lolo series

The Lolo series consists of deep, well drained soils that formed in alluvium. These soils are on fans and stream terraces in mountain valleys at an elevation of 3,000 to 4,500 feet. Slopes are 0 to 4 percent. The average annual precipitation is 15 to 19 inches. The average annual temperature is 40 to 44 degrees F., and the growing season is 90 to 120 days.

Typical pedon of Lolo loam, in native grass, 2,600 feet east and 400 feet south of the NW corner of sec. 9, T. 25 N., R. 24 E.

- A11—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; neutral; clear wavy boundary.
- A12—6 to 22 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak moderate prismatic structure parting to moderate fine subangular blocky; hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; 20 percent fine pebbles, by volume; neutral; gradual wavy boundary.
- B2—22 to 38 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine pores; 50 percent pebbles and 5 percent cobbles, by volume; thin lime crusts on undersides of fragments; slightly effervescent; moderately alkaline; gradual wavy boundary.

C—38 to 60 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; massive; hard, very friable, nonsticky and nonplastic; few very fine roots; 55 percent pebbles and 5 percent cobbles, by volume; strongly effervescent; moderately alkaline.

Depth to very gravelly loam or very gravelly sandy loam ranges from 16 to 24 inches. The A horizon is dark brown or very dark grayish brown. The 10- to 40-inch control section on the average is 35 to 60 percent coarse fragments, by volume.

### Macmeal series

The Macmeal series consists of deep, well drained soils that formed in colluvial and alluvial material from igneous and metamorphic rock. These soils are on mountains at an elevation of 4,000 to 6,000 feet. Slopes are 25 to 60 percent. The average annual precipitation is 17 to 25 inches. The average annual temperature is 38 to 42 degrees F., and the growing season is 80 to 100 days.

Typical pedon of Macmeal gravelly loam, in woodland, 500 feet west and 1,600 feet north of the SE corner of sec. 15, T. 26 N., R. 24 E.

O1—2 inches to 1 inch; mat of twigs, leaves, and dead plants.

O2—1 inch to 0; decomposed organic material.

A2—0 to 7 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 4/3) moist; weak fine and very fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and medium roots; common fine pores; many unstained sand and silt grains; about 30 percent pebbles, by volume, and few flagstones; neutral; clear wavy boundary.

B21t—7 to 14 inches; yellowish brown (10YR 5/4) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; hard, friable, sticky and plastic; common fine and very fine roots; common fine and very fine pores; about 60 percent pebbles and 5 percent flagstones, by volume; neutral; clear wavy boundary.

B22t—14 to 32 inches; yellowish brown (10YR 5/4) extremely channery clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium and fine blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; common very fine pores; about 70 percent rock fragments, by volume, of which 85 percent are angular pebbles and 15 percent are flagstones; neutral; gradual wavy boundary.

B23t—32 to 48 inches; yellowish brown (10YR 5/4) extremely channery clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium and fine blocky structure; very hard, firm, sticky and plastic; common very fine pores; about 70 percent rock fragments, by volume, of which about 85 percent are angular pebbles and 15 percent are flagstones.

B3ca—48 to 60 inches; brown (10YR 5/3) extremely flaggy clay loam, dark brown (10YR 4/3) moist; moderate medium and fine subangular blocky structure; very hard, friable, sticky and plastic; about 70 percent rock fragments, by volume, of which about 70 percent are angular pebbles and 30 percent are flagstones; noncalcareous matrix with lime coats on undersides of fragments; mildly alkaline.

Some pedons have a C horizon below a depth of 40 inches. Depth to accumulation of lime ranges from 25 to 55 inches. The A2 horizon is very pale brown, light brownish gray, or light gray. The B2t horizon is light yellowish brown or brown. Coarse fragments range from 50 to 75 percent, by volume, in the lower part of the B horizon and in the C horizon, where there is a C horizon.

### Marmarth series

The Marmarth series consists of moderately deep, well drained soils that formed in material weathered from soft sedimentary beds. These soils are on uplands at an elevation of 2,800 to 3,800 feet. They are underlain at a depth of 20 to 40 inches by soft sedimentary beds. Slopes are 2 to 8 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Marmarth clay loam, in a cultivated field, 1,000 feet south and 1,000 feet west of the NE corner of sec. 30, T. 23 N., R. 18 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

B2t—6 to 14 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and plastic; common fine roots; few fine pores; few clay films on faces of peds; mildly alkaline; clear smooth boundary.

B3ca—14 to 18 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium angular and subangular blocky; hard, friable, sticky and slightly plastic; common fine roots; few fine pores; common medium soft light brownish gray (2.5Y 6/2) masses of lime; slightly effervescent; moderately alkaline; clear smooth boundary.

C1ca—18 to 24 inches; light brownish gray (2.5Y 6/2) sandy clay loam; grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine pores; many soft masses of lime; strongly

effervescent; moderately alkaline; gradual wavy boundary.

- C2ca—24 to 30 inches; light brownish gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, very friable, slightly sticky and nonplastic; few very fine roots; few fine pores; common soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.
- C3r—30 to 60 inches; light brownish gray (2.5Y 6/2) and thin strata of olive brown (2.5Y 5/4) stratified beds of soft siltstone with thin strata of soft sandstone that rub to loam, grayish brown (2.5Y 5/2) moist; slightly effervescent.

The A horizon is brown or dark brown. The B horizon is dark brown, brown, or grayish brown. There are few to many soft masses of lime in the B3ca horizon and in the Cca horizon. Sedimentary beds are soft siltstone and soft sandstone, but in some pedons they have thin strata of hard sandstone.

### Martinsdale series

The Martinsdale series consists of deep, well drained soils that formed in alluvium. These soils are on terraces and fans in uplands at an elevation of 3,200 to 4,500 feet. Slopes are 0 to 8 percent. The mean annual precipitation is 14 to 19 inches. The mean annual temperature is 41 to 45 degrees F., and the growing season is 100 to 120 days.

Typical pedon of Martinsdale clay loam, in native grass, 790 feet north and 500 feet east of the SW corner of sec. 4, T. 25 N., R. 23 E.

- A1—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; mildly alkaline; clear smooth boundary.
- B2t—3 to 10 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong medium and fine prismatic structure parting to moderate medium and fine angular and subangular blocky; hard, friable, sticky and plastic; many fine and very fine roots; many fine and very fine pores; thin continuous clay films on faces of peds; dark grayish brown (10YR 4/2) coats on faces of peds in the upper 4 inches; mildly alkaline; clear smooth boundary.
- B3ca—10 to 13 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and plastic; common fine and very fine roots; common fine and very fine pores; few soft masses of lime; violently effervescent; mildly alkaline; clear wavy boundary.
- C1ca—13 to 29 inches; light gray (10YR 7/2) clay loam, pale brown (10YR 6/3) moist; weak medium and

coarse prismatic structure; hard, friable, sticky and slightly plastic; common very fine roots in the upper part and few in the lower part; few fine pores; common large white (10YR 8/2) masses of soft lime; violently effervescent; moderately alkaline; gradual wavy boundary.

- C2ca—29 to 41 inches; light gray (10YR 7/2) clay loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; hard, friable, sticky and slightly plastic; few very fine roots; few fine pores; common medium and large white (10YR 8/2) masses of soft lime; violently effervescent; strongly alkaline; gradual wavy boundary.
- C3—41 to 54 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and slightly plastic; few to common soft masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.
- C4—54 to 60 inches; pale brown (10YR 6/3) gravelly clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and slightly plastic; lime coats on fragments; violently effervescent; strongly alkaline.

The A horizon is dark grayish brown, dark brown, or brown. Depth to carbonates ranges from 10 to 16 inches. The B horizon ranges from grayish brown to dark brown, and it has moderate or strong prismatic structure. The C horizon is mostly clay loam in the upper part, but ranges from clay loam to gravelly loam below a depth of 40 inches. The Cca horizon consists of 20 to 40 percent calcium carbonate equivalent.

### Marvan series

The Marvan series consists of deep, well drained soils that formed in clayey alluvium. These soils are on fans and terraces in valleys and on uplands at an elevation of 2,300 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 15 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Marvan clay, in native grass, 200 feet south and 2,300 feet west of the NE corner of sec. 11, T. 35 N., R. 20 E.

- A11—0 to 2 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; light brownish gray (2.5Y 6/2) vesicular crust 1/4 inch thick on surface; moderate fine and very fine granular structure; slightly hard, friable, sticky and plastic; many medium and fine roots; mildly alkaline; clear smooth boundary.
- A12—2 to 7 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; extremely hard, firm, very sticky and very plastic; many medium and fine roots; few very fine pores; vertical cracks 1/4 to 1/2 inch wide; slightly effervescent in spots; moderately alkaline; clear smooth boundary.

C1—7 to 23 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; extremely hard, very firm, very sticky and very plastic; common fine roots; few very fine pores; vertical cracks 1/4 to 1/2 inch wide; few slickensides; slightly effervescent; strongly alkaline; clear smooth boundary.

C2—23 to 32 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse subangular blocky structure; very hard, firm, very sticky and plastic; few fine roots; few very fine pores; few fine seams of gypsum crystals; strongly effervescent; moderately alkaline; clear smooth boundary.

C3cs—32 to 60 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and plastic; common seams of gypsum crystals; strongly effervescent; moderately alkaline.

The A horizon is grayish brown or light brownish gray. Depth to segregated gypsum ranges from 12 to 24 inches. The C horizon has 10 to 20 percent exchangeable sodium and is moderately alkaline or strongly alkaline.

### Nesda series

The Nesda series consists of deep, well drained soils that formed in alluvium. These soils are on stream terraces and flood plains at an elevation of 2,600 to 4,000 feet. They are underlain by very gravelly sand or very gravelly loamy sand at a depth of 10 to 20 inches. Slopes are 0 to 2 percent. The average annual precipitation is 13 to 18 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 100 to 120 days.

Typical pedon of Nesda sandy loam, in native grass, 650 feet south and 1,350 feet east of the NW corner of sec. 16, T. 31 N., R. 20 E.

Ap—0 to 7 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine pores; 5 percent pebbles, by volume; mildly alkaline; clear wavy boundary.

A12—7 to 11 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; soft, very friable, slightly sticky and nonplastic; many fine and very fine roots; common fine pores; 10 percent pebbles, by volume; slightly effervescent; mildly alkaline; clear wavy boundary.

IIC1—11 to 15 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark grayish brown (10YR 4/2)

moist; single grain; loose; common fine and very fine roots; 45 percent pebbles, by volume; lime coats on undersides of larger coarse fragments; slightly effervescent; moderately alkaline; gradual wavy boundary.

IIC2—15 to 60 inches; pale brown (10YR 6/3) very gravelly sand, brown (10YR 5/3) moist; single grain; loose; few fine roots in upper part; 55 percent pebbles, by volume; slightly effervescent; moderately alkaline.

The A horizon is brown, grayish brown, or dark grayish brown loam or sandy loam. Coarse fragments in the C horizon range from 35 to 65 percent, by volume.

### Nishon series

The Nishon series consists of deep, somewhat poorly drained or poorly drained soils that formed in alluvium from glacial till. These soils are in closed basins on glaciated uplands at an elevation of 2,500 to 3,300 feet. Slopes are 0 to 1 percent. The average annual precipitation is 12 to 16 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 100 to 120 days.

Typical pedon of Nishon clay loam, in native grass, 1,200 feet south and 1,400 feet east of the NW corner of sec. 16, T. 28 N., R. 22 E.

A2—0 to 5 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; many unstained silt and sand grains; neutral; abrupt smooth boundary.

B21t—5 to 8 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; weak coarse prismatic structure parting to strong medium subangular blocky; extremely hard, very firm, very sticky and very plastic; common fine roots; common fine and very fine pores; common thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

B22tg—8 to 22 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; weak coarse prismatic structure parting to strong medium subangular blocky; extremely hard, very firm, very sticky and very plastic; common fine roots; common fine and very fine pores; common thin clay films on faces of peds; moderately alkaline; clear smooth boundary.

B3tcag—22 to 36 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; moderate medium subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few fine roots; few fine and very fine pores; thin discontinuous clay films; few fine soft masses of lime; slightly effervescent; moderately alkaline; clear smooth boundary.

Ccag—36 to 60 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; massive; extremely hard, very firm, very sticky and very plastic; common fine seams and few

soft masses of segregated lime; strongly effervescent; moderately alkaline.

The A horizon is loam or clay loam. The B horizon is gray or olive gray clay or silty clay. Depth to carbonates ranges from 20 to 36 inches. In some pedons there are yellowish brown mottles.

### Nobe series

The Nobe series consists of deep, well drained and moderately well drained soils that formed in alluvium. These soils are on fans and terraces on uplands at an elevation of 2,300 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Nobe clay, in native range, 1,000 feet west and 1,600 feet south of the NE corner of sec. 27, T. 34 N., R. 19 E.

A2—0 to 1/2 inch; light brownish gray (2.5Y 6/2) loam, olive (5Y 4/3) moist; vesicular crust; hard, friable, sticky and slightly plastic; common fine and few medium roots; common fine pores; mildly alkaline; abrupt smooth boundary.

B2t—1/2 inch to 3 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine subangular blocky structure; very hard, firm, sticky and very plastic; common fine and very fine roots; common fine and very fine pores; common thin clay films on peds; moderately alkaline; clear wavy boundary.

C1cs—3 to 8 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine subangular blocky structure; very hard, firm, sticky and very plastic; few fine and very fine roots; few fine and very fine pores; common fine threads of salts and gypsum; slightly effervescent in spots; moderately alkaline; clear wavy boundary.

C2sa—8 to 30 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and very plastic; very few fine and very fine roots in upper part; common very fine pores; many threads and soft masses of salts and gypsum; strongly effervescent in spots; strongly alkaline; clear wavy boundary.

C3sa—30 to 60 inches; olive (5Y 5/3) silty clay, olive (5Y 4/3) moist; massive; hard, friable, very sticky and very plastic; many threads and soft masses of salts and gypsum; strongly effervescent in spots; strongly alkaline.

The A2 horizon ranges from 1/2 inch to 2 inches in thickness and is light gray to light brownish gray. The C horizon is clay or silty clay. Some pedons are stratified with lenses of clay loam or silty clay loam. The Csa

horizon is at a depth of 8 to 16 inches, and it is 2 to 3 percent salts. The Csa horizon is moderately alkaline or strongly alkaline.

### Norbert series

The Norbert series consists of shallow, well drained soils that formed in material that weathered from clayey shale. These soils are on uplands at an elevation of 2,500 to 4,400 feet. They are underlain by shale at a depth of 10 to 20 inches. Slopes are 4 to 45 percent. The average annual precipitation is 13 to 18 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 100 to 120 days.

Typical pedon of Norbert clay, in native grass, 2,000 feet west and 10 feet north of the SE corner of sec. 25, T. 26 N., R. 23 E.

A11—0 to 1 inch; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; moderate medium and very fine granular structure; hard, friable, very sticky and plastic; many fine roots; many very fine pores; mildly alkaline; clear smooth boundary.

A12—1 inch to 10 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; moderate fine granular structure; extremely hard, very firm, very sticky and very plastic; common fine roots; common very fine pores; mildly alkaline; gradual wavy boundary.

C1—10 to 14 inches; olive gray (5Y 5/2) very shaly clay, olive gray (5Y 5/2) moist; fine angular blocky structure; common very fine roots; few very fine pores; about 40 percent shale chips, by volume; mildly alkaline; gradual wavy boundary.

C2r—14 to 60 inches; olive gray (5Y 5/2) platy shale that rubs to clay and clay loam, olive gray (5Y 4/2) moist; dark gray (5Y 4/1) stains on some plate surfaces; few fine roots in upper part.

The depth to the platy shale ranges from 10 to 20 inches. The A and C horizons are grayish brown to olive gray. In some pedons there is segregated gypsum in the shale.

### Perma series

The Perma series consists of deep, well drained soils that formed in colluvium and alluvium from igneous and hard sandstone. These soils are on the sides of hills and mountains at an elevation of 3,500 to 6,500 feet. Slopes are 25 to 60 percent. The average annual precipitation is 15 to 20 inches. The average annual temperature is 40 to 44 degrees F. The growing season is 90 to 110 days.

Typical pedon of Perma gravelly loam, in native grass, 2,560 feet south and 270 feet east of the NW corner of sec. 35, T. 29 N., R. 20 E.

A11—0 to 5 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist;

moderate medium granular structure parting to weak fine granular; soft, very friable, slightly sticky and nonplastic; many fine and few medium roots; 20 percent subrounded pebbles and 5 percent angular cobbles, by volume; neutral; clear wavy boundary.

- A12—5 to 11 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common to many fine and very fine roots and few medium roots; many fine and medium pores; about 50 percent angular pebbles and 10 percent angular cobbles, by volume; mildly alkaline; clear wavy boundary.
- B2—11 to 40 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, friable, sticky and slightly plastic; common fine and very fine roots in upper part grading to very few in the lower part; common fine and very fine pores; 50 percent angular pebbles and 10 percent angular cobbles, by volume; mildly alkaline; gradual wavy boundary.
- C—40 to 60 inches; grayish brown (10YR 5/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; 50 percent angular pebbles and 20 percent angular cobbles, by volume; lime coats on underside of larger coarse fragments; mildly alkaline.

The A horizon is very dark grayish brown or dark brown. It is 7 to 14 inches thick. Coarse fragments are mostly angular igneous rocks, but in some places they are hard sandstone. In some pedons, the soil material at a depth of 40 to 60 inches is calcareous.

### Phillips series

The Phillips series consists of deep, well drained soils that formed in glacial till. These soils are on uplands at an elevation of 2,300 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Phillips loam, in native grass, 1,850 feet north and 300 feet east of the SW corner of sec. 3, T. 35 N., R. 19 E.

- A1—0 to 2 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak thin and very thin platy structure parting to moderate very fine granular; soft, very friable, nonsticky and nonplastic; upper surface of plates is light gray (10YR 7/2) dry; many fine and very fine roots; many fine pores; slightly acid; clear smooth boundary.
- A21—2 to 4 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to weak thin platy; soft, very friable, slightly

sticky and nonplastic; upper surface of plates has skeletons of light gray (10YR 7/2) unstained grains of sand and silt; many fine roots; many fine pores; slightly acid; clear wavy boundary.

- A22—4 to 7 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate thin and very thin platy; hard, very friable, slightly sticky and slightly plastic; upper surface of plates has skeletons of light gray (10YR 7/2) unstained grains of sand; many fine roots; many fine pores; slightly acid; abrupt wavy boundary.
- B21t—7 to 10 inches; brown (10YR 5/3) light clay, dark brown (10YR 4/3) moist; strong fine and medium prismatic structure parting to strong fine and very fine subangular blocky; very hard, friable, sticky and plastic; continuous dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; light gray (10YR 7/2) skeletons on vertical surface of peds; many fine roots; many fine and very fine pores; neutral; clear wavy boundary.
- B22t—10 to 15 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; strong fine and medium prismatic structure parting to strong fine and very fine blocky; very hard, friable, sticky and plastic; continuous dark grayish brown (10YR 4/2) clay films on faces of peds and lining some pores; common unstained sand grains on faces of prisms; many fine roots mainly along ped faces; many fine inped pores; moderately alkaline; clear wavy boundary.
- B3ca—15 to 22 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; strong medium prismatic structure parting to strong medium and coarse blocky; extremely hard, firm, sticky and plastic; thin patchy clay films on faces of peds; common fine roots; many fine pores; slightly effervescent; few masses of segregated lime; moderately alkaline; clear wavy boundary.
- C1ca—22 to 36 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse and very coarse prismatic structure parting to moderate medium and coarse blocky; very hard, firm, sticky and plastic; common to few fine roots; many fine pores; 5 percent pebbles, by volume, and few lignite and shale fragments; strongly effervescent with common soft masses of segregated lime; moderately alkaline; gradual wavy boundary.
- C2cs—36 to 78 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak very coarse prismatic structure in upper part parting to weak very thick platy; weak very thick platy structure in the lower part; very hard, firm, sticky and plastic; few fine roots; common fine pores; 5 percent cobbles and pebbles, by volume, and few to many lignite chips; slightly effervescent; mildly to moderately alkaline; common nests of gypsum.

The depth to carbonates ranges from 12 to 18 inches. The B horizon is brown, grayish brown, or dark grayish brown clay loam or clay.

### Reeder series

The Reeder series consists of moderately deep, well drained soils that formed in material that weathered from siltstone and shale. These soils are on uplands at an elevation of 2,400 to 3,600 feet. Slopes are 2 to 8 percent. The average annual precipitation is 13 to 16 inches, and the average annual temperature is 41 to 45 degrees F. The growing season is 100 to 125 days.

Typical pedon of Reeder loam, in cultivated field, 350 feet south and 300 feet east of the NW corner of sec. 32, T. 32 N., R. 20 E.

Ap—0 to 7 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, slightly firm, slightly sticky and slightly plastic; many fine roots; many fine pores; neutral; clear smooth boundary.

B2t—7 to 16 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and plastic; many fine roots; many fine and very fine pores; few thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

B3ca—16 to 20 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, slightly sticky and plastic; common fine and very fine roots; many fine and very fine pores; violently effervescent; moderately alkaline; clear wavy boundary.

C1ca—20 to 28 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few very fine pores; violently effervescent; moderately alkaline; clear smooth boundary.

IIc2r—28 to 45 inches; light olive gray (5Y 6/2) soft siltstone that rubs to loam or silt loam; slightly effervescent.

IIc3r—45 to 60 inches; light brownish gray (2.5Y 6/2) soft sandstone that rubs to fine sandy loam or loamy fine sand, grayish brown (2.5Y 5/2) moist.

The A horizon is dark brown or dark grayish brown. The depth to soft sandstone or soft siltstone ranges from 20 to 40 inches.

### Riedel series

The Riedel series consists of moderately deep, well drained soils that formed in material that weathered from soft sandstone. These soils are on uplands at an

elevation of 2,800 to 4,000 feet. Slopes are 4 to 20 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Riedel fine sandy loam, in native grass, 2,540 feet south and 1,840 feet west of the NE corner of sec. 34, T. 26 N., R. 20 E.

A1—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium and fine granular structure; soft, very friable, nonsticky and nonplastic; many medium and fine roots; slightly effervescent; mildly alkaline; gradual wavy boundary.

C1—5 to 17 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; weak coarse prismatic structure; soft, very friable, nonsticky and nonplastic; common medium and fine roots; common fine pores; few soft masses of segregated lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—17 to 24 inches; light yellowish brown (10YR 6/4) soft calcareous weathered sandstone that crushes to loamy very fine sand and fine sandy loam; common fine roots; strongly effervescent; moderately alkaline.

C3r—24 to 60 inches; light yellowish brown (10YR 6/4) soft sandstone; thin horizontal bedding planes; few roots in cracks in upper part.

The A horizon is 2 to 6 inches thick and is light brownish gray or grayish brown. The C horizon is grayish brown to very pale brown. The depth to strongly weathered sandstone is 10 to 20 inches, and the depth to soft sandstone is 20 to 40 inches. In some pedons there are thin hard layers of sandstone in the C horizon.

### Savage series

The Savage series consists of deep, well drained soils that formed in alluvium. These soils are on stream terraces and fans on uplands at an elevation of 2,500 to 4,000 feet. Slopes are 0 to 4 percent. The average annual precipitation is 14 to 19 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 120 days.

Typical pedon of Savage silty clay loam, in cultivated field, 2,240 feet east and 600 feet south of the NW corner of sec. 10, T. 29 N., R. 20 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; very hard, friable, sticky and plastic; many fine roots; neutral; clear wavy boundary.

B2t—6 to 14 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to

strong medium angular blocky; very hard, firm, sticky and plastic; many fine and very fine roots; common fine and very fine pores; moderately thick clay films on faces of peds; mildly alkaline; clear wavy boundary.

B3ca—14 to 21 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium angular and subangular blocky; very hard, friable, sticky and plastic; common fine and very fine roots; common fine and very fine pores; thin discontinuous clay films; few fine threads of soft lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—21 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; hard, friable, sticky and plastic; common fine and very fine roots; common fine and very fine pores; few fine threads of soft lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2cs—36 to 48 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, very sticky and plastic; few fine and very fine roots; few fine pores; few fine yellowish brown (10YR 5/6) mottles; few fine threads of gypsum; slightly effervescent; moderately alkaline; gradual wavy boundary.

C3—48 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and plastic; few yellowish brown (10YR 5/6) mottles; moderately alkaline.

Depth to carbonates ranges from 10 to 20 inches. The B horizon is silty clay loam or silty clay and contains 35 to 45 percent clay. The Cca horizon has few to many soft masses or threads of lime.

### Scobey series

The Scobey series consists of deep, well drained soils that formed in glacial till. These soils are on uplands at an elevation of 2,400 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Scobey clay loam, in cultivated field, 500 feet west and 100 feet north of the SE corner of sec. 5, T. 34 N., R. 24 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; hard, friable, sticky and plastic; many fine roots; 5 percent pebbles, by volume; neutral; clear wavy boundary.

B2t—6 to 12 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong fine and medium prismatic structure parting to strong fine angular blocky; hard,

friable, sticky and plastic; many fine roots; many fine and very fine tubular pores; dark grayish brown (10YR 4/2) thin continuous clay films on faces of peds; 5 percent pebbles, by volume; neutral; clear wavy boundary.

B3tca—12 to 19 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure parting to strong fine subangular blocky; very hard, friable, sticky and plastic; common fine roots; many fine and very fine tubular pores; thin continuous clay films on vertical faces of peds; 5 percent pebbles, by volume; few soft masses of lime; strongly effervescent; mildly alkaline; gradual wavy boundary.

C1ca—19 to 42 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse and very coarse prismatic structure parting to weak subangular blocky; very hard, firm, sticky and plastic; few fine and very fine roots; common fine and very fine pores; 5 percent pebbles, by volume; many soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2cs—42 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak thick platy structure; very hard, firm, sticky and plastic; 5 percent pebbles, by volume; common soft masses of gypsum and lime; strongly effervescent; moderately alkaline.

The combined thickness of the A and B horizons is from 12 to 24 inches. The B horizon is clay loam or light clay and has moderate or strong grades of prismatic and blocky structure. It is brown, dark brown, or dark grayish brown. Gravel in the pedon ranges from less than 5 percent throughout to as much as 15 percent in some horizons. Common or many soft masses of lime are present in the B3tca and C1ca horizons. Some C horizons lack the gypsum crystals.

### Shaak series

The Shaak series consists of deep, well drained soils that formed in alluvium. These soils are on terraces and fans on uplands at an elevation of 3,000 to 4,200 feet. Slopes are 0 to 4 percent. The average annual precipitation is 13 to 17 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Shaak loam, in native grass, 100 feet east and 1,590 feet north of the SW corner of sec. 8, T. 25 N., R. 18 E.

A11—0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable, slightly sticky and nonplastic; many fine roots; many unstained sand and silt grains on plates; neutral; clear wavy boundary.

- A12—2 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak thin and medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common fine pores; many unstained sand and silt grains on plates; neutral; abrupt wavy boundary.
- B1—4 to 6 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common fine pores; thin frosting of unstained sand and silt grains on faces of peds; 5 percent fine pebbles, by volume; mildly alkaline; clear wavy boundary.
- B21t—6 to 10 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong fine and medium prismatic structure parting to strong fine angular blocky; extremely hard, firm, sticky and plastic; common fine and very fine roots; common fine and very fine pores; dark brown (10YR 4/3) stains on thin continuous clay films; few unstained sand and silt grains on vertical faces of peds; 5 percent pebbles, by volume; mildly alkaline; clear wavy boundary.
- B22t—10 to 16 inches; brown (10YR 5/3) clay, dark grayish brown (10YR 4/2) moist; strong fine angular blocky; friable, sticky and plastic; few fine roots; common fine and very fine pores; dark grayish brown (10YR 4/2) stains on thin continuous clay films; 5 percent pebbles, by volume; mildly alkaline; clear wavy boundary.
- B23tca—16 to 20 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong fine and medium prismatic structure parting to strong fine angular and subangular blocky; extremely hard, firm, sticky and plastic; few fine roots; common fine and very fine pores; dark grayish brown (2.5Y 4/2) stains on thin discontinuous clay films; 5 percent pebbles, by volume; few soft masses of lime; strongly effervescent; moderately alkaline; abrupt wavy boundary.
- B3ca—20 to 28 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; very hard, friable, sticky and plastic; few very fine roots; common fine and very fine pores; 5 percent pebbles, by volume; common to many soft masses of lime; violently effervescent; moderately alkaline; abrupt wavy boundary.
- IIIC1ca—28 to 42 inches; brown (10YR 5/3) gravelly sandy clay loam, dark brown (10YR 4/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; few fine and very fine pores; 20 percent pebbles, by volume; common seams and coarse soft masses of lime; violently effervescent; moderately alkaline; abrupt wavy boundary.
- IIIC2—42 to 60 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; single

grain; soft, very friable, nonsticky and nonplastic; 35 percent pebbles, by volume; few coarse seams of soft lime; strongly effervescent; moderately alkaline.

The C horizon below a depth of 40 inches is very gravelly loam or very gravelly sandy loam.

### Shawmut series

The Shawmut series consists of deep, well drained soils that formed in alluvium on terraces and fans on uplands at an elevation of 2,800 to 4,000 feet. Slopes are 0 to 8 percent. The annual precipitation is 14 to 19 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 100 to 120 days.

Typical pedon of Shawmut gravelly loam, in native grass, 1,300 feet north and 1,000 feet east of the SW corner of sec. 15, T. 28 N., R. 21 E.

- A1—0 to 3 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; 15 percent pebbles, by volume, and few cobbles on the surface and in the horizon; neutral; clear wavy boundary.
- B21t—3 to 9 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; weak fine prismatic structure parting to strong fine angular and subangular blocky; hard, friable, sticky and plastic; many fine roots; common fine pores; common thin clay films on faces of peds and on pebbles; 25 percent pebbles and 5 percent cobbles, by volume; neutral; clear wavy boundary.
- B22t—9 to 12 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, very dark grayish brown (10YR 3/2) moist; strong fine angular and subangular blocky structure; hard, friable, sticky and plastic; many fine and very fine roots; common fine pores; common thin continuous clay films on faces of peds and on pebbles; 35 percent pebbles and 5 percent cobbles, by volume; mildly alkaline; clear wavy boundary.
- B23tca—12 to 15 inches; grayish brown (10YR 5/2) very gravelly clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and fine angular and subangular blocky structure; hard, very friable, sticky and plastic; common fine roots; common fine pores; few thin patchy clay films on faces of peds; 50 percent pebbles and 5 percent cobbles, by volume; strongly effervescent; moderately alkaline; clear irregular boundary.
- IIIC1ca—15 to 24 inches; grayish brown (2.5Y 5/2) very gravelly loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine pores; 50 percent pebbles and 5 percent cobbles, by volume; lime coats on undersides of coarse fragments;

violently effervescent; moderately alkaline; gradual boundary.

IIC2ca—24 to 60 inches; grayish brown (2.5Y 5/2) extremely gravelly loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots in upper part; few fine pores; 60 percent pebbles and 10 percent cobbles, by volume; lime coats on undersides of pebbles; violently effervescent; moderately alkaline.

The B horizon is brown, grayish brown, or dark grayish brown. Coarse fragments, to a depth of 24 to 36 inches, range from 35 to 60 percent, by volume, and are mainly pebbles. Below 36 inches the coarse fragments range from 50 to 70 percent, by volume, and are mainly pebbles; less than 15 percent are cobbles.

### Silverchief series

The Silverchief series consists of deep, well drained soils that formed in colluvial and alluvial material weathered from mixed sedimentary and igneous rocks. These soils are on mountain slopes and fans at an elevation of 4,000 to 6,000 feet. Slopes are 8 to 35 percent. The average annual precipitation is 17 to 22 inches. The average annual temperature is 38 to 42 degrees F. The growing season is 80 to 100 days.

Typical pedon of Silverchief loam, in woodland, 1,500 feet west and 2,060 feet south of the NE corner of sec. 9, T. 25 N., R. 24 E.

O1—3 inches to 2; organic mat of needles, leaves, and twigs.

O2—2 inches to 0; humus layer.

A2—0 to 5 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; many fine and very fine pores; many unstained silt and sand grains; 5 percent pebbles, by volume; neutral; clear wavy boundary.

B21t—5 to 20 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to strong fine and medium subangular blocky; very hard, firm, sticky and plastic; many fine and medium roots; many fine pores; common medium olive brown (2.5Y 4/4) clay films on faces of peds; 10 percent pebbles, by volume; neutral; clear wavy boundary.

B22t—20 to 27 inches; light olive brown (2.5Y 5/4) gravelly clay, olive brown (2.5Y 4/4) moist; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; common fine and medium roots; many fine pores; thin patchy clay films on faces of peds; 20 percent pebbles and 10 percent cobbles, by volume; thin coats of lime on undersides of smaller coarse fragments and as

crusts on undersides of larger coarse fragments; matrix is noncalcareous but is slightly effervescent around coarse fragments; mildly alkaline; gradual wavy boundary.

Cca—27 to 60 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots in upper part grading to few fine and medium roots in lower part; common fine pores; 35 percent pebbles and 15 percent cobbles, by volume; lime coats on coarse fragments; strongly effervescent; moderately alkaline.

The A horizon is 3 to 6 inches thick. The A2 horizon is very pale brown, pale brown, or light brownish gray. The B2 horizons are brown or light olive brown. Coarse fragments range from 5 percent, by volume, in the upper part of the B2t horizon to 30 percent in the lower part. A B3ca horizon is present in some pedons. Depth to strong accumulation of lime ranges from 17 to 30 inches. The C horizon is light yellowish brown, pale brown, or brown.

### Straw series

The Straw series consists of deep, well drained soils that formed in alluvium. These soils are on flood plains and stream terraces at an elevation of 2,600 to 4,000 feet. Slopes are 0 to 2 percent. The average annual precipitation is 13 to 18 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 120 days.

Typical pedon of Straw loam, in native grass, 10 feet north and 1,200 feet east of the SW corner of sec. 17, T. 13 N., R. 18 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; strong fine and medium granular structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine and very fine pores; mildly alkaline; clear wavy boundary.

A12—7 to 21 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; strong fine and medium granular structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine and very fine pores; few thin lenses of fine sandy loam; slightly effervescent; mildly alkaline; clear smooth boundary.

C—21 to 60 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; few fine olive brown (2.5Y 4/4) mottles; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; common fine pores; thin lenses of sandy loam and silty clay loam; strongly effervescent; moderately alkaline; clear wavy boundary.

The surface layer ranges from calcareous to noncalcareous. The mollic epipedon is 20 to 32 inches

thick. In some places there is a buried A horizon. The horizons below a depth of 30 to 40 inches are stratified with thin lenses of loam, fine sandy loam, clay loam, or silt loam.

### Telstad series

The Telstad series consists of deep, well drained soils that formed in glacial till. These soils are on glaciated uplands at an elevation of 2,400 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Telstad loam, in cultivated field, 600 feet south and 75 feet east of the NW corner of sec. 27, T. 37 N., R. 23 E.

- Ap—0 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; neutral; clear wavy boundary.
- B21t—7 to 10 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate fine prismatic structure parting to moderate medium and fine angular blocky; hard, friable, sticky and plastic; many fine roots; common fine pores; thin very dark grayish brown (10YR 3/2) clay films on vertical faces of peds; mildly alkaline; clear smooth boundary.
- B22t—10 to 14 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; strong medium prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and plastic; common fine roots; few to common fine and very fine pores; thin dark grayish brown (10YR 3/2) clay films on vertical faces of peds; mildly alkaline; clear wavy boundary.
- B3tca—14 to 18 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium prismatic structure parting to moderate medium angular and subangular blocky; hard, friable, sticky and plastic; common fine roots; common fine pores; thin discontinuous clay films on vertical faces of peds; few to common soft masses of lime; slightly to strongly effervescent; mildly alkaline; gradual wavy boundary.
- C1ca—18 to 32 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate medium and coarse prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and plastic; few fine roots; common fine and medium pores; 5 percent pebbles, by volume; common soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.
- C2—32 to 45 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; hard, friable, sticky and plastic;

few very fine roots in upper part; common pores; 5 percent pebbles, by volume; few soft masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

- C3—45 to 60 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; 5 percent pebbles, by volume; strongly effervescent; moderately alkaline.

The thickness of the A horizon ranges from 4 to 8 inches. The A horizon is loam or gravelly loam. The B horizon is brown or grayish brown. In some areas, strata of sandy clay loam are present in the C horizon. Coarse fragments range from 0 to 10 percent in the B and C horizons and from 0 to 25 percent in the surface layer.

### Thoeny series

The Thoeny series consists of deep, well drained soils that formed in glacial till. These soils are on uplands at an elevation of 2,400 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 15 inches. The average annual temperature is 41 to 45 degrees F. The growing season is 105 to 125 days.

Typical pedon of Thoeny loam, in native grass, 1,000 feet east and 500 feet south of the NW corner of sec. 29, T. 34 N., R. 20 E.

- A21—0 to 3 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; weak very fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine roots; common fine pores; many unstained silt and sand grains; neutral; clear wavy boundary.
- A22—3 to 6 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak fine granular; soft, very friable, slightly sticky and nonplastic; many fine and very fine roots; common fine pores; many unstained silt and sand grains; mildly alkaline; abrupt wavy boundary.
- B21t—6 to 9 inches; brown (10YR 5/3) clay, grayish brown (10YR 4/1) moist; strong fine and medium columnar structure parting to weak medium angular blocky; extremely hard, firm, sticky and very plastic; common fine and very fine roots between peds; few very fine and fine pores; moderately thick dark grayish brown (10YR 4/2) clay films on faces of peds; light gray (10YR 6/1) skeletons on top of columns and common unstained silt and sand grains on vertical faces of peds; mildly alkaline; clear wavy boundary.
- B22t—9 to 12 inches; brown (10YR 5/3) clay, dark grayish brown (10YR 4/2) moist; strong medium and fine prismatic structure parting to moderate medium and fine angular blocky; very hard, firm, sticky and very plastic; common fine and very fine roots; few

very fine pores; dark grayish brown (10YR 4/2) coats on faces of peds; thin continuous clay films on faces of peds; moderately alkaline; clear wavy boundary.

B31tca—12 to 17 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure parting to moderate medium angular and subangular blocky; very hard, firm, sticky and very plastic; common very fine roots; few fine and very fine pores; thin discontinuous clay films; 5 percent lime-coated fine pebbles, by volume; strongly effervescent; strongly alkaline; clear wavy boundary.

B32cacs—17 to 28 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium subangular and angular blocky; very hard, firm, sticky and very plastic; few very fine roots; common fine and very fine pores; 5 percent lime-coated pebbles, by volume; common fine soft masses and threads of lime and gypsum; strongly effervescent; strongly alkaline; gradual wavy boundary.

C1cacs—28 to 52 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky structure in the upper part grading to weak coarse subangular blocky structure in the lower part; very hard, friable, sticky and plastic; few very fine roots in the upper part; common fine pores; 5 percent lime-coated pebbles, by volume; common medium and fine soft masses and threads of lime and gypsum; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2cs—52 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak thick platy structure; very hard, friable, sticky and plastic; common fine soft threads of gypsum; slightly effervescent; moderately alkaline.

Depth to carbonates ranges from 12 to 18 inches. The A horizon is 5 to 8 inches thick. It is medium acid to neutral. The B2t horizon is brown, dark brown, or grayish brown clay loam or clay. It has moderate or strong columnar structure in the upper 2 to 4 inches and moderate or strong prismatic and blocky structure below that. It is mildly alkaline to strongly alkaline. The Ccs horizon has 15 to 25 percent exchangeable sodium. It is mildly alkaline to strongly alkaline.

### Turner series

The Turner series consists of deep, well drained soils that formed in alluvium. These soils are on terraces and fans on uplands at an elevation of 2,800 to 4,200 feet. They are underlain by very gravelly loamy sand or very gravelly sand at a depth of 20 to 40 inches. Slopes are 0

to 8 percent. The average annual precipitation is 13 to 18 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 120 days.

Typical pedon of Turner loam, in native grass, 1,540 feet west and 2,470 feet north of the SE corner of sec. 21, T. 27 N., R. 19 E.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; 10 percent pebbles, by volume; neutral; abrupt wavy boundary.

B21t—2 to 4 inches; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; strong very fine subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; continuous clay films on faces of peds; 10 percent pebbles, by volume, with few cobbles; neutral; clear wavy boundary.

B22t—4 to 7 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; very hard, friable, sticky and plastic; many very fine and fine roots; common very fine pores; continuous clay films on faces of peds, in pores, and on surface of pebbles; 10 percent pebbles, by volume, with few cobbles; neutral; clear wavy boundary.

B23t—7 to 11 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, friable, sticky and plastic; common very fine roots; few very fine pores; continuous thin clay films on faces of peds, in pores, and on surface of pebbles; 10 percent pebbles, by volume, with few cobbles; mildly alkaline; abrupt wavy boundary.

C1ca—11 to 16 inches; light gray (10YR 7/2) clay loam, brown (10YR 5/3) moist; weak medium and coarse angular blocky structure; very hard, very friable, sticky and slightly plastic; common fine roots; few fine pores; 10 percent pebbles, by volume, with few cobbles; many coarse masses of lime; violently effervescent; moderately alkaline; diffuse wavy boundary.

C2ca—16 to 26 inches; light gray (10 YR 7/2) gravelly loam, brown (10YR 5/3) moist; massive; very hard, very friable, sticky and slightly plastic; few very fine roots; common very fine pores; 15 percent pebbles and 5 percent cobbles, by volume; calcium carbonate coatings on underside of coarse fragments; many coarse masses of lime; violently effervescent; moderately alkaline; abrupt wavy boundary.

IIC3ca—26 to 60 inches; grayish brown (2.5Y 5/2) very gravelly loamy coarse sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; 40 percent

pebbles and 15 percent cobbles, by volume; calcium carbonate coatings on underside of coarse fragments; strongly effervescent; moderately alkaline.

The A horizon is dark grayish brown, very dark grayish brown, or dark brown. The B horizon is brown, dark brown, or grayish brown loam, clay loam, or sandy clay loam. The lower part of the C horizon is very gravelly sand or very gravelly loamy sand.

### Twilight series

The Twilight series consists of moderately deep, well drained soils that formed in material weathered from soft sandstone. These soils are on uplands at an elevation of 2,800 to 4,000 feet. They are underlain by soft sandstone at a depth of 20 to 40 inches. Slopes are 4 to 20 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Twilight fine sandy loam, in native grass, 1,050 feet north and 1,880 feet east of the SW corner of sec. 18, T. 27 N., R. 21 E.

A1—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine and very fine roots; mildly alkaline; clear smooth boundary.

B2—3 to 11 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate and fine subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; many fine and very fine roots; common medium and fine pores; mildly alkaline; gradual wavy boundary.

C1ca—11 to 22 inches; pale olive (5Y 6/3) fine sandy loam, olive (5Y 5/4) moist; weak medium and coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; common fine and very fine roots; few fine pores; moderately alkaline; violently effervescent; gradual wavy boundary.

C2ca—22 to 35 inches; pale olive (5Y 6/3) fine sandy loam, olive (5Y 5/4) moist; massive; soft, very friable, slightly sticky and nonplastic; few fine and very fine roots; few fine pores; few soft sandstone fragments; violently effervescent; moderately alkaline; clear wavy boundary.

C3r—35 to 60 inches; soft calcareous sandstone that crushes to fine sandy loam and loamy fine sand.

Depth to soft or slightly indurated sandstone ranges from 20 to 40 inches. The A horizon is grayish brown or brown.

### Vanda series

The Vanda series consists of deep, well drained soils that formed in clayey alluvium. These soils are on fans and terraces in valleys and on fans on uplands at an elevation of 2,300 to 3,300 feet. Slopes are 0 to 8 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Vanda clay, in native grass, 1,100 feet east and 1,000 feet south of the NW corner of sec. 9, T. 23 N., R. 18 E.

A1—0 to 6 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium granular structure; very hard, firm, very sticky and very plastic; common fine roots; few fine pores; thin light brownish gray (2.5Y 6/2) vesicular crust that is 1/4 to 1/2 inch thick on the surface; slightly effervescent; strongly alkaline; clear smooth boundary.

C1cs—6 to 16 inches; olive gray (5Y 5/2) clay, olive gray (5Y 5/2) moist; massive; very hard, firm, very sticky and very plastic; common to few fine roots; few fine pores; common fine soft threads of gypsum; strongly effervescent; very strongly alkaline; gradual wavy boundary.

C2cs—16 to 26 inches; olive gray (5Y 5/2) clay, olive gray (5Y 5/2) moist; massive; very hard, firm, very sticky and very plastic; few fine roots; few fine pores; few fine soft threads of gypsum; strongly effervescent; very strongly alkaline; gradual wavy boundary.

C3—26 to 60 inches; olive gray (5Y 5/2) clay, olive gray (5Y 5/2) moist; massive; very hard, firm, very sticky and very plastic; strongly effervescent; very strongly alkaline.

The depth to segregated gypsum ranges from 11 to 20 inches. The C horizon is light olive gray to grayish brown clay or silty clay. In some places, there are thin strata of silty clay loam, clay loam, and sandy clay loam below a depth of 30 inches. The C horizon has 15 to 30 percent exchangeable sodium. It is strongly alkaline or very strongly alkaline.

### Vida series

The Vida series consists of deep, well drained soils that formed in glacial till. These soils are on uplands at an elevation of 2,400 to 3,800 feet. Slopes are 2 to 25 percent. The average annual precipitation is 13 to 17 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Vida clay loam, in native grass, 400 feet east and 1,400 feet south of the NW corner of sec. 25, T. 29 N., R. 21 E.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; neutral; clear smooth boundary.

B1—2 to 4 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky; hard, friable, sticky and slightly plastic; many fine roots; common fine and very fine pores; mildly alkaline; clear smooth boundary.

B2t—4 to 9 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong medium and fine angular and subangular blocky; very hard, friable, sticky and plastic; many fine roots; few fine and very fine pores; thin continuous clay films; mildly alkaline; clear wavy boundary.

B3ca—9 to 14 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; common fine roots; common fine and very fine pores; few to common soft masses of lime; strongly effervescent in the upper part and violently effervescent in the lower part; mildly alkaline; clear wavy boundary.

C1ca—14 to 34 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure; very hard, friable, sticky and plastic; few to common fine roots; common fine and very fine pores; common to many soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—34 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, friable, sticky and plastic; few fine roots in upper part; common fine pores; few soft masses of lime; strongly effervescent; moderately alkaline.

The mollic epipedon is 7 to 9 inches thick. Depth to carbonates ranges from 6 to 10 inches. The surface layer is loam or clay loam. The C horizon is clay loam or loam.

### Wabek series

The Wabek series consists of deep, excessively drained soils that formed in alluvium. These soils are on outwash terraces on uplands at an elevation of 2,400 to 3,600 feet. They are underlain by very gravelly sand or very gravelly loamy coarse sand at a depth of 6 to 14 inches. Slopes are 2 to 35 percent. The average annual precipitation is 12 to 17 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 100 to 125 days.

Typical pedon of Wabek gravelly loam, in native grass, 1,050 feet north and 1,320 feet east of the SW corner of sec. 23, T. 25 N., R. 18 E.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; many fine roots; 15 percent pebbles, by volume; mildly alkaline; clear smooth boundary.

A12—3 to 8 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common fine pores; 20 percent pebbles, by volume; lime coats on undersides of pebbles; mildly alkaline; clear wavy boundary.

IIc1ca—8 to 15 inches; light brownish gray (2.5Y 6/2) very gravelly loamy coarse sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; common fine roots; 35 percent pebbles, by volume; lime coats on pebbles and masses of lime; violently effervescent; moderately alkaline; gradual boundary.

IIIC2—15 to 60 inches; grayish brown (2.5Y 5/2) very gravelly coarse sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; few fine roots in upper part; 55 percent pebbles, by volume; lime crusts on undersides of larger pebbles in upper part; slightly effervescent; moderately alkaline.

The A horizon is brown, grayish brown, or dark grayish brown. The underlying material ranges from very gravelly loamy coarse sand to very gravelly sand. Depth to carbonates ranges from 6 to 9 inches.

### Warneke series

The Warneke series consists of shallow, well drained soils that formed in material that weathered from hard limestone. These soils are on mountains at an elevation of 4,000 to 6,000 feet. They are underlain by hard limestone at a depth of 10 to 20 inches. Slopes are 25 to 70 percent. The average annual precipitation is 17 to 25 inches. The average annual temperature is 38 to 42 degrees F., and the growing season is 80 to 100 days.

Typical pedon of Warneke gravelly loam, in native grass, 400 feet south and 2,640 feet east of the NW corner of sec. 20, T. 26 N., R. 24 E.

A1—0 to 4 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and medium roots; 20 percent subrounded pebbles, by volume, and few angular cobbles; strongly effervescent; moderately alkaline; clear smooth boundary.

B2—4 to 15 inches; very pale brown (10YR 7/3) very channery loam, pale brown (10YR 6/3) moist;

moderate fine subangular blocky structure; hard, friable, sticky and slightly plastic; few fine and medium roots; common fine and very fine pores; 25 percent angular pebbles and 15 percent angular cobbles, by volume; lime crusts on undersides of fragments; violently effervescent; moderately alkaline; clear wavy boundary.

R—15 inches; limestone bedrock.

The A horizon is grayish brown, brown, or dark brown. Coarse fragments make up 35 to 50 percent of the B horizon; the calcium carbonate equivalent makes up 40 to 60 percent. The limestone bedrock is fractured in some pedons.

### Whitecow series

The Whitecow series consists of deep, well drained soils that formed in alluvium and colluvium from limestone. These soils are on mountainsides at an elevation of 4,000 to 6,000 feet. Slopes are 25 to 60 percent. The average annual precipitation is 17 to 25 inches. The average annual temperature is 40 to 45 degrees F. The growing season is 80 to 100 days.

Typical pedon of Whitecow gravelly loam, in woodland, 500 feet west and 1,500 feet south of the NE corner of sec. 26, T. 20 N., R. 24 E.

O1—1 inch to 0; forest litter of needles and twigs.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots and few medium roots; 25 percent subrounded pebbles, by volume; slightly effervescent; moderately alkaline; clear smooth boundary.

A12—3 to 10 inches; grayish brown (10YR 5/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; 40 percent angular pebbles, by volume, and few angular cobbles; lime crusts on undersides of pebbles and cobbles; violently effervescent; moderately alkaline; clear boundary.

B2—10 to 20 inches; light brownish gray (2.5Y 6/2) very gravelly loam, light olive brown (2.5Y 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few or common fine roots; common fine pores; 60 percent angular pebbles, by volume, and few angular cobbles; lime coats on coarse fragments; violently effervescent; moderately alkaline; gradual boundary.

C1ca—20 to 30 inches; light brownish gray (2.5Y 6/2) extremely gravelly loam, light olive brown (2.5Y 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, sticky and slightly

plastic; few fine roots; few fine pores; about 70 percent angular pebbles, by volume, and few angular cobbles; lime coats on coarse fragments; violently effervescent; moderately alkaline; gradual boundary.

C2ca—30 to 60 inches; light brownish gray (2.5Y 6/2) extremely gravelly loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, sticky and slightly plastic; few fine roots; few fine pores; 70 percent angular pebbles, by volume, and few angular cobbles; violently effervescent; moderately alkaline.

The A horizon is brown, grayish brown, or dark grayish brown. Under dense forest cover there is a thin A2 horizon. The upper part of the 10- to 14-inch control section is 35 to 60 percent coarse fragments, by volume. The lower part is 60 to 80 percent coarse fragments, by volume, mostly pebbles. The Cca horizon is 40 to 60 percent calcium carbonate equivalent.

### Williams series

The Williams series consists of deep, well drained soils that formed in glacial till. They are on uplands at an elevation of 2,400 to 3,600 feet. Slopes are 0 to 8 percent. The average annual precipitation is 13 to 17 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 100 to 125 days.

Typical pedon of Williams loam, in cultivated field, 1,900 feet east and 10 feet south of the NW corner of sec. 35, T. 32 N., R. 18 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; soft, very friable, slightly sticky and slightly plastic; many fine roots; common fine and very fine pores; few clear unstained sand grains; neutral; clear smooth boundary.

B2t—6 to 14 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; strong medium prismatic structure parting to moderate fine subangular and angular blocky; very hard, friable, sticky and plastic; many fine roots; common fine and very fine pores; thin continuous clay films on faces of peds; peds are coated with a few clear unstained sand grains and common stained sand grains; mildly alkaline; clear irregular boundary.

B3tca—14 to 20 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, friable, sticky and slightly plastic; common fine and very fine roots; many fine and very fine pores; thin clay films on vertical faces of peds; 5 percent pebbles, by volume; few fragments of lignite; common large soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C1ca—20 to 41 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure parting to moderate coarse and medium subangular blocky; extremely hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine and very fine pores; 5 percent pebbles, by volume; few fragments of shale and lignite; common white masses and films of segregated lime and hard lime casts on pebbles; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—41 to 53 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak very coarse prismatic structure parting to moderate thick platy; extremely hard, friable, slightly sticky and slightly plastic; few fine and very fine pores; few fragments of shale and lignite; 5 percent pebbles, by volume; few soft masses of gypsum crystals in lower part; strongly effervescent; moderately alkaline; gradual boundary.

C3ca—53 to 60 inches; light olive brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) moist; strong thick and very thick platy structure; extremely hard, friable, slightly sticky and slightly plastic; 5 percent pebbles, by volume; segregated gypsum as clear crystals in horizontal seams between plates and along vertical breaks in plates; slightly effervescent; moderately alkaline.

The mollic epipedon is 7 to 12 inches thick. Depth to carbonates ranges from 10 to 16 inches. The B horizon has moderate or strong grades of prismatic structure. The Cca horizon has few to many soft masses of lime. The pedon is less than 15 percent coarse fragments, by volume.

### Windham series

The Windham series consists of deep, well drained soils that formed in alluvium derived mostly from limestone. These soils are on terraces and fans on uplands at an elevation of 3,200 to 4,500 feet. Slopes are 4 to 45 percent. The average annual precipitation is 14 to 18 inches. The average annual temperature is 40 to 44 degrees F., and the growing season is 90 to 120 days.

Typical pedon of Windham gravelly loam, in native grass, 2,260 feet west and 200 feet south of the NE corner of sec. 1, T. 25 N., R. 23 E.

A1—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, friable, slightly sticky and nonplastic; many fine roots; 20 percent fine pebbles, by volume; strongly effervescent; mildly alkaline; clear wavy boundary.

C1ca—6 to 20 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; massive;

slightly hard, friable, sticky and plastic; common fine roots; common fine pores; 35 percent pebbles and 5 percent cobbles, by volume; lime coats on pebbles; violently effervescent; moderately alkaline; clear wavy boundary.

C2—20 to 60 inches; pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; massive; soft, friable, slightly sticky and nonplastic; few fine and very fine roots in upper part; common fine pores; 45 percent cobbles, by volume; lime coats on undersides of coarse fragments; violently effervescent; moderately alkaline.

The A horizon is grayish brown or dark grayish brown. It is gravelly loam or cobbly loam. In some places there is no B horizon. The B and C horizons are 35 to 60 percent coarse fragments, by volume. The Cca horizon has 40 to 60 percent calcium carbonate equivalent.

### Work series

The Work series consists of deep, well drained soils that formed in alluvium. These soils are on terraces and fans on uplands at an elevation of 2,800 to 4,000 feet. Slopes are 0 to 8 percent. The average annual precipitation is 13 to 18 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Work clay loam, in cropland, 1,600 feet east and 500 feet south of the NW corner of sec. 24, T. 27 N., R. 20 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and plastic; many fine roots; common unstained silt and sand grains; mildly alkaline; clear smooth boundary.

B2t—6 to 13 inches; dark brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong medium and fine angular blocky; very hard, firm, sticky and plastic; many fine and very fine roots; common fine and very fine pores; thin continuous clay films; mildly alkaline; clear smooth boundary.

B3tca—13 to 19 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium angular blocky; hard, friable, sticky and plastic; common to many fine and very fine roots; common fine and very fine pores; thin discontinuous clay films on vertical faces of peds; 5 percent pebbles, by volume; common soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—19 to 29 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; hard, friable, sticky and

plastic; few to common fine roots; many fine and very fine pores; 10 percent pebbles, by volume; many soft masses of lime and lime coats on gravel; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—29 to 42 inches; pale brown (10YR 5/3) gravelly clay loam, dark brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few very fine roots; many fine pores; 20 percent pebbles, by volume; few soft masses of lime; lime coats on undersides of pebbles; strongly effervescent; moderately alkaline; gradual wavy boundary.

C3—42 to 60 inches; pale brown (10YR 6/3) gravelly clay loam, dark brown (10YR 4/3) moist; massive; hard, very friable, sticky and slightly plastic; 30 percent pebbles, by volume; lime coats on undersides of pebbles; strongly effervescent; moderately alkaline.

The mollic epipedon is 10 to 14 inches thick. The A horizon is dark brown, brown, or grayish brown. The B horizon is dark brown, grayish brown, or dark grayish brown; it is clay loam or clay with 36 to 45 percent clay. The C horizon, below a depth of 26 inches, is clay loam, gravelly clay loam, or gravelly loam.

### Yamac series

The Yamac series consists of deep, well drained soils that formed in alluvium. These soils are on fans, foot slopes, and terraces on uplands at an elevation of 2,300 to 3,600 feet. Slopes are 0 to 25 percent. The average annual precipitation is 10 to 14 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 105 to 125 days.

Typical pedon of Yamac loam, in native grass, 2,600 feet east and 2,560 feet north of the SW corner of sec. 18, T. 27 N., R. 21 E.

A1—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; many fine pores; mildly alkaline; clear smooth boundary.

B2—4 to 11 inches; light olive brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine and very fine pores; mildly alkaline; clear wavy boundary.

C1ca—11 to 26 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine pores; common fine soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—26 to 60 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots in upper part; few fine pores; strongly effervescent; strongly alkaline.

The A horizon is brown or grayish brown. The B horizon is grayish brown to olive. The C horizon is loam, but in some places it has thin strata of sandy loam or silt loam. The A and B horizons are neutral or mildly alkaline. The C horizon is mildly alkaline to strongly alkaline.

### Zahill series

The Zahill series consists of deep, well drained soils that formed in glacial till. These soils are on uplands at an elevation of 2,400 to 4,000 feet. Slopes are 8 to 45 percent. The average annual precipitation is 13 to 17 inches. The average annual temperature is 41 to 45 degrees F., and the growing season is 100 to 125 days.

Typical pedon of Zahill clay loam, in native grass, 1,800 feet south and 800 feet west of the NE corner of sec. 25, T. 29 N., R. 21 E.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many fine roots; many fine pores; mildly alkaline; clear smooth boundary.

AC—3 to 12 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and plastic; many fine roots; few fine pores; 5 percent fine pebbles, by volume; few fine soft masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—12 to 36 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; very hard, friable, sticky and plastic; few to common fine roots; few fine pores; 5 percent fine pebbles, by volume; common medium soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—36 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak thick platy structure; hard, friable, sticky and plastic; few fine pores; 5 percent fine pebbles, by volume; common medium soft masses of lime; strongly effervescent; moderately alkaline.

The A horizon is grayish brown or dark grayish brown. The C horizon is clay loam or loam.



# formation of the soils

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George B. Hiltz and Arial Anderson, soil scientists, Soil Conservation Service, prepared this section.

In this section, the five factors that affect the formation of soils are discussed.

## factors of soil formation

Soil is composed of mineral matter mixed with varying amounts of organic matter derived from vegetation. The mineral matter is derived from parent material that has been weathered and broken down by the combined effect of climate, living organisms, and topography through a long period of time. Within short distances, the combination of these factors varies. Consequently, the soils that form have different fertility, productivity, and physical and chemical characteristics.

### parent material

About two-thirds of the soils in the survey area formed in glacial till or in glacial outwash material. Some of the soils formed in alluvium derived from mixed sources, and other soils formed in material that weathered from shale, sandstone, limestone, or igneous rocks. Soils that formed in soft sandstone, such as the Twilight soils, are generally sandy; soils that formed over hard rock, such as the Castner soils, are generally loamy and have a high content of rock fragments. Soils that formed in soft shale or siltstone, such as the Delpoint and Cabbart soils, are generally loamy; soils that formed in clay shale or mudstone, such as the Lisam and Bascovy soils, are generally clayey. Soils that formed in alluvium range from sandy, for example, the Glendive soils, to clayey, for example, the Harlem soils. Many soils in the survey area have accumulated lime and salt from the parent material. Soils that formed in outwash material generally have a high percentage of sand and rock fragments.

### climate

Climate is an active force in the formation of soils, mainly through the effects of temperature and precipitation, although wind has some influence. Erosion and alternate freezing and thawing break down rocks into material in which soils form. The weathered material is further broken down by chemical reactions, such as solution and hydration. In this survey area, the annual precipitation ranges from about 10 to 25 inches. In the driest and warmest parts of the survey area there are

soils of the Aridisol order, such as those in the Phillips series. In cooler and wetter parts of the survey area there are soils of the Mollisol order, such as those of the Bearpaw and Belain series.

### living organisms

Living organisms are an active force in the formation of soils. Organic matter is the main source of the dark color of the surface layer. However, some soils, such as those in the Belain series, get their dark color from dark minerals as well as from organic matter. Fungi and algae are among the earliest inhabitants of rock material. They contribute to the decomposition of rocks. As the rocks decompose, grasses, shrubs, and trees are able to grow and support animal life.

The kinds of plants and animals present largely determine the kind and amount of organic matter added to the soil and how this matter is incorporated with the mineral part of the soil. Roots, rodents, and insects penetrate the soil and influence its structure. Leaves, roots, and whole plants, on the surface or in the surface layer, are changed to humus by microorganisms, chemicals in the soil, and insects.

The vegetation in the survey area ranges from short and mid grasses and shrubs in most areas to aspen, ponderosa pine, and Douglas-fir trees in the Bearpaw Mountains and the Little Rocky Mountains. Mounds of earth on the ground surface have been dug up from underlying layers by burrowing rodents.

### topography

Topography, or relief, is determined by the resistance of bedrock to erosion by wind and water. On eroded uplands in the survey area, runoff water has carved deep valleys into the bedrock formations. The rugged relief contrasts sharply with the nearly level relief of the terraces and flood plains of the river valleys.

On uplands, the number and the distinctness of soil horizons generally decrease as the slope increases. Exceptions to this are the soils of the Macmeal and Whitecow series, which formed on steep mountainsides. Steep soils that have rapid runoff have many characteristics similar to those of soils formed in arid climates. Level soils that receive runoff water from overlying areas have many of the characteristics of soils

that formed in humid climates. An example of this pattern is the shallow Cabbart soil that has steep slopes and the deep Dimmick soil in glacial depressions. The Cabbart soil has a thin, light-colored A horizon, and the Dimmick soil has a thick, dark-colored A horizon.

#### **time**

Soil genesis is that phase of soil science that deals with the factors and processes of soil formation. These processes give the soil distinct horizons, or layers, by which it can be recognized.

Soils are classified as young to mature. The age of a soil is determined by the thickness of the A horizon, the content of organic matter and of clay, the depth to which

soluble material is leached, and the form and distribution of calcium carbonate and gypsum in the soil.

Havre loam, a soil of the Entisol order, is an example of a young soil. It is on a flood plain adjacent to a flowing stream. The soil contains little organic matter with which to form an A horizon, it has no clay accumulation, and little translocation of carbonates has occurred to form B2 and Cca horizons.

The Farnuf soils formed in parent material similar to but much older than that of Havre loam. The Farnuf soils formed in alluvium on uplands and are mature soils of the Mollisol order. They contain enough organic matter to have a dark A horizon. Also, they have a distinct clay accumulation in a B2t horizon, and nearly all the carbonates have been leached from the solum.

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# glossary

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**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.

**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—

	<i>Inches</i>
Very low.....	0 to 3
Low.....	3 to 6
Moderate.....	6 to 9
High.....	9 to 12
Very high.....	More than 12

**Badland.** Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

**Basal till.** Compact glacial till deposited beneath the ice.

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

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

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Blowout.** A shallow depression from which all or most of the soil material has been removed by 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.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

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

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

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

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

**Channery soil.** A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

**Chiseling.** Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and

- bring clods to the surface. A form of emergency tillage to control soil blowing.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
- Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
- 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) 15.2 to 38.1 centimeters (6 to 15 inches) long.
- Coarse textured soil.** Sand or loamy sand.
- Cobblestone (or cobble).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.
- Colluvium.** Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.
- Complex slope.** Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures 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.
- Compressible (in tables).** Excessive decrease in volume of soft soil under load.
- Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.
- Consistence, soil.** The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—
- Loose.*—Noncoherent when dry or moist; does not hold together in a mass.
- Friable.*—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
- Firm.*—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
- Plastic.*—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a “wire” when rolled between thumb and forefinger.
- Sticky.*—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
- Hard.*—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
- Soft.*—When dry, breaks into powder or individual grains under very slight pressure.
- Cemented.*—Hard; little affected by moistening.
- 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.
- Corrosive.** High risk of corrosion to uncoated steel or deterioration of concrete.
- Cutbanks cave (in tables).** The walls of excavations tend to cave in or slough.
- Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.
- Deferred grazing.** Postponing grazing or arresting grazing for a prescribed period.
- Depth to rock (in tables).** Bedrock is too near the surface for the specified use.
- Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.
- Drainage class (natural).** Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
- Excessively drained.*—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.

**Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

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

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the

building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

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

**Excess alkali** (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

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

**Excess lime** (in tables). Excess carbonates in the soil that restrict the growth of some plants.

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

**Fallow.** Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal 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.

**Fine textured soil.** Sandy clay, silty clay, and clay.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

**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.

**Glacial outwash** (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

**Glacial till** (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

**Glaciofluvial deposits** (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

**Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial melt water. Many deposits are interbedded or laminated.

**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 7.5 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 (7.5 centimeters) in diameter.

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

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

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike

that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

*R layer.*—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

**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.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

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

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

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

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

**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—  
*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

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

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

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

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Lacustrine deposit** (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Large stones** (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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

**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.

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

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

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**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.

**Moderately coarse textured soil.** Sandy loam and fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, and 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 the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, 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.

**Outwash, glacial.** Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

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

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

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

**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 0.20 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. For example, 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.

**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.

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

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

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

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

	<i>pH</i>
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.

**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-size particles.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

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

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

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

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

**Shrink-swell.** 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.

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

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils,

slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

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

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

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

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

**Small stones** (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Sodicity.** The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium absorption ratio (SAR) of a saturation extract, or the ratio of  $Na^+$  to  $Ca^{++} + Mg^{++}$ . The degrees of sodicity are—

	SAR
Slight.....	Less than 13:1
Moderate.....	13-30:1
Strong.....	More than 30:1

**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 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millime- ters
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 and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

**Stone line.** A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one

fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

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

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

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

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

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

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

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

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

**Terminal moraine.** A belt of thick glacial drift that generally marks the termination of important glacial advances.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended

mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace** (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

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

**Thin layer** (in tables). Otherwise suitable soil material too thin for the specified use.

**Till plain.** An extensive flat to undulating area underlain by glacial till.

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

**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.

**Unstable fill** (in tables). Risk of caving or sloughing on banks of fill material.

**Variant, soil.** A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

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

**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.

**Wetting depth.** Depth to which a soil is wetted by normal precipitation.

**tables**

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TABLE 1.--TEMPERATURE AND PRECIPITATION

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days <sup>1</sup>	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>	
Recorded in the period 1951-75 at Chinook, Montana											
January----	23.9	1.0	12.5	58	-39	33	.63	.23	.95	3	9.2
February---	31.9	8.3	20.3	61	-31	38	.37	.17	.53	2	4.8
March-----	41.6	16.3	28.9	72	-24	107	.41	.08	.67	2	5.1
April-----	57.2	29.3	43.2	84	3	187	1.29	.44	1.96	4	1.7
May-----	69.8	41.0	55.4	91	24	477	1.82	.77	2.66	5	.0
June-----	77.6	48.9	63.3	97	34	699	2.34	1.35	3.13	7	.0
July-----	86.3	53.2	69.8	102	40	924	1.40	.52	2.10	4	.0
August-----	84.7	51.3	68.0	101	37	868	1.23	.25	2.00	3	.0
September--	72.8	40.8	56.8	95	23	504	.97	.31	1.48	3	.1
October----	62.3	31.6	47.0	87	12	257	.58	.16	.90	2	.3
November---	42.9	18.5	30.7	69	-21	83	.47	.10	.75	2	3.3
December---	30.5	7.9	19.2	61	-31	49	.48	.11	.76	2	4.6
Year-----	56.8	29.0	42.9	103	-40	4,226	11.99	9.22	14.38	39	29.1
Recorded in the period 1960-75 at Cleveland, Montana											
January----	27.5	3.5	15.5	58	-32	34	.68	.13	1.11	3	9.2
February---	35.1	11.2	23.2	62	-26	19	.37	.13	.56	1	4.9
March-----	41.1	17.3	29.2	69	-21	74	.68	.21	1.04	2	8.4
April-----	53.1	28.7	40.9	78	2	157	2.09	.94	3.02	4	17.2
May-----	64.8	39.3	52.1	89	21	375	2.29	.93	3.38	5	2.4
June-----	73.6	47.8	60.8	92	32	624	3.10	1.78	4.17	7	.1
July-----	82.6	52.0	67.3	98	37	846	1.43	.59	2.13	4	.0
August-----	80.9	50.8	65.7	99	34	797	1.59	.29	2.60	3	.0
September--	69.1	40.6	54.9	91	22	463	1.11	.30	1.75	3	.3
October----	59.4	32.1	45.8	84	9	235	.75	.20	1.16	2	1.6
November---	44.1	19.2	31.7	70	-17	34	.41	.15	.62	1	4.3
December---	32.4	8.8	20.6	59	-30	26	.53	.29	.72	3	7.4
Year-----	53.3	29.3	42.3	99	-37	3,684	15.03	11.36	18.44	38	55.8

<sup>1</sup>A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL.

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Recorded in the period 1951-75 at Chinook, Montana			
Last freezing temperature in spring:			
1 year in 10 later than--	May 6	May 16	May 28
2 years in 10 later than--	May 1	May 13	May 24
5 years in 10 later than--	April 21	May 3	May 17
First freezing temperature in fall:			
1 year in 10 earlier than--	September 20	September 8	September 2
2 years in 10 earlier than--	September 27	September 13	September 7
5 years in 10 earlier than--	October 9	September 23	September 16
Recorded in the period 1960-75 at Cleveland, Montana			
Last freezing temperature in spring:			
1 year in 10 later than--	May 12	May 23	June 3
2 years in 10 later than--	May 6	May 19	May 29
5 years in 10 later than--	April 25	May 11	May 21
First freezing temperature in fall:			
1 year in 10 earlier than--	September 15	September 6	September 3
2 years in 10 earlier than--	September 22	September 13	September 8
5 years in 10 earlier than--	October 6	September 27	September 19

TABLE 3.--GROWING SEASON

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
Recorded in the period 1951-75 at Chinook, Montana			
9 years in 10	148	122	105
8 years in 10	156	129	111
5 years in 10	171	142	122
2 years in 10	155	225	133
1 year in 10	193	162	138
Recorded in the period 1960-75 at Cleveland, Montana			
9 years in 10	134	114	99
8 years in 10	144	122	106
5 years in 10	164	138	121
2 years in 10	183	153	135
1 year in 10	193	161	143

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

Map symbol	Soil name	Acres	Percent
1	Absher-Nobe complex, 0 to 4 percent slopes-----	4,902	0.2
2	Assinniboine fine sandy loam, 0 to 4 percent slopes-----	8,274	0.3
3	Attewan loam, 0 to 4 percent slopes-----	19,307	0.7
4	Attewan-Beaverell complex, 0 to 4 percent slopes-----	21,694	0.8
5	Attewan-Wabek complex, 0 to 4 percent slopes-----	3,859	0.1
6	Badland*-----	47,338	1.7
7	Barkof clay, 4 to 8 percent slopes-----	5,508	0.2
8	Barkof-Norbert clays, 2 to 8 percent slopes-----	1,494	0.1
9	Barkof-Norbert clays, 8 to 20 percent slopes-----	8,420	0.3
10	Barkof-Windham association, moderately steep*-----	19,824	0.7
11	Bascovy clay, 2 to 6 percent slopes-----	15,244	0.5
12	Bascovy-Lisam-Dilts clays, 2 to 8 percent slopes-----	4,741	0.2
13	Bearpaw clay loam, 0 to 4 percent slopes-----	19,932	0.7
14	Bearpaw-Elloam clay loams, 0 to 4 percent slopes-----	19,703	0.7
15	Bearpaw-Elloam clay loams, 4 to 8 percent slopes-----	10,683	0.4
16	Bearpaw-Vida clay loams, 0 to 4 percent slopes-----	20,526	0.7
17	Bearpaw-Vida clay loams, 4 to 8 percent slopes-----	148,751	5.2
18	Belain loam, 2 to 8 percent slopes-----	2,754	0.1
19	Benz loam, 0 to 4 percent slopes-----	7,345	0.3
20	Bowdoin clay-----	10,155	0.4
21	Cabba loam, 8 to 35 percent slopes-----	4,996	0.2
22	Cabba-Rock outcrop complex, 25 to 75 percent slopes*-----	1,869	0.1
23	Cabba-Windham association, steep*-----	7,547	0.3
24	Cabba-Zahill association, steep*-----	11,891	0.4
25	Cabbart-Delpoint loams, 8 to 35 percent slopes-----	23,806	0.8
26	Cabbart-Hillon association, steep*-----	28,845	1.0
27	Cabbart-Rock outcrop, shale complex, 25 to 60 percent slopes*-----	43,325	1.5
28	Cabbart-Yamac-Rock outcrop complex, 15 to 70 percent slopes*-----	6,589	0.2
29	Castner gravelly loam, 8 to 35 percent slopes-----	5,203	0.2
30	Castner-Perma-Rock outcrop complex, 25 to 70 percent slopes*-----	41,651	1.5
31	Chinook fine sandy loam, 2 to 6 percent slopes-----	5,808	0.2
32	Chinook fine sandy loam, 6 to 12 percent slopes-----	4,295	0.2
33	Chinook-Phillips complex, 2 to 6 percent slopes-----	1,554	0.1
34	Cozberg fine sandy loam, 0 to 4 percent slopes-----	8,508	0.3
35	Creed loam, 0 to 4 percent slopes-----	1,986	0.1
36	Creed-Gerdum complex, 0 to 4 percent slopes-----	17,513	0.6
37	Delpoint loam, 2 to 4 percent slopes-----	1,118	**
38	Delpoint-Cabbart loams, 2 to 8 percent slopes-----	11,654	0.4
39	Dimmick clay-----	5,597	0.2
40	Elloam clay loam, 0 to 4 percent slopes-----	26,924	0.9
41	Ethridge silty clay loam, 0 to 4 percent slopes-----	14,765	0.5
42	Ethridge-Gerdum complex, 0 to 4 percent slopes-----	8,440	0.3
43	Farnuf loam, 0 to 2 percent slopes-----	2,028	0.1
44	Farnuf loam, 2 to 4 percent slopes-----	6,881	0.2
45	Farnuf loam, 4 to 8 percent slopes-----	1,905	0.1
46	Gerdum clay loam, 0 to 4 percent slopes-----	1,885	0.1
47	Glendive fine sandy loam-----	8,989	0.3
48	Hanly loamy fine sand-----	9,186	0.3
49	Harlem loam-----	2,196	0.1
50	Harlem silty clay loam-----	11,051	0.4
51	Harlem silty clay loam, saline-----	6,586	0.2
52	Harlem silty clay-----	11,639	0.4
53	Harlem silty clay, saline-----	16,442	0.6
54	Harlem Variant-Lardell silty clay loams-----	5,438	0.2
55	Havre loam-----	21,224	0.7
56	Havre loam, saline-----	7,091	0.2
57	Havre silty clay loam-----	5,184	0.2
58	Havre silty clay loam, saline-----	2,540	0.1
59	Havre, Hanly and Glendive soils, channeled*-----	35,808	1.3
60	Havre Variant-Lardell silty clay loams-----	7,613	0.3
61	Hedoes loam, 2 to 4 percent slopes-----	3,527	0.1
62	Hedoes loam, 4 to 8 percent slopes-----	6,612	0.2
63	Hedoes-Belain loams, 4 to 15 percent slopes-----	9,107	0.3
64	Hedoes-Belain loams, 15 to 35 percent slopes-----	34,586	1.2
65	Hedoes-Belain-Castner complex, 15 to 60 percent slopes*-----	79,848	2.8
66	Hedoes-Benz loams, 2 to 4 percent slopes-----	1,675	0.1
67	Hillon clay loam, 25 to 45 percent slopes-----	60,856	2.1
68	Hillon-Kevin clay loams, 15 to 35 percent slopes-----	74,389	2.6
69	Hillon-Scobey clay loams, 4 to 20 percent slopes-----	11,298	0.4

See footnotes at end of table.

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

Map symbol	Soil name	Acres	Percent
70	Judith-Windham complex, 4 to 8 percent slopes-----	1,712	0.1
71	Judith-Windham complex, 8 to 15 percent slopes-----	947	**
72	Kevin clay loam, 2 to 8 percent slopes-----	8,227	0.3
73	Kevin-Elloam clay loams, 2 to 8 percent slopes-----	37,772	1.3
74	Kevin-Hillon clay loams, 8 to 15 percent slopes-----	12,445	0.4
75	Korent-Nesda complex, occasionally flooded-----	1,267	**
76	Lardell silty clay loam-----	8,460	0.3
77	Lihen loamy fine sand, 0 to 6 percent slopes-----	2,756	0.1
78	Lihen loamy fine sand, 6 to 12 percent slopes-----	1,007	**
79	Lisam-Dilts clays, 8 to 35 percent slopes-----	80,255	2.8
80	Lisam-Dilts-Rock outcrop, shale complex, 25 to 60 percent slopes*-----	117,776	4.1
81	Lisam-Hillon association, steep*-----	47,310	1.7
82	Lisam-Wabek association, steep*-----	7,104	0.2
83	Lolo loam-----	2,282	0.1
84	Macmeal association, steep*-----	6,166	0.2
85	Marmarth-Cabbart complex, 2 to 8 percent slopes-----	5,744	0.2
86	Martinsdale clay loam, 0 to 4 percent slopes-----	15,622	0.5
87	Martinsdale-Judith complex, 2 to 8 percent slopes-----	4,367	0.2
88	Marvan clay, 0 to 4 percent slopes-----	13,954	0.5
89	Marvan-Bascovy clays, 2 to 8 percent slopes-----	8,744	0.3
90	Nishon loam-----	2,042	0.1
91	Nishon clay loam-----	6,795	0.2
92	Norbert clay, 8 to 35 percent slopes-----	2,980	0.1
93	Norbert-Rock outcrop, shale complex, 25 to 60 percent slopes*-----	1,278	**
94	Perma-Castner-Belain complex, 25 to 60 percent slopes-----	57,806	2.0
95	Phillips loam, 0 to 4 percent slopes-----	13,618	0.5
96	Phillips loam, 4 to 8 percent slopes-----	1,182	**
97	Phillips-Elloam complex, 0 to 4 percent slopes-----	298,723	10.5
98	Phillips-Elloam complex, 4 to 8 percent slopes-----	31,643	1.1
99	Phillips-Kevin complex, 0 to 4 percent slopes-----	26,065	0.9
100	Phillips-Kevin complex, 4 to 8 percent slopes-----	38,902	1.4
101	Pits, gravel-----	92	**
102	Reeder loam, 2 to 4 percent slopes-----	1,130	**
103	Reeder loam, 4 to 8 percent slopes-----	2,598	0.1
104	Rubble land-Rock outcrop association*-----	1,150	**
105	Savage silty clay loam, 0 to 2 percent slopes-----	6,067	0.2
106	Savage silty clay loam, 2 to 4 percent slopes-----	4,529	0.2
107	Savage-Gerdrum silty clay loams, 0 to 4 percent slopes-----	4,186	0.1
108	Scobey clay loam, 0 to 4 percent slopes-----	9,277	0.3
109	Scobey-Kevin clay loams, 0 to 4 percent slopes-----	18,958	0.7
110	Scobey-Kevin clay loams, 4 to 8 percent slopes-----	85,414	3.0
111	Shaak loam, 0 to 4 percent slopes-----	6,798	0.2
112	Shaak-Gerdrum complex, 0 to 4 percent slopes-----	3,298	0.1
113	Shawmut gravelly loam, 0 to 4 percent slopes-----	5,108	0.2
114	Shawmut gravelly loam, 4 to 8 percent slopes-----	4,173	0.1
115	Silverchief-Whitecow-Macmeal association steep*-----	2,690	0.1
116	Straw-Korent loams-----	7,042	0.2
117	Straw-Korent loams, occasionally flooded-----	2,367	0.1
118	Straw and Nesda soils, channeled*-----	10,203	0.4
119	Telstad loam, 0 to 4 percent slopes-----	145,054	5.1
120	Telstad-Joplin loams, 0 to 4 percent slopes-----	42,559	1.5
121	Telstad-Joplin loams, 4 to 8 percent slopes-----	40,133	1.4
122	Telstad-Joplin gravelly loams, 0 to 4 percent slopes-----	7,470	0.3
123	Thoeny-Elloam complex, 0 to 4 percent slopes-----	116,698	4.1
124	Thoeny-Kevin-Elloam complex, 4 to 8 percent slopes-----	14,706	0.5
125	Turner loam, 0 to 4 percent slopes-----	9,803	0.3
126	Turner-Beaverton complex, 2 to 8 percent slopes-----	1,997	0.1
127	Twilight-Riedel fine sandy loams, 4 to 8 percent slopes-----	2,805	0.1
128	Twilight-Riedel fine sandy loams, 8 to 20 percent slopes-----	3,088	0.1
129	Typic Fluvaquents, 0 to 2 percent slopes-----	1,317	**
130	Typic Ustifluvents, wet*-----	6,309	0.2
131	Ustic Torrifuvents, wet*-----	8,677	0.3
132	Vanda clay, 0 to 2 percent slopes-----	9,903	0.3
133	Vanda-Nobe clays, 0 to 2 percent slopes-----	12,520	0.4
134	Vanda-Nobe clays, 2 to 8 percent slopes-----	1,718	0.1
135	Vida clay loam, 4 to 8 percent slopes-----	4,024	0.1
136	Vida-Zahill clay loams, 8 to 15 percent slopes-----	22,665	0.8
137	Wabek gravelly loam, 8 to 35 percent slopes-----	9,576	0.3

See footnotes at end of table.

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

Map symbol	Soil name	Acres	Percent
138	Warneke-Whitecow-Rock outcrop complex, 35 to 70 percent slopes*	4,904	0.2
139	Whitecow-Warneke gravelly loams, 25 to 60 percent slopes*	4,634	0.2
140	Whitecow association, steep*	9,726	0.3
141	Williams loam, 0 to 4 percent slopes	9,993	0.4
142	Williams-Vida loams, 0 to 4 percent slopes	40,534	1.4
143	Williams-Vida loams, 4 to 8 percent slopes	31,512	1.1
144	Windham cobbly loam, 15 to 45 percent slopes	3,842	0.1
145	Work clay loam, 0 to 4 percent slopes	6,461	0.2
146	Work clay loam, 4 to 8 percent slopes	1,228	**
147	Yamac loam, 2 to 4 percent slopes	785	**
148	Yamac-Benz loams, 0 to 4 percent slopes	5,201	0.2
149	Yamac-Wabek association, moderately steep*	2,224	0.1
150	Zahill clay loam, 25 to 45 percent slopes	30,101	1.1
151	Zahill-Vida clay loams, 15 to 35 percent slopes	59,904	2.1
	Water	4,304	0.2
	Total	2,846,328	100.0

\* Broadly defined map unit.

\*\* Less than 0.1 percent.

TABLE 5.--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 figure indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only the soils used for crops are listed]

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay		Sugar beets		Corn silage	
	N Bu	I Bu	N Bu	I Bu	N Bu	I Bu	N Bu	I Bu	N Ton	I Ton	N Ton	I Ton	N Ton	I Ton
2----- Assinniboine	30	---	25	---	35	---	52	---	1.5	---	---	---	---	---
3----- Attewan	30	---	25	50	40	80	56	100	1.3	4.0	---	22	---	25
4----- Attewan-Beaverell	25	---	20	40	32	60	50	70	1.1	3.8	---	---	---	---
7----- Barkof	22	---	18	---	28	---	45	---	0.8	---	---	---	---	---
11----- Bascovy	18	---	16	---	24	---	40	---	0.7	---	---	---	---	---
13----- Bearpaw	40	---	35	---	50	---	64	---	2.0	5.5	---	---	---	---
14----- Bearpaw-Elloam	34	---	30	---	44	---	56	---	1.5	---	---	---	---	---
15----- Bearpaw-Elloam	32	---	28	---	42	---	54	---	1.3	---	---	---	---	---
16----- Bearpaw-Vida	38	---	34	---	48	---	62	---	2.0	5.2	---	---	---	---
17----- Bearpaw-Vida	36	---	32	---	45	---	60	---	1.9	5.0	---	---	---	---
18----- Belain	26	---	20	---	30	---	46	---	2.0	4.5	---	---	---	---
31----- Chinook	32	---	27	---	38	---	52	---	1.2	---	---	---	---	---
32----- Chinook	27	---	22	---	34	---	48	---	1.0	---	---	---	---	---
33----- Chinook-Phillips	31	---	26	---	37	---	50	---	1.1	---	---	---	---	---
34----- Cozberg	17	---	15	---	22	---	30	---	0.6	---	---	---	---	---
35----- Creed	18	---	15	---	25	---	35	---	---	---	---	---	---	---
36----- Creed-Gerdrum	16	---	13	---	22	---	30	---	---	---	---	---	---	---

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

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay		Sugar beets		Corn silage	
	N	I	N	I	N	I	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton	Ton	Ton	Ton	Ton
37----- Delpoint	32	---	25	---	38	---	55	---	1.2	---	---	---	---	---
38----- Delpoint-Cabbart	22	---	18	---	30	---	42	---	0.8	---	---	---	---	---
40----- Elloam	16	---	13	---	22	---	30	---	---	---	---	---	---	---
41----- Ethridge	38	---	28	---	46	---	60	---	2.0	5.3	---	---	---	---
42----- Ethridge-Gerdrum	32	---	25	---	38	---	52	---	1.5	---	---	---	---	---
43, 44----- Farnuf	45	---	35	65	55	95	70	120	2.5	5.5	---	22	5	26
45----- Farnuf	40	---	32	---	50	---	65	---	2.0	5.3	---	---	---	---
46----- Gerdrum	14	---	12	---	18	---	28	---	---	---	---	---	---	---
47----- Glendive	30	---	25	45	35	60	48	80	1.5	5.0	---	22	---	25
48----- Hanly	---	---	---	---	---	---	---	---	---	2.5	---	---	---	---
49, 50----- Harlem	34	---	27	60	40	70	65	85	1.5	5.5	---	22	---	25
51----- Harlem	18	---	16	40	28	55	45	68	---	4.0	---	14	---	16
52----- Harlem	30	---	22	50	35	60	52	70	1.3	5.0	---	20	---	22
53----- Harlem	16	---	14	35	23	45	38	60	---	3.5	---	9	---	14
55, 57----- Havre	35	---	27	60	40	80	65	90	1.5	6.0	---	22	---	25
56, 58----- Havre	18	---	16	40	30	60	50	70	---	4.0	---	16	---	18
61----- Hedoes	---	---	30	---	42	75	55	80	2.0	4.5	---	---	---	---
62----- Hedoes	---	---	26	---	40	70	50	75	2.0	4.5	---	---	---	---
63----- Hedoes-Belain	---	---	20	---	32	60	40	65	1.8	4.0	---	---	---	---
66----- Hedoes-Benz	---	---	18	---	32	---	40	---	1.0	---	---	---	---	---

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

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay		Sugar beets		Corn silage	
	N Bu	I Bu	N Bu	I Bu	N Bu	I Bu	N Bu	I Bu	N Ton	I Ton	N Ton	I Ton	N Ton	I Ton
69----- Hillon-Scobey	31	---	27	---	40	---	55	---	1.4	---	---	---	---	---
70----- Judith-Windham	24	---	18	---	29	---	46	---	0.6	---	---	---	---	---
72----- Kevin	30	---	25	---	35	---	52	---	1.0	4.2	---	---	---	---
73----- Kevin-Elloam	28	---	23	---	32	---	48	---	0.8	---	---	---	---	---
74----- Kevin-Hillon	27	---	21	---	30	---	45	---	0.8	---	---	---	---	---
77----- Lihen	25	---	20	35	30	45	40	60	1.2	4.0	---	---	---	---
83----- Lolo	---	---	33	58	42	72	53	80	2.0	5.3	---	---	---	---
85----- Marmarth-Cabbart	24	---	18	---	30	---	45	---	0.9	---	---	---	---	---
86----- Martinsdale	38	---	30	---	50	---	60	---	1.8	---	---	---	---	---
87----- Martinsdale-Judith	32	---	26	---	38	---	50	---	1.2	---	---	---	---	---
88----- Marvan	18	---	14	30	25	45	40	58	0.5	2.5	---	---	---	---
89----- Marvan-Bascovy	---	---	13	---	23	---	38	---	0.6	---	---	---	---	---
90----- Nishon	---	---	35	---	45	---	60	---	---	---	---	---	---	---
95----- Phillips	30	---	25	---	40	---	55	---	1.5	---	---	---	---	---
96----- Phillips	28	---	23	---	38	---	52	---	1.4	---	---	---	---	---
97----- Phillips-Elloam	28	---	23	---	36	---	50	---	1.0	---	---	---	---	---
98----- Phillips-Elloam	26	---	21	---	35	---	48	---	1.0	---	---	---	---	---
99----- Phillips-Kevin	30	---	25	---	38	---	52	---	1.3	---	---	---	---	---
100----- Phillips-Kevin	28	---	24	---	37	---	50	---	1.2	---	---	---	---	---

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

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay		Sugar beets		Corn silage	
	N Bu	I Bu	N Bu	I Bu	N Bu	I Bu	N Bu	I Bu	N Ton	I Ton	N Ton	I Ton	N Ton	I Ton
102----- Reeder	32	---	26	---	41	---	56	---	1.3	---	---	---	---	---
103----- Reeder	30	---	24	---	38	---	52	1.2	---	---	---	---	---	---
105----- Savage	42	---	35	62	55	90	70	115	2.2	5.5	---	22	5	26
106----- Savage	40	---	35	60	55	85	70	110	2.2	5.5	---	21	5	26
107----- Savage-Gerdum	33	---	28	---	46	---	62	---	1.5	---	---	---	---	---
108----- Scobey	35	---	28	50	44	75	60	85	1.5	5.5	---	---	---	---
109----- Scobey-Kevin	33	---	26	---	42	---	58	---	1.3	---	---	---	---	---
110----- Scobey-Kevin	31	---	24	---	38	---	54	---	1.2	---	---	---	---	---
111----- Shaak	34	---	26	---	42	---	58	---	1.4	---	---	---	---	---
112----- Shaak-Gerdum	26	---	22	---	35	---	50	---	1.0	---	---	---	---	---
113----- Shawmut	33	---	28	---	42	---	55	---	1.5	5.0	---	---	---	---
114----- Shawmut	30	---	25	---	40	---	52	---	1.3	4.5	---	---	---	---
116----- Straw-Korent	40	---	32	58	50	85	64	92	2.0	5.5	---	---	---	25
117----- Straw-Korent	---	---	---	---	---	---	---	---	---	5.0	---	---	---	---
119----- Telstad	35	---	30	---	45	---	60	---	1.4	5.5	---	---	---	---
120----- Telstad-Joplin	33	---	26	---	42	---	56	---	1.2	5.2	---	---	---	---
121----- Telstad-Joplin	30	---	24	---	38	---	52	---	1.1	---	---	---	---	---
122----- Telstad-Joplin	30	---	24	---	38	---	51	---	1.1	---	---	---	---	---
123----- Thoeny-Elloam	20	---	15	---	25	---	40	---	---	---	---	---	---	---

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

Soil name and map symbol	Winter wheat		Spring wheat		Barley		Oats		Alfalfa hay		Sugar beets		Corn silage	
	N Bu	I Bu	N Bu	I Bu	N Bu	I Bu	N Bu	I Bu	N Ton	I Ton	N Ton	I Ton	N Ton	I Ton
124----- Thoeny-Kevin-Elloam	21	---	16	---	26	---	42	---	0.6	---	---	---	---	---
125----- Turner	30	---	24	45	38	75	52	85	1.4	4.5	---	---	---	---
126----- Turner-Beaverton	22	---	17	---	30	---	45	---	1.1	---	---	---	---	---
127----- Twilight-Riedel	20	---	15	---	28	---	40	---	0.8	---	---	---	---	---
135----- Vida	36	---	30	---	45	---	58	---	1.8	---	---	---	---	---
136----- Vida-Zahill	28	---	22	---	35	---	48	---	1.3	---	---	---	---	---
141----- Williams	38	---	33	---	49	---	62	---	2.0	---	---	---	---	---
142----- Williams-Vida	36	---	32	---	45	---	60	---	1.9	---	---	---	---	---
143----- Williams-Vida	32	---	27	---	40	---	55	---	1.8	---	---	---	---	---
145----- Work	42	---	37	62	50	85	62	110	2.0	5.5	---	---	---	---
146----- Work	40	---	35	---	46	---	58	---	1.8	---	---	---	---	---
147----- Yamac	34	---	27	---	40	---	55	---	1.5	---	---	---	---	---
148----- Yamac-Benz	18	---	15	---	24	---	35	---	0.7	---	---	---	---	---

TABLE 6.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1*: Absher-----	Severe: percs slowly.	Slight-----	Severe: percs slowly.	Slight.
Nobe-----	Moderate: too clayey, percs slowly.	Moderate: slope.	Moderate: too clayey, percs slowly.	Moderate: too clayey.
2----- Assinniboine	Slight-----	Slight-----	Moderate: slope.	Slight.
3----- Attewan	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
4*: Attewan-----	Slight-----	Slight-----	Moderate: small stones.	Slight.
Beaverell-----	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
5*: Attewan-----	Slight-----	Slight-----	Moderate: slope, small stones.	Slight.
Wabek-----	Slight-----	Slight-----	Moderate: slope.	Slight.
6. Badland				
7----- Barkof	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey, depth to rock.	Moderate: too clayey.
8*: Barkof-----	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey, depth to rock.	Moderate: too clayey.
Norbert-----	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Severe: too clayey, depth to rock.	Moderate: too clayey.
9*: Barkof-----	Moderate: too clayey, slope.	Moderate: too clayey, slope.	Severe: slope.	Severe: slope.
Norbert-----	Moderate: percs slowly, too clayey, slope.	Moderate: too clayey.	Severe: too clayey, slope.	Moderate: too clayey.
10*: Barkof.				
Windham-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
11----- Bascovy	Moderate: too clayey.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
12*: Bascovy-----	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey, depth to rock.	Moderate: too clayey.
Lisam-----	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, depth to rock, slope.	Severe: too clayey.
Dilts-----	Severe: too clayey.	Severe: too clayey.	Severe: too clayey, depth to rock, slope.	Severe: too clayey.
13----- Bearpaw	Moderate: too clayey.	Moderate: too clayey.	Moderate: percs slowly, too clayey, slope.	Moderate: too clayey.
14*: Bearpaw-----	Moderate: too clayey.	Moderate: too clayey.	Moderate: percs slowly, too clayey, slope.	Moderate: too clayey.
Elloam-----	Moderate: percs slowly.	Slight-----	Moderate: slope, too clayey, percs slowly.	Slight.
15*: Bearpaw-----	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
Elloam-----	Moderate: percs slowly.	Slight-----	Severe: slope.	Slight.
16*: Bearpaw-----	Moderate: too clayey.	Moderate: too clayey.	Moderate: percs slowly, too clayey, slope.	Moderate: too clayey.
Vida-----	Slight-----	Slight-----	Moderate: too clayey, slope.	Slight.
17*: Bearpaw-----	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
Vida-----	Slight-----	Slight-----	Severe: slope.	Slight.
18----- Belain	Slight-----	Slight-----	Moderate: slope, small stones, depth to rock.	Slight.
19----- Benz	Slight-----	Slight-----	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
20----- Bowdoin	Severe: floods.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
21----- Cabba	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
22*: Cabba-----  Rock outcrop.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
23*: Cabba-----  Windham-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
24*: Cabba-----  Zahill-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
25*: Cabbart-----  Delpoint-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
26*: Cabbart-----  Hillon-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
27*: Cabbart-----  Rock outcrop.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
28*: Cabbart-----  Yamac-----  Rock outcrop.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
29----- Castner	Severe: slope.	Severe: slope.	Severe: slope. small stones, large stones.	Moderate: slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
30*: Castner-----	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.
Perma-----	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Rock outcrop.				
31----- Chinook	Slight-----	Slight-----	Moderate: slope.	Slight.
32----- Chinook	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
33*: Chinook-----	Slight-----	Slight-----	Moderate: slope.	Slight.
Phillips-----	Slight-----	Slight-----	Moderate: slope.	Slight.
34----- Cozberg	Slight-----	Slight-----	Moderate: slope.	Slight.
35----- Creed	Moderate: percs slowly.	Slight-----	Moderate: percs slowly, slope.	Slight.
36*: Creed-----	Moderate: percs slowly.	Slight-----	Moderate: percs slowly, slope.	Slight.
Gerdrum-----	Slight-----	Slight-----	Moderate: slope.	Slight.
37----- Delpoint	Slight-----	Slight-----	Moderate: slope.	Slight.
38*: Delpoint-----	Slight-----	Slight-----	Moderate: slope.	Slight.
Cabbart-----	Slight-----	Slight-----	Severe: depth to rock.	Slight.
39----- Dimmick	Severe: floods, wetness, percs slowly.	Severe: wetness, too clayey.	Severe: floods, wetness, too clayey.	Severe: wetness, too clayey.
40----- Elloam	Moderate: percs slowly.	Slight-----	Moderate: slope, too clayey, percs slowly.	Slight.
41----- Ethridge	Slight-----	Slight-----	Moderate: slope, percs slowly, too clayey.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
42*: Ethridge-----	Slight-----	Slight-----	Moderate: slope, percs slowly, too clayey.	Slight.
Gerdrum-----	Slight-----	Slight-----	Moderate: slope.	Slight.
43----- Farnuf	Slight-----	Slight-----	Moderate: small stones.	Slight.
44----- Farnuf	Slight-----	Slight-----	Moderate: slope.	Slight.
45----- Farnuf	Slight-----	Slight-----	Severe: slope.	Slight.
46----- Gerdrum	Slight-----	Slight-----	Moderate: slope.	Slight.
47----- Glendive	Severe: floods.	Slight-----	Slight-----	Slight.
48----- Hanly	Severe: floods.	Slight-----	Moderate: floods.	Slight.
49----- Harlem	Severe: floods.	Slight-----	Slight-----	Slight.
50----- Harlem	Severe: floods.	Slight-----	Moderate: too clayey.	Slight.
51----- Harlem	Severe: floods.	Slight-----	Moderate: too clayey.	Slight.
52----- Harlem	Severe: floods.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
53----- Harlem	Severe: floods.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
54*: Harlem Variant-----	Severe: floods.	Moderate: too clayey, wetness.	Moderate: wetness, too clayey.	Moderate: too clayey.
Lardell-----	Severe: wetness, floods.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
55----- Havre	Severe: floods.	Slight-----	Slight-----	Slight.
56----- Havre	Severe: floods.	Moderate: wetness.	Moderate: percs slowly, wetness.	Slight.
57----- Havre	Severe: floods.	Slight-----	Moderate: too clayey.	Slight.
58----- Havre	Severe: floods.		Moderate: too clayey, percs slowly, wetness.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
59*: Havre-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
Hanly-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
Glendive-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
60*: Havre Variant-----	Severe: floods.	Moderate: wetness.	Moderate: wetness.	Slight.
Lardell-----	Severe: wetness, floods.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
61----- Hedoes	Slight-----	Slight-----	Moderate: slope.	Slight.
62----- Hedoes	Slight-----	Slight-----	Severe: slope.	Slight.
63*: Hedoes-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Belain-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
64*: Hedoes-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Belain-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
65*: Hedoes-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Belain-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Castner-----	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.
66*: Hedoes-----	Slight-----	Slight-----	Moderate: slope.	Slight.
Benz-----	Slight-----	Slight-----	Moderate: slope.	Slight.
67----- Hillon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
68*: Hillon-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kevin-----	Severe: slope.	Severe: slope.	Severe: slope.	

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
69*: Hillon-----	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Scobey-----	Slight-----	Slight-----	Severe: slope.	Slight.
70*: Judith-----	Slight-----	Slight-----	Severe: slope.	Slight.
Windham-----	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
71*: Judith-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Windham-----	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
72----- Kevin	Slight-----	Slight-----	Moderate: slope, too clayey.	Slight.
73*: Kevin-----	Slight-----	Slight-----	Moderate: slope, too clayey.	Slight.
Elloam-----	Moderate: percs slowly.	Slight-----	Moderate: slope, too clayey, percs slowly.	Slight.
74*: Kevin-----	Moderate: slope.	Moderate: slope.	Severe: slope.	
Hillon-----	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
75*: Korent-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
Nesda-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
76----- Lardell	Severe: wetness, floods.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
77----- Lihen	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
78----- Lihen	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
79*: Lisam-----	Severe: too clayey, slope, percs slowly.	Severe: too clayey, slope.	Severe: too clayey, depth to rock, slope.	Severe: too clayey.
Dilts-----	Severe: too clayey. slope.	Severe: too clayey, slope.	Severe: too clayey, depth to rock, slope.	Severe: too clayey.
80*: Lisam-----	Severe: too clayey, slope, percs slowly.	Severe: too clayey, slope.	Severe: too clayey, depth to rock, slope.	Severe: too clayey, slope.
Dilts-----	Severe: too clayey, slope.	Severe: too clayey, slope.	Severe: too clayey, depth to rock, slope.	Severe: too clayey, slope.
Rock outcrop.				
81*: Lisam-----	Severe: too clayey, slope, percs slowly.	Severe: too clayey, slope.	Severe: too clayey, depth to rock, slope.	Severe: too clayey, slope.
Hillon-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
82*: Lisam-----	Severe: too clayey, slope, percs slowly.	Severe: too clayey, slope.	Severe: too clayey, depth to rock, slope.	Severe: too clayey, slope.
Wabek-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
83----- Lolo	Slight-----	Slight-----	Moderate: small stones.	Slight.
84*: Macmeal-----	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.
85*: Marmarth-----	Slight-----	Slight-----	Moderate: slope.	Slight.
Cabbart-----	Slight-----	Slight-----	Severe: depth to rock.	Slight.
86----- Martinsdale	Moderate: percs slowly.	Slight-----	Moderate: slope.	Slight.
87*: Martinsdale-----	Moderate: percs slowly.	Slight-----	Moderate: slope.	Slight.
Judith-----	Slight-----	Slight-----	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
88----- Marvan	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
89*: Marvan-----	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
Bascovy-----	Moderate: too clayey.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
90, 91----- Nishon	Severe: floods, percs slowly, wetness.	Severe: wetness.	Severe: floods, percs slowly, wetness.	Moderate: floods, wetness.
92----- Norbert	Severe: slope.	Moderate: slope, too clayey.	Severe: too clayey, slope.	Moderate: slope, too clayey.
93*: Norbert-----	Severe: slope.	Moderate: slope, too clayey.	Severe: too clayey, slope.	Severe: slope.
Rock outcrop.				
94*: Perma-----	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Castner-----	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.
Belain-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
95----- Phillips	Slight-----	Slight-----	Moderate: slope.	Slight.
96----- Phillips	Slight-----	Slight-----	Severe: slope.	Slight.
97*: Phillips-----	Slight-----	Slight-----	Moderate: slope.	Slight.
Elloam-----	Moderate: percs slowly.	Slight-----	Moderate: slope, too clayey, percs slowly.	Slight.
98*: Phillips-----	Slight-----	Slight-----	Severe: slope.	Slight.
Elloam-----	Moderate: percs slowly.	Slight-----	Severe: slope.	Slight.
99*: Phillips-----	Slight-----	Slight-----	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
99*: Kevin-----	Slight-----	Slight-----	Moderate: slope, too clayey.	Slight.
100*: Phillips-----	Slight-----	Slight-----	Severe: slope.	Slight.
Kevin-----	Slight-----	Slight-----	Severe: slope.	Slight.
101*. Pits				
102----- Reeder	Slight-----	Slight-----	Moderate: depth to rock, slope.	Slight.
103----- Reeder	Slight-----	Slight-----	Severe: slope.	Slight.
104: Rubble land. Rock outcrop.				
105----- Savage	Moderate: percs slowly.	Slight-----	Moderate: too clayey.	Slight.
106----- Savage	Moderate: percs slowly.	Slight-----	Moderate: slope.	Slight.
107*: Savage-----	Moderate: percs slowly.	Slight-----	Moderate: slope.	Slight.
Gerdrum-----	Slight-----	Slight-----	Moderate: slope.	Slight.
108----- Scobey	Slight-----	Slight-----	Moderate: slope, too clayey.	Slight.
109*: Scobey-----	Slight-----	Slight-----	Moderate: slope, too clayey.	Slight.
Kevin-----	Slight-----	Slight-----	Moderate: slope, too clayey.	
110*: Scobey-----	Slight-----	Slight-----	Severe: slope.	Slight.
Kevin-----	Slight-----	Slight-----	Severe: slope.	
111----- Shaak	Slight-----	Slight-----	Moderate: slope.	Slight.
112*: Shaak-----	Slight-----	Slight-----	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
112*: Gerdrum-----	Slight-----	Slight-----	Moderate: slope.	Slight.
113----- Shawmut	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
114----- Shawmut	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
115*: Silverchief-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Whitecow-----	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.
Macmeal-----	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.
116*: Straw-----	Severe: floods.	Slight-----	Slight-----	Slight.
Korent-----	Severe: floods.	Slight-----	Slight-----	Slight.
117*: Straw-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
Korent-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
118*: Straw-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
Nesda-----	Severe: floods.	Slight-----	Moderate: floods.	Slight.
119----- Telstad	Slight-----	Slight-----	Moderate: small stones.	Slight.
120*: Telstad-----	Slight-----	Slight-----	Moderate: small stones.	Slight.
Joplin-----	Slight-----	Slight-----	Moderate: slope.	Slight.
121*: Telstad-----	Slight-----	Slight-----	Severe: slope.	Slight.
Joplin-----	Slight-----	Slight-----	Severe: slope.	Slight.
122*: Telstad-----	Slight-----	Slight-----	Severe: small stones.	Slight.
Joplin-----	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
123*: Thoeny-----	Moderate: percs slowly.	Slight-----	Moderate: slope, percs slowly.	Slight.
Elloam-----	Moderate: percs slowly.	Slight-----	Moderate: slope, too clayey, percs slowly.	Slight.
124*: Thoeny-----	Moderate: percs slowly.	Slight-----	Severe: slope.	Slight.
Kevin-----	Slight-----	Slight-----	Severe: slope.	
Elloam-----	Moderate: percs slowly.	Slight-----	Severe: slope.	Slight.
125----- Turner	Slight-----	Slight-----	Moderate: slope.	Slight.
126*: Turner-----	Slight-----	Slight-----	Moderate: slope.	Slight.
Beaverton-----	Moderate: small stones,	Moderate: small stones.	Severe: small stones, large stones.	Moderate: small stones.
127*: Twilight-----	Slight-----	Slight-----	Severe: slope.	Slight.
Riedel-----	Slight-----	Slight-----	Severe: slope.	Slight.
128*: Twilight-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Riedel-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
129. Typic Fluvaquents				
130. Typic Ustifluvents				
131. Ustic Torrifuvents				
132----- Vanda	Moderate: too clayey, percs slowly.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
133*, 134*: Vanda-----	Moderate: too clayey, percs slowly.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
Nobe-----	Moderate: too clayey, percs slowly.	Moderate: slope.	Moderate: too clayey, percs slowly.	Moderate: too clayey.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
135----- Vida	Slight-----	Slight-----	Severe: slope.	Slight.
136*: Vida-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Zahill-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
137----- Wabek	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
138*: Warneke-----	Severe: slope.	Severe: slope.	Severe: small stones, slope, depth to rock.	Severe: slope.
Whitecow-----	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.
Rock outcrop.				
139*: Whitecow-----	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.
Warneke-----	Severe: slope.	Severe: slope.	Severe: small stones, slope, depth to rock.	Severe: slope.
140*: Whitecow-----	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.
141----- Williams	Slight-----	Slight-----	Moderate: slope.	Slight.
142*: Williams-----	Slight-----	Slight-----	Moderate: slope.	Slight.
Vida-----	Slight-----	Slight-----	Moderate: slope.	Slight.
143*: Williams-----	Slight-----	Slight-----	Severe: slope.	Slight.
Vida-----	Slight-----	Slight-----	Severe: slope.	Slight.
144----- Windham	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
145----- Work	Slight-----	Slight-----	Moderate: slope, too clayey.	Moderate: too clayey.
146----- Work	Slight-----	Slight-----	Severe: slope.	Moderate: too clayey.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
147----- Yamac	Slight-----	Slight-----	Moderate: slope.	Slight.
148*: Yamac-----	Slight-----	Slight-----	Moderate: slope.	Slight.
Benz-----	Slight-----	Slight-----	Moderate: slope.	Slight.
149*: Yamac-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Wabek-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
150----- Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
151*: Zahill-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Vida-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

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

TABLE 7.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1*: Absher-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Nobe-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
2----- Assinniboine	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: frost action, low strength.
3----- Attewan	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action, low strength.
4*: Attewan-----	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action, low strength.
Beaverell-----	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action.
5*: Attewan-----	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action, low strength.
Wabek-----	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight.
6. Badland					
7----- Barkof	Moderate: depth to rock, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
8*: Barkof-----	Moderate: depth to rock, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Norbert-----	Moderate: too clayey, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
9*: Barkof-----	Moderate: too clayey, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength.
Norbert-----	Moderate: too clayey, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
10*: Barkof-----	Severe: slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.
Windham-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11----- Bascovy	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
12*: Bascovy-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Lisam-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Dilts-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
13----- Bearpaw	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
14*, 15*: Bearpaw-----	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Elloam-----	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
16*: Bearpaw-----	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Vida-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
17*: Bearpaw-----	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Vida-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, low strength.	Severe: low strength.
18----- Belain	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.
19----- Benz	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
20----- Bowdoin	Moderate: too clayey.	Severe: shrink-swell, floods, low strength.	Severe: shrink-swell, floods, low strength.	Severe: shrink-swell, floods, low strength.	Severe: shrink-swell, low strength.
21----- Cabba	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
22*: Cabba-----  Rock outcrop.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
23*: Cabba-----  Windham-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
24*: Cabba-----  Zahill-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
25*: Cabbart-----  Delpoint-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
26*: Cabbart-----  Hillon-----	Moderate: slope, depth to rock.	Moderate: slope, shrink-swell.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope.	Moderate: slope, frost action.
27*: Cabbart-----  Rock outcrop.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
28*: Cabbart-----  Yamac-----  Rock outcrop.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
29----- Castner	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
30*: Castner-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Perma----- Rock outcrop.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
31----- Chinook	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.
32----- Chinook	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
33*: Chinook-----	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.
Phillips-----	Slight-----	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: low strength.
34----- Cozberg	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action.
35----- Creed	Slight-----	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
36*: Creed-----	Slight-----	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
Gerdrum-----	Slight-----	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
37----- Delpoint	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, shrink-swell,
38*: Delpoint-----	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: slope, shrink-swell.	Moderate: frost action, shrink-swell,
Cabbart-----	Moderate: depth to rock, too clayey.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: slope, depth to rock, shrink-swell.	Moderate: frost action, depth to rock, low strength.
39----- Dimmick	Severe: floods, wetness, too clayey.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, low strength.
40----- Elloam	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
41----- Ethridge	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
42*: Ethridge-----	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Gerdrum-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
43, 44----- Farnuf	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
45----- Farnuf	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
46----- Gerdrum	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
47----- Glendive	Slight-----	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: frost action, floods.
48----- Hanly	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
49, 50----- Harlem	Moderate: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.
51----- Harlem	Moderate: wetness, too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: low strength, shrink-swell.
52----- Harlem	Moderate: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.
53----- Harlem	Moderate: too clayey, wetness.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: low strength, shrink-swell.
54*: Harlem Variant-----	Severe: wetness.	Severe: shrink-swell, floods.	Severe: shrink-swell, wetness, floods.	Severe: shrink-swell, floods.	Severe: low strength, shrink-swell.
Lardell-----	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness.
55, 57----- Havre	Slight-----	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: frost action, low strength, floods.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
56, 58----- Havre	Moderate: wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: frost action, low strength.
59*: Havre-----	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Hanly-----	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Glendive-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
60*: Havre Variant-----	Severe: wetness.	Severe: floods.	Severe: wetness, floods.	Severe: floods.	Severe: low strength.
Lardell-----	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness.
61----- Hedoes	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: frost action.
62----- Hedoes	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.
63*: Hedoes-----	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, slope.
Belain-----	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, frost action, depth to rock.
64*: Hedoes-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Belain-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
65*: Hedoes-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Belain-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Castner-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
66*: Hedoes-----	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: frost action.
Benz-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
67----- Hillon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
68*: Hillon-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Kevin-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength.
69*: Hillon-----	Moderate: slope.	Moderate: slope, low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.
Scobey-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
70*: Judith-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: low strength, frost action, shrink-swell.
Windham-----	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.
71*: Judith-----	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, low strength, frost action.
Windham-----	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
72----- Kevin	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
73*: Kevin-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
Elloam-----	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
74*: Kevin-----	Moderate: slope.	Moderate: slope, low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.
Hillon-----	Moderate: slope.	Severe: shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: slope, shrink-swell.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
75*: Korent-----	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Nesda-----	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
76----- Lardell	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness.
77----- Lihen	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight.
78----- Lihen	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
79*: Lisam-----	Severe: slope, depth to rock.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, depth to rock, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.
Dilts-----	Severe: slope, depth to rock.	Severe: low strength, slope, shrink-swell.	Severe: shrink-swell, depth to rock, slope.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength, slope.
80*: Lisam-----	Severe: slope, depth to rock.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.
Dilts-----	Severe: slope, depth to rock.	Severe: low strength, slope, shrink-swell.	Severe: shrink-swell, depth to rock, slope.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength, slope.
Rock outcrop.					
81*: Lisam-----	Severe: slope, depth to rock.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, depth to rock, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.
Hillon-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
82*: Lisam-----	Severe: slope, depth to rock.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, depth to rock, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.
Wabek-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
83----- Lolo	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: frost action.
84*: Macmeal-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
85*: Marmarth-----	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: shrink-swell, depth to rock.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.
Cabbart-----	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: frost action, depth to rock, low strength.
86----- Martinsdale	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.
87*: Martinsdale-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: shrink-swell, frost action.
Judith-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: low strength, frost action, shrink-swell.
88----- Marvan	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
89*: Marvan-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Bascovy-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
90, 91----- Nishon	Severe: wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.
92----- Norbert	Severe: slope, depth to rock.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, slope, low strength.
93*: Norbert-----	Severe: slope, depth to rock.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, slope, low strength.
Rock outcrop.					
94*: Perma-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Castner-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Belain-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
95, 96----- Phillips	Slight-----	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: low strength.
97*, 98*: Phillips-----	Slight-----	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: low strength.
Elloam-----	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
99*: Phillips-----	Slight-----	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: low strength.
Kevin-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
100*: Phillips-----	Slight-----	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: low strength.
Kevin-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
101. Pits					
102----- Reeder	Moderate: depth to rock.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, depth to rock.	Moderate: shrink-swell, low strength.	Severe: low strength.
103----- Reeder	Moderate: depth to rock.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, depth to rock.	Moderate: shrink-swell, slope, low strength.	Severe: low strength.
104: Rubble land.  Rock outcrop.					
105, 106----- Savage	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
107*: Savage-----	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
Gerdrum-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
108----- Scobey	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
109*: Scobey-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Kevin-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
110*: Scobey-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
Kevin-----	Slight----- too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
111----- Shaak	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength, shrink-swell.
112*: Shaak-----	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength, shrink-swell.
Gerdrum-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
113----- Shawmut	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: frost action.
114----- Shawmut	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.
115*: Silverchief-----	Severe: slope.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope, shrink-swell, low strength.
Whitecow-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Macmeal-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
116*: Straw-----	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength, frost action, floods.
Korent-----	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, low strength, frost action.
117*: Straw-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Korent-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
118*: Straw-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Nesda-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
119----- Telstad	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
120*: Telstad-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Joplin-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
121*: Telstad-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
Joplin-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
122*: Telstad-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Joplin-----	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
123*: Thoeny-----	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Elloam-----	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
124*: Thoeny-----	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Kevin-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
Elloam-----	Slight-----	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
125----- Turner	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
126*: Turner-----	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Moderate: slope, low strength.	Severe: low strength.
Beaverton-----	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.
127*: Twilight-----	Moderate: depth to rock.	Slight-----	Moderate: depth to rock.	Moderate: slope.	Slight.
Riedel-----	Moderate: depth to rock.	Slight-----	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.
128*: Twilight-----	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.
Riedel-----	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.
129. Typic Fluvaquents					
130. Typic Ustifluents					
131. Ustic Torrifluents					
132----- Vanda	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
133*, 134*: Vanda-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Nobe-----	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
135----- Vida	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, low strength.	Severe: low strength.
136*: Vida-----	Moderate: slope.	Moderate: slope, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.
Zahill-----	Moderate: slope.	Moderate: slope, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.
137----- Wabek	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
138*: Warneke-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Whitecow-----  Rock outcrop.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
139*: Whitecow-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Warneke-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
140*: Whitecow-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
141----- Williams	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
142*: Williams-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Vida-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
143*: Williams-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: low strength.
Vida-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, low strength.	Severe: low strength.
144----- Windham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
145----- Work	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.
146----- Work	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.
147----- Yamac	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: frost action, low strength.
148*: Yamac-----	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: frost action, low strength.
Benz-----	Slight-----	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
149*: Yamac-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength.
Wabek-----	Severe: slope, outbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
150----- Zahill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
151*: Zahill-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Vida-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.

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

TABLE 8.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1*: Absher-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
Nobe-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
2----- Assinniboine	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
3----- Attewan	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
4*: Attewan-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Beaverell-----	Slight-----	Severe: seepage.	Severe: seepage,	Severe: seepage.	Poor: small stones.
5*: Attewan-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Wabek-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
6. Badland					
7----- Barkof	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight-----	Poor: thin layer, area reclaim, too clayey.
8*: Barkof-----	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight-----	Poor: thin layer, area reclaim, too clayey.
Norbert-----	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight-----	Poor: too clayey, thin layer, area reclaim.
9*: Barkof-----	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey, thin layer, area reclaim.
Norbert-----	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey, thin layer, area reclaim.
10*: Barkof-----	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Moderate: slope.	Poor: too clayey, thin layer, slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
10*: Windham-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Moderate: slope.	Poor: slope, small stones.
11----- Bascovy	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight-----	Poor: too clayey, thin layer, area reclaim.
12*: Bascovy-----	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight-----	Poor: too clayey, thin layer, area reclaim.
Lisam-----	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight-----	Poor: too clayey, thin layer, area reclaim.
Dilts-----	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight-----	Poor: too clayey, thin layer, area reclaim.
13----- Bearpaw	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
14*, 15*: Bearpaw-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Elloam-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
16*, 17*: Bearpaw-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Vida-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
18----- Belain	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, area reclaim.
19----- Benz	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
20----- Bowdoin	Severe: percs slowly.	Severe: floods.	Severe: too clayey.	Moderate: floods.	Poor: too clayey.
21----- Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
22*: Cahba-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Rock outcrop.					

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
23*: Cabba-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Windham-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Poor: slope, small stones.
24*: Cabba-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Zahill-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
25*: Cabbart-----	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Delpoint-----	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
26*: Cabbart-----	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Hillon-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
27*: Cabbart-----	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Rock outcrop.					
28*: Cabbart-----	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Yamac-----	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
29----- Castner	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer.
30*: Castner-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
30*: Perma-----  Rock outcrop.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
31----- Chinook	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
32----- Chinook	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
33*: Chinook-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Phillips-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
34----- Cozberg	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
35----- Creed	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
36*: Creed-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Gerdrum-----	Severe: percs slowly.	Moderate: slope, seepage.	Severe: too clayey.	Slight-----	Poor: too clayey.
37----- Delpoint	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.
38*: Delpoint-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.
Cabbart-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.
39----- Dimmick	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: wetness, too clayey.
40----- Elloam	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
41----- Ethridge	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
42*: Ethridge-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
Gerdrum-----	Severe: percs slowly.	Moderate: slope, seepage.	Severe: too clayey.	Slight-----	Poor: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
43----- Farnuf	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----	Fair: too clayey.
44, 45----- Farnuf	Severe: percs slowly.	Moderate: slope, seepage.	Slight-----	Slight-----	Fair: too clayey.
46----- Gerdrum	Severe: percs slowly.	Moderate: slope, seepage.	Severe: too clayey.	Slight-----	Poor: too clayey.
47----- Glendive	Moderate: floods.	Severe: seepage, floods.	Severe: seepage.	Severe: seepage.	Good.
48----- Hanly	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods.	Poor: seepage.
49, 50----- Harlem	Severe: percs slowly.	Severe: floods.	Moderate: floods, too clayey.	Moderate: floods.	Fair: too clayey.
51----- Harlem	Severe: wetness, percs slowly.	Severe: floods.	Severe: wetness.	Moderate: floods, wetness.	Fair: too clayey.
52----- Harlem	Severe: percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Fair: too clayey.
53----- Harlem	Severe: wetness, percs slowly.	Severe: floods.	Severe: wetness.	Moderate: floods, wetness.	Fair: too clayey.
54*: Harlem Variant-----	Severe: percs slowly, wetness.	Severe: floods, wetness.	Severe: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
Lardell-----	Severe: percs slowly, wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Poor: wetness.
55----- Havre	Moderate: floods, percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
56----- Havre	Severe: wetness.	Severe: floods.	Severe: wetness.	Moderate: wetness, floods.	Good.
57----- Havre	Moderate: floods, percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Fair: too clayey.
58----- Havre	Severe: wetness.	Severe: floods.	Severe: wetness.	Moderate: wetness, floods.	Good.
59*: Havre-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Hanly-----	Severe: floods.	Severe: seepage, floods.	Severe: seepage, floods.	Severe: seepage, floods.	Poor: seepage.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
59*: Glendive-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
60*: Havre Variant-----	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Lardell-----	Severe: percs slowly, wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Poor: wetness.
61, 62----- Hedoes	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
63*: Hedoes-----	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones.
Belain-----	Severe: depth to rock.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, area reclaim.
64*: Hedoes-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Belain-----	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: thin layer, slope, area reclaim.
65*: Hedoes-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Belain-----	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: thin layer, slope, area reclaim.
Castner-----	Severe: slope, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, large stones.
66*: Hedoes-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Benz-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
67----- Hillon	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
68*: Hillon-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
68*: Kevin-----	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
69*: Hillon-----	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
Scobey-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
70*: Judith-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Windham-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Poor: small stones.
71*: Judith-----	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Windham-----	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Poor: small stones.
72----- Kevin	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
73*: Kevin-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Elloam-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
74*: Kevin-----	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
Hillon-----	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
75*: Korent-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Nesda-----	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Poor: small stones, area reclaim.
76----- Lardell	Severe: percs slowly, wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Poor: wetness.
77----- Lihen	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
78----- Lihen	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
79*: Lisam-----	Severe: percs slowly, slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: too clayey, thin layer, slope.
Dilts-----	Severe: percs slowly, depth to rock, slope.	Severe: depth to rock, slope.	Severe: too clayey, depth to rock.	Severe: slope.	Poor: too clayey, thin layer, slope.
80*: Lisam-----	Severe: percs slowly, slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey, slope.	Severe: slope.	Poor: too clayey, thin layer, slope.
Dilts-----	Severe: percs slowly, depth to rock, slope.	Severe: depth to rock, slope.	Severe: too clayey, slope, depth to rock.	Severe: slope.	Poor: too clayey, thin layer, slope.
Rock outcrop.					
81*: Lisam-----	Severe: percs slowly, slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey, slope.	Severe: slope.	Poor: too clayey, thin layer, slope.
Hillon-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
82*: Lisam-----	Severe: percs slowly, slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey, slope.	Severe: slope.	Poor: too clayey, thin layer, slope.
Wabek-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope, seepage, small stones.
83----- Lolo	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones, seepage.
84*: Macmeal-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Macmeal-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
85*: Marmarth-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.
Cabbart-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
86----- Martinsdale	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
87*: Martinsdale-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Judith-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
88----- Marvan	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
89*: Marvan-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
Bascovy-----	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight-----	Poor: too clayey, thin layer, area reclaim.
90, 91----- Nishon	Severe: percs slowly, floods, wetness.	Severe: wetness, floods.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.
92----- Norbert	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: too clayey, slope, thin layer.
93*: Norbert-----	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey, slope.	Severe: slope.	Poor: too clayey, slope, thin layer.
Rock outcrop.					
94*: Perma-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Castner-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer.
Belain-----	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: thin layer, slope, area reclaim.
95, 96----- Phillips	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
97*, 98*: Phillips-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Elloam-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
99*, 100*: Phillips-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
99*, 100*: Kevin-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
101. Pits					
102, 103----- Reeder	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.
104: Rubble land. Rock outcrop.					
105----- Savage	Severe: percs slowly.	Slight-----	Severe: too clayey.	Slight-----	Poor: too clayey.
106----- Savage	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
107*: Savage-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
Gerdrum-----	Severe: percs slowly.	Moderate: slope, seepage.	Severe: too clayey.	Slight-----	Poor: too clayey.
108----- Scobey	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
109*, 110*: Scobey-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Kevin-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
111----- Shaak	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
112*: Shaak-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
Gerdrum-----	Severe: percs slowly.	Moderate: slope, seepage.	Severe: too clayey.	Slight-----	Poor: too clayey.
113, 114----- Shawmut	Moderate: percs slowly.	Moderate: slope, seepage.	Slight-----	Slight-----	Poor: small stones.
115*: Silverchief-----	Severe: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: too clayey.
Whitecow-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Macmeal-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
116*: Straw-----	Moderate: floods, percs slowly.	Moderate: seepage.	Moderate: floods.	Moderate: floods.	Good.
Korent-----	Moderate: floods, percs slowly.	Severe: floods, seepage.	Severe: seepage.	Severe: seepage.	Good.
117*: Straw-----	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Korent-----	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
118*: Straw-----	Severe: floods.	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Nesda-----	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Poor: small stones, seepage, area reclaim.
119----- Telstad	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
120*, 121*, 122*: Telstad-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Joplin-----	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
123*: Thoeny-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
Elloam-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
124*: Thoeny-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
Kevin-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Elloam-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
125----- Turner	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
126*: Turner-----	Slight-----	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones.
Beaverton-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones, seepage.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
127*: Twilight-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.
Riedel-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.
128*: Twilight-----	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, seepage.	Slight-----	Poor: thin layer, area reclaim.
Riedel-----	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
129. Typic Fluvaquents					
130. Typic Ustifluents					
131. Ustic Torrifuents					
132----- Vanda	Severe: percs slowly.	Slight-----	Severe: too clayey.	Slight-----	Poor: too clayey.
133*: Vanda-----	Severe: percs slowly.	Slight-----	Severe: too clayey.	Slight-----	Poor: too clayey.
Nobe-----	Severe: percs slowly.	Slight-----	Severe: too clayey.	Slight-----	Poor: too clayey.
134*: Vanda-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
Nobe-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
135----- Vida	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
136*: Vida-----	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
Zahill-----	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
137----- Wabek	Severe: slope.	Severe: seepage, slope.	Severe: too sandy, seepage.	Severe: seepage, slope.	Poor: too sandy, slope, seepage.
138*: Warneke-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
138*: Whitewow-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Rock outcrop.					
139*: Whitewow-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Warneke-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.
140*: Whitewow-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
141-----	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----	Fair: too clayey.
142*, 143*: Williams-----	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----	Fair: too clayey.
Vida-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
144-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Moderate: slope.	Poor: slope, small stones.
145, 146-----	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----	Fair: too clayey.
147-----	Moderate: percs slowly.	Moderate: slope, seepage.	Slight-----	Slight-----	Good.
148*: Yamac-----	Moderate: percs slowly.	Moderate: slope, seepage.	Slight-----	Slight-----	Good.
Benz-----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
149*: Yamac-----	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Wabek-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, seepage.
150-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
151*: Zahill-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Vida-----	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.

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

TABLE 9.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1*: Absher-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, too clayey, excess salt.
Nobe-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess sodium.
2----- Assinniboine	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
3----- Attewan	Fair: frost action, low strength.	Poor: excess fines.	Good-----	Fair: small stones, too clayey.
4*: Attewan-----	Fair: frost action, low strength.	Poor: excess fines.	Good-----	Fair: small stones, too clayey.
Beaverell-----	Good-----	Fair: excess fines.	Fair: excess fines.	Poor: small stones.
5*: Attewan-----	Fair: frost action, low strength.	Poor: excess fines.	Good-----	Fair: small stones, too clayey.
Wabek-----	Good-----	Good-----	Good-----	Poor: small stones.
6. Badland				
7----- Barkof	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
8*, 9*: Barkof-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Norbert-----	Poor: shrink-swell, low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, thin layer.
10*: Barkof-----	Poor: low strength, shrink-swell, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope.
Windham-----	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11----- Bascovy	Poor: shrink-swell, low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess fines.
12*: Bascovy-----	Poor: shrink-swell, low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess salt.
Lisam-----	Poor: low strength, shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Dilts-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, thin layer, area reclaim.
13----- Bearpaw	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
14*, 15*: Bearpaw-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Elloam-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
16*, 17*: Bearpaw-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Vida-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
18----- Belain	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
19----- Benz	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, excess salt.
20----- Bowdoin	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess sodium, excess salt.
21----- Cabba	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer, area reclaim.
22*: Cabba-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer, area reclaim.
Rock outcrop.				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
23*: Cabba-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer, area reclaim.
Windham-----	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones, slope.
24*: Cabba-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer, area reclaim.
Zahill-----	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
25*: Cabbart-----	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium, thin layer.
Delpoint-----	Fair: low strength, shrink-swell, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Moderate: slope.
26*: Cabbart-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium, thin layer.
Hillon-----	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium.
27*: Cabbart-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium, thin layer.
Rock outcrop.				
28*: Cabbart-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium, thin layer.
Yamac-----	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Rock outcrop.				
29----- Castner	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: thin layer.	Poor: slope, large stones, thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
30*: Castner-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: thin layer.	Poor: slope, large stones, thin layer.
Perma-----	Poor: slope.	Poor: excess fines, small stones.	Poor: excess fines.	Poor: slope, small stones.
Rock outcrop.				
31----- Chinook	Good-----	Poor: excess fines.	Unsuited: excess fines.	Good.
32----- Chinook	Good-----	Poor: excess fines.	Unsuited: excess fines.	Fair: slope.
33*: Chinook-----	Good-----	Poor: excess fines.	Unsuited: excess fines.	Good.
Phillips-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
34----- Cozberg	Good-----	Poor: excess fines.	Unsuited: excess fines.	Good.
35----- Creed	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
36*: Creed-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Gerdrum-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess salt.
37----- Delpoint	Fair: low strength, shrink-swell, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
38*: Delpoint-----	Fair: low strength, shrink-swell, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
Cabbart-----	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, thin layer, area reclaim.
39----- Dimmick	Poor: wetness, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.
40----- Elloam	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
41----- Ethridge	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
42*: Ethridge-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Gerdrum-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess salt.
43, 44, 45----- Farnuf	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
46----- Gerdrum	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess salt.
47----- Glendive	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
48----- Hanly	Good-----	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy.
49----- Harlem	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
50----- Harlem	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
51----- Harlem	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess salt, excess sodium.
52----- Harlem	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
53----- Harlem	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess salt, excess sodium.
54*: Harlem Variant-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess salt.
Lardell-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, excess salt.
55----- Havre	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
56----- Havre	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess salt.
57----- Havre	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
58----- Havre	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess salt.
59*: Havre-----	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Hanly-----	Good-----	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
59*: Glendive-----	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
60*: Havre Variant-----	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess salt.
Lardell-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, excess salt.
61, 62----- Hedoes	Good-----	Poor: excess fines.	Poor: excess fines.	Fair: small stones.
63*: Hedoes-----	Good-----	Poor: excess fines.	Poor: excess fines.	Fair: slope, small stones.
Belain-----	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
64*: Hedoes-----	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope.
Belain-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
65*: Hedoes-----	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope.
Belain-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Castner-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: thin layer.	Poor: slope, large stones, thin layer.
66*: Hedoes-----	Good-----	Poor: excess fines.	Poor: excess fines.	Fair: small stones.
Benz-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, excess salt.
67----- Hillon	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium.
68*: Hillon-----	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium.
Kevin-----	Severe: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
69*: Hillon-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
Scobey-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
70*, 71*: Judith-----	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: small stones.
Windham-----	Fair: low strength.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
72----- Kevin	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
73*: Kevin-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Elloam-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
74*: Kevin-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey.
Hillon-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
75*: Korent-----	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
Nesda-----	Fair: large stones.	Poor: large stones.	Poor: large stones.	Fair: small stones.
76----- Lardell	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, excess salt.
77, 78----- Lihen	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, too sandy.
79*: Lisam-----	Poor: low strength, shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope, thin layer.
Dilts-----	Poor: low strength, shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope, thin layer.
80*: Lisam-----	Poor: low strength, shrink-swell, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope, thin layer.
Dilts-----	Poor: low strength, shrink-swell, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope, thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
80*: Rock outcrop.				
81*: Lisam-----	Poor: low strength, shrink-swell, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope, thin layer.
Hillon-----	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium.
82*: Lisam-----	Poor: low strength, shrink-swell, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope, thin layer.
Wabek-----	Poor: slope.	Good-----	Good-----	Poor: small stones, slope.
83----- Lolo	Good-----	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
84*: Macmeal-----	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
85*: Marmarth-----	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
Cabbart-----	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, thin layer, area reclaim.
86----- Martinsdale	Fair: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, too clayey.
87*: Martinsdale-----	Fair: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, too clayey.
Judith-----	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: small stones, too clayey.
88----- Marvan	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
89*: Marvan-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Bascovy-----	Poor: shrink-swell, low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess salt.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
90, 91----- Nishon	Poor: shrink-swell, wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.
92----- Norbert	Poor: shrink-swell, low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, thin layer, slope.
93*: Norbert-----	Poor: slope, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, thin layer, slope.
Rock outcrop.				
94*: Perma-----	Poor: slope.	Poor: excess fines, small stones.	Poor: excess fines.	Poor: slope, small stones.
Castner-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: thin layer.	Poor: slope, large stones, thin layer.
Belain-----	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
95, 96----- Phillips	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
97*, 98*: Phillips-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Elloam-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
99*, 100*: Phillips-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Kevin-----	Severe: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
101. Pits				
102, 103----- Reeder	Poor: low strength, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
104: Rubble land Rock outcrop				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
105, 106----- Savage	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
107*: Savage-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Gerdrum-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess salt.
108----- Scobey	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
109*, 110*: Scobey-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Kevin-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
111----- Shaak	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Poor: excess fines.	Poor: too clayey.
112*: Shaak-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Poor: excess fines.	Poor: too clayey.
Gerdrum-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess salt.
113, 114----- Shawmut	Good-----	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
115*: Silverchief-----	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, too clayey.
Whitecow-----	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Macmeal-----	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
116*: Straw-----	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Korent-----	Fair: low strength, frost action.	Poor: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
117*: Straw-----	Fair: low strength, frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
117*: Korent-----	Fair: low strength, frost action.	Poor: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
118*: Straw-----	Fair: low strength, frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.
Nesda-----	Fair: large stones.	Poor: large stones.	Poor: large stones.	Fair: small stones.
119----- Telstad	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
120*, 121*: Telstad-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Joplin-----	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, small stones.
122*: Telstad-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Joplin-----	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
123*: Thoeny-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess sodium.
Elloam-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
124*: Thoeny-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess sodium.
Kevin-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Elloam-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
125----- Turner	Good-----	Fair: excess fines.	Good-----	Fair: too clayey, small stones.
126*: Turner-----	Good-----	Fair: excess fines.	Good-----	Fair: too clayey, small stones.
Beaverton-----	Good-----	Unsuited: excess fines.	Good-----	Poor: small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
127*: Twilight-----	Poor: thin layer, area reclaim.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
Riedel-----	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, thin layer, area reclaim.
128*: Twilight-----	Poor: thin layer, area reclaim.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Fair: slope, area reclaim, thin layer.
Riedel-----	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, thin layer, area reclaim.
129. Typic Fluvaquents				
130. Typic Ustifluvents				
131. Ustic Torrifluvents				
132----- Vanda	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess sodium, excess salt.
133*, 134*: Vanda-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess sodium, excess salt.
Nobe-----	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, excess sodium.
135----- Vida	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
136*: Vida-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
Zahill-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
137----- Wabek	Fair: slope.	Good-----	Good-----	Poor: small stones, slope.
138*: Warneke-----	Poor: slope, area reclaim, thin layer.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: small stones, slope, thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
138*: Whitecow-----	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Rock outcrop.				
139*: Whitecow-----	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Warneke-----	Poor: slope, area reclaim, thin layer.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: small stones, slope, thin layer.
140*: Whitecow-----	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
141-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
142*, 143*: Williams-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Vida-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium.
144-----	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones, slope.
145, 146----- Work	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, excess sodium.
147-----	Good-----	Unsuited: excess fines.	Unsuited: excess fines.	Good.
148*: Yamac-----	Good-----	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Benz-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess sodium, excess salt.
149*: Yamac-----	Good-----	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Wabek-----	Poor: slope.	Good-----	Good-----	Poor: small stones, slope.
150----- Zahill	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
151*: Zahill-----	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Vida-----	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, excess sodium.

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

TABLE 10.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1*: Absher-----	Favorable-----	Piping, excess salt, hard to pack.	Slope, excess sodium, excess salt.	Slope, excess sodium, excess salt.	Percs slowly, erodes easily.	Excess salt, excess sodium, erodes easily.
Nobe-----	Favorable-----	Excess salt, hard to pack, piping.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly, erodes easily.	Erodes easily, excess sodium, excess salt.
2----- Assinniboine	Seepage-----	Piping, seepage.	Slope-----	Slope, soil blowing.	Soil blowing---	Favorable.
3----- Attewan	Seepage-----	Seepage, piping.	Slope-----	Slope, droughty.	Favorable-----	Droughty.
4*: Attewan-----	Seepage-----	Seepage, piping.	Favorable-----	Droughty-----	Favorable-----	Droughty.
Beaverell-----	Seepage-----	Seepage-----	Slope-----	Slope, droughty.	Droughty-----	Droughty.
5*: Attewan-----	Seepage-----	Seepage, piping.	Slope-----	Slope, droughty.	Favorable-----	Droughty.
Wabek-----	Seepage-----	Seepage-----	Favorable-----	Droughty-----	Too sandy-----	Droughty.
6. Badland						
7----- Barkof	Depth to rock--	Thin layer, hard to pack.	Depth to rock, percs slowly.	Too clayey, rooting depth, percs slowly.	Depth to rock, percs slowly.	Rooting depth, percs slowly.
8*: Barkof-----	Depth to rock, slope.	Thin layer, hard to pack.	Slope, depth to rock, percs slowly.	Percs slowly, rooting depth, slope.	Depth to rock, percs slowly.	Slope, percs slowly.
Norbert-----	Depth to rock, slope.	Thin layer-----	Slope, depth to rock, percs slowly.	Slope, percs slowly, rooting depth.	Depth to rock, percs slowly.	Slope, erodes easily, rooting depth.
9*: Barkof-----	Depth to rock, slope.	Thin layer, hard to pack.	Slope, depth to rock, percs slowly.	Slope, percs slowly, rooting depth.	Depth to rock, percs slowly, slope.	Slope, rooting depth, percs slowly.
Norbert-----	Depth to rock, slope.	Thin layer-----	Slope, depth to rock, percs slowly.	Slope, percs slowly, rooting depth.	Slope, depth to rock, percs slowly.	Slope, erodes easily, rooting depth.
10*: Barkof-----	Depth to rock, slope.	Thin layer, hard to pack.	Slope, depth to rock, percs slowly.	Slope, percs slowly, rooting depth.	Depth to rock, percs slowly, slope.	Slope, rooting depth, percs slowly.
Windham-----	Slope-----	Seepage-----	Slope-----	Slope, droughty.	Slope-----	Slope, droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
11----- Bascovy	Slope-----	Hard to pack, excess salt, thin layer.	Percs slowly, depth to rock, slope.	Percs slowly, slow intake, slope.	Depth to rock, percs slowly.	Excess salt, erodes easily, rooting depth.
12*: Bascovy-----	Slope-----	Hard to pack, excess salt, thin layer.	Percs slowly, depth to rock, slope.	Percs slowly, slow intake, slope.	Depth to rock, percs slowly.	Excess salt, erodes easily, rooting depth.
Lisam-----	Slope, depth to rock.	Thin layer-----	Percs slowly, depth to rock.	Droughty, percs slowly, rooting depth.	Percs slowly, depth to rock, slope.	Droughty, rooting depth.
Dilts-----	Depth to rock	Thin layer-----	Percs slowly, depth to rock.	Percs slowly, rooting depth.	Percs slowly, depth to rock.	Percs slowly, rooting depth.
13----- Bearpaw	Favorable-----	Hard to pack----	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Percs slowly----	Percs slowly, erodes easily.
14*: Bearpaw-----	Favorable-----	Hard to pack----	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Percs slowly----	Percs slowly, erodes easily.
Elloam-----	Favorable-----	Piping, hard to pack.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly----	Excess sodium, percs slowly.
15*: Bearpaw-----	Slope-----	Hard to pack----	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Percs slowly----	Slope, percs slowly, erodes easily.
Elloam-----	Slope-----	Piping, hard to pack.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly----	Slope, excess sodium, percs slowly.
16*: Bearpaw-----	Favorable-----	Hard to pack----	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Percs slowly----	Percs slowly, erodes easily.
Vida-----	Favorable-----	Piping-----	Slope, percs slowly.	Percs slowly, slope.	Percs slowly----	Percs slowly.
17*: Bearpaw-----	Slope-----	Hard to pack----	Percs slowly, slope.	Slope, slow intake, erodes easily.	Percs slowly----	Slope, percs slowly, erodes easily.
Vida-----	Slope-----	Piping-----	Slope, percs slowly.	Percs slowly, slope.	Percs slowly----	Slope, percs slowly, excess sodium.
18----- Belain	Slope, seepage, depth to rock.	Thin layer-----	Slope, depth to rock, frost action.	Slope, erodes easily, rooting depth.	Depth to rock	Slope, erodes easily, rooting depth.
19----- Benz	Favorable-----	Piping-----	Percs slowly, excess sodium, slope.	Excess sodium, percs slowly, slope.	Percs slowly----	Percs slowly, excess sodium, excess salt.
20----- Bowdoin	Favorable-----	Piping, excess salt, hard to pack.	Percs slowly, excess sodium, floods.	Slow intake, excess sodium, percs slowly.	Percs slowly----	Excess sodium, percs slowly, excess salt.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
21----- Cabba	Slope, seepage, depth to rock.	Thin layer-----	Slope, depth to rock.	Slope, rooting depth, erodes easily.	Slope, depth to rock.	Rooting depth, slope, erodes easily.
22*: Cabba-----  Rock outcrop.	Slope, seepage, depth to rock.	Thin layer-----	Slope, depth to rock.	Slope, rooting depth, erodes easily.	Slope, depth to rock.	Rooting depth, slope, erodes easily.
23*: Cabba-----	Slope, seepage, depth to rock.	Thin layer-----	Slope, depth to rock.	Slope, rooting depth, erodes easily.	Slope, depth to rock.	Rooting depth, slope, erodes easily.
Windham-----	Slope-----	Piping-----	Slope-----	Slope, droughty.	Slope, droughty.	Slope, droughty.
24*: Cabba-----	Slope, seepage, depth to rock.	Thin layer-----	Slope, depth to rock.	Slope, rooting depth, erodes easily.	Slope, depth to rock.	Rooting depth, slope, erodes easily.
Zahill-----	Slope-----	Favorable-----	Slope-----	Slope, erodes easily.	Slope-----	Slope, erodes easily.
25*: Cabbart-----	Slope, depth to rock.	Piping, thin layer.	Slope, depth to rock.	Slope, rooting depth, erodes easily.	Slope, depth to rock.	Slope, rooting depth, erodes easily.
Delpoint-----	Slope-----	Piping, low strength.	Slope, depth to rock.	Rooting depth, slope, erodes easily.	Slope, depth to rock.	Slope, erodes easily.
26*: Cabbart-----	Slope, depth to rock.	Piping, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth, erodes easily.
Hillon-----	Slope-----	Piping-----	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
27*: Cabbart-----  Rock outcrop.	Slope, depth to rock.	Piping, thin layer.	Slope, depth to rock.	Slope, rooting depth, erodes easily.	Slope, depth to rock.	Slope, rooting depth, erodes easily.
28*: Cabbart-----	Slope, depth to rock.	Piping, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth, erodes easily.
Yamac-----  Rock outcrop.	Slope, seepage.	Piping-----	Slope-----	Slope, erodes easily.	Slope-----	Slope, erodes easily.
29----- Castner	Slope, depth to rock.	Thin layer-----	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock, large stones.	Large stones, slope, rooting depth.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
30*: Castner-----	Slope, depth to rock.	Thin layer-----	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock, large stones.	Large stones, slope, rooting depth.
Perma-----  Rock outcrop.	Slope, seepage.	Seepage, large stones.	Slope-----	Slope, large stones.	Slope, droughty.	Slope, droughty, large stones.
31----- Chinook	Seepage, slope.	Seepage-----	Slope-----	Seepage, soil blowing, slope.	Soil blowing---	Slope.
32----- Chinook	Seepage, slope.	Seepage-----	Slope-----	Seepage, soil blowing, slope.	Soil blowing, slope.	Slope.
33*: Chinook-----	Seepage, slope.	Seepage-----	Slope-----	Seepage, soil blowing, slope.	Soil blowing---	Slope.
Phillips-----	Slope-----	Hard to pack---	Slope, percs slowly.	Percs slowly, slope.	Percs slowly, erodes easily.	Slope, erodes easily, percs slowly.
34----- Cozberg	Seepage-----	Seepage, piping.	Slope-----	Slope, droughty, soil blowing.	Soil blowing---	Droughty.
35----- Creed	Favorable-----	Hard to pack, excess salt.	Percs slowly, slope.	Percs slowly, slope, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
36*: Creed-----	Favorable-----	Hard to pack, excess salt.	Percs slowly, slope.	Percs slowly, slope, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Gerdrum-----	Favorable-----	Excess salt-----	Slope, percs slowly, excess salt.	Slope, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
37----- Delpoint	Depth to rock--	Thin layer-----	Slope, depth to rock.	Rooting depth, slope, erodes easily.	Depth to rock--	Erodes easily.
38*: Delpoint-----	Slope-----	Thin layer-----	Slope, depth to rock.	Rooting depth, slope, erodes easily.	Depth to rock--	Slope, erodes easily.
Cabbart-----	Slope, depth to rock.	Piping, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Depth to rock	Slope, rooting depth, erodes easily.
39----- Dimmick	Favorable-----	Wetness, hard to pack.	Floods, percs slowly.	Wetness, slow intake, percs slowly.	Percs slowly---	Wetness, percs slowly.
40----- Elloam	Favorable-----	Piping, hard to pack, excess salt.	Slope, percs slowly, excess salt.	Slope, percs slowly, excess salt.	Percs slowly---	Excess sodium, percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
41----- Ethridge	Favorable-----	Hard to pack, piping.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly---	Percs slowly, erodes easily.
42*: Ethridge-----	Favorable-----	Hard to pack, piping.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly---	Percs slowly, erodes easily.
Gerdrum-----	Favorable-----	Piping, excess salt.	Slope, percs slowly, excess salt.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
43----- Farnuf	Seepage-----	Piping-----	Favorable-----	Favorable-----	Favorable-----	Favorable.
44----- Farnuf	Seepage-----	Piping-----	Slope-----	Slope-----	Favorable-----	Favorable.
45----- Farnuf	Slope, seepage.	Piping-----	Slope-----	Slope-----	Favorable-----	Slope.
46----- Gerdrum	Favorable-----	Piping, excess salt.	Slope, percs slowly, excess salt.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
47----- Glendive	Seepage-----	Piping-----	Favorable-----	Soil blowing---	Soil blowing---	Favorable.
48----- Hanly	Seepage-----	Seepage, piping.	Floods-----	Droughty, floods, soil blowing.	Droughty-----	Droughty.
49, 50----- Harlem	Favorable-----	Favorable-----	Percs slowly---	Percs slowly---	Percs slowly, poor outlets.	Percs slowly.
51----- Harlem	Favorable-----	Excess salt, piping.	Wetness, percs slowly.	Wetness, percs slowly, excess sodium.	Percs slowly---	Excess salt, excess sodium, percs slowly.
52----- Harlem	Favorable-----	Piping-----	Percs slowly---	Percs slowly, slow intake.	Percs slowly, poor outlets.	Percs slowly.
53----- Harlem	Favorable-----	Excess salt, piping.	Wetness, percs slowly.	Slow intake, percs slowly, excess sodium.	Percs slowly---	Excess salt, excess sodium, percs slowly.
54*: Harlem Variant---	Favorable-----	Excess salt,, piping.	Percs slowly, excess sodium.	Percs slowly, excess sodium.	Percs slowly, wetness.	Percs slowly, excess sodium.
Lardell-----	Favorable-----	Piping, excess salt.	Percs slowly, excess salt, excess sodium.	Percs slowly, wetness, excess sodium.	Wetness, percs slowly, droughty.	Excess salt, wetness, excess sodium.
55, 57----- Havre	Seepage-----	Piping-----	Favorable-----	Erodes easily--	Favorable-----	Erodes easily.
56, 58----- Havre	Seepage-----	Piping-----	Excess salt, wetness.	Excess salt, wetness, erodes easily.	Favorable-----	Excess salt.
59*: Havre-----	Seepage-----	Piping-----	Floods-----	Floods-----	Favorable-----	Favorable.
Hanly-----	Seepage-----	Seepage, piping.	Not needed----	Droughty, floods, soil blowing.	Not needed----	Not needed.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
59*: Glendive-----	Seepage-----	Piping-----	Floods-----	Floods, soil blowing.	Soil blowing---	Favorable.
60*: Havre Variant----	Seepage-----	Piping-----	Excess sodium, wetness.	Excess sodium, wetness.	Wetness-----	Excess sodium, wetness.
Lardell-----	Favorable-----	Piping, excess salt.	Percs slowly, excess salt, excess sodium.	Percs slowly, wetness, excess sodium.	Wetness, percs slowly, droughty.	Excess salt, wetness, excess sodium.
61----- Hedoes	Seepage-----	Seepage, piping.	Slope-----	Slope, droughty.	Favorable-----	Droughty.
62----- Hedoes	Slope, seepage.	Seepage, piping.	Slope-----	Slope, droughty.	Favorable-----	Slope, droughty.
63*, 64*: Hedoes-----	Slope, seepage.	Seepage, piping.	Slope-----	Slope, droughty.	Slope-----	Slope, droughty.
Belain-----	Slope, seepage, depth to rock.	Thin layer, seepage.	Slope, depth to rock, frost action.	Slope, erodes easily, rooting depth.	Slope, depth to rock.	Slope, erodes easily, rooting depth.
65*: Hedoes-----	Slope, seepage.	Seepage, piping.	Slope-----	Slope, droughty.	Slope-----	Slope, droughty.
Belain-----	Slope, seepage, depth to rock.	Thin layer, seepage.	Slope, depth to rock, frost action.	Slope, erodes easily, rooting depth.	Slope, depth to rock.	Slope, erodes easily, rooting depth.
Castner-----	Slope, depth to rock.	Thin layer----	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock, large stones.	Large stones, slope, rooting depth.
66*: Hedoes-----	Seepage-----	Seepage, piping.	Slope-----	Slope, droughty.	Favorable-----	Droughty.
Benz-----	Favorable-----	Piping-----	Percs slowly, excess sodium, slope.	Excess sodium, percs slowly, slope.	Percs slowly---	Percs slowly, excess sodium, excess salt.
67----- Hillon	Slope-----	Piping-----	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
68*: Hillon-----	Slope-----	Piping-----	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Kevin-----	Slope-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
69*: Hillon-----	Slope-----	Piping-----	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Scobey-----	Slope-----	Piping-----	Complex slope, percs slowly.	Complex slope, percs slowly.	Percs slowly---	Slope, percs slowly.
70*: Judith-----	Slope, seepage.	Piping, seepage.	Slope-----	Slope-----	Favorable-----	Slope.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
70*: Windham-----	Slope, seepage.	Piping, seepage.	Slope-----	Slope, droughty.	Favorable-----	Slope, droughty.
71*: Judith-----	Slope, seepage.	Piping, seepage.	Slope-----	Slope-----	Slope-----	Slope.
Windham-----	Slope, seepage.	Piping, seepage.	Slope-----	Slope, droughty.	Slope-----	Slope, droughty.
72----- Kevin	Slope-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Percs slowly---	Slope, percs slowly.
73*: Kevin-----	Slope-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Percs slowly---	Slope, percs slowly.
Elloam-----	Slope-----	Piping, excess sodium.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly---	Slope, excess sodium.
74*: Kevin-----	Slope-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
Hillon-----	Slope-----	Piping-----	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
75*: Korent-----	Seepage-----	Favorable-----	Floods-----	Erodes easily, floods.	Favorable-----	Erodes easily.
Nesda-----	Seepage-----	Seepage-----	Floods-----	Floods, droughty.	Large stones, too sandy.	Droughty, large stones.
76----- Lardell	Favorable-----	Piping, excess salt, excess sodium.	Percs slowly, excess salt, excess sodium.	Percs slowly, wetness, excess sodium.	Wetness, percs slowly, droughty.	Excess salt, wetness, excess sodium.
77----- Lihen	Seepage-----	Piping, seepage.	Slope-----	Slope, droughty, soil blowing.	Too sandy, droughty.	Droughty.
78----- Lihen	Seepage, slope.	Piping, seepage.	Slope-----	Slope, droughty, soil blowing.	Too sandy, soil blowing, slope.	Slope, droughty.
79*: Lisam-----	Slope, depth to rock.	Thin layer-----	Depth to rock--	Slope, droughty, rooting depth.	Percs slowly, depth to rock, slope.	Droughty, percs slowly.
Dilts-----	Depth to rock	Thin layer-----	Depth to rock--	Slope, droughty, rooting depth.	Percs slowly, depth to rock.	Percs slowly, rooting depth.
80*: Lisam-----	Slope, depth to rock.	Thin layer-----	Depth to rock--	Slope, droughty, rooting depth.	Percs slowly, depth to rock, slope.	Droughty, percs slowly.
Dilts-----	Depth to rock	Thin layer-----	Depth to rock--	Slope, droughty, rooting depth.	Percs slowly, depth to rock.	Percs slowly, rooting depth.
Rock outcrop.						

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
81*: Lisam-----	Slope, depth to rock.	Thin layer-----	Depth to rock--	Slope, droughty, rooting depth.	Percs slowly, depth to rock, slope.	Droughty, percs slowly.
Hillon-----	Slope-----	Piping-----	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
82*: Lisam-----	Slope, depth to rock.	Thin layer-----	Depth to rock--	Slope, droughty, rooting depth.	Percs slowly, depth to rock, slope.	Droughty, percs slowly.
Wabek-----	Slope, seepage.	Seepage-----	Not needed-----	Droughty, slope.	Slope, too sandy.	Slope, droughty.
83----- Lolo	Seepage-----	Piping-----	Slope-----	Slope, fast intake, droughty.	Small stones---	Droughty.
84*: Macmeal-----	Slope-----	Favorable-----	Slope-----	Slope, droughty.	Slope, large stones.	Slope, droughty.
85*: Marmarth-----	Seepage, depth to rock.	Low strength, piping.	Not needed-----	Rooting depth	Depth to rock, rooting depth.	Rooting depth, slope.
Cabbart-----	Slope, depth to rock.	Piping, thin layer.	Slope, depth to rock.	Slope, rooting depth, erodes easily.	Depth to rock	Slope, rooting depth, erodes easily.
86----- Martinsdale	Favorable-----	Piping-----	Slope-----	Slope, erodes easily.	Favorable-----	Erodes easily.
87*: Martinsdale-----	Slope-----	Piping-----	Slope-----	Slope, erodes easily.	Favorable-----	Slope, erodes easily.
Judith-----	Slope, seepage.	Piping, seepage.	Slope, cutbanks cave.	Slope-----	Favorable-----	Slope, droughty.
88----- Marvan	Favorable-----	Piping, hard to pack.	Slope, percs slowly, excess sodium.	Slope, percs slowly, slow intake.	Percs slowly---	Percs slowly, excess sodium, erodes easily.
89*: Marvan-----	Slope-----	Piping, hard to pack.	Slope, percs slowly, excess sodium.	Slope, percs slowly, slow intake.	Percs slowly---	Slope, percs slowly, excess sodium.
Bascovy-----	Slope-----	Hard to pack, excess salt, thin layer.	Percs slowly, depth to rock, slope.	Percs slowly, slow intake, slope.	Depth to rock, percs slowly.	Excess salt, erodes easily, slope.
90, 91----- Nishon	Favorable-----	Hard to pack, wetness, piping.	Percs slowly, floods, excess sodium.	Percs slowly, slow intake, wetness.	Percs slowly, wetness.	Percs slowly, wetness, excess sodium.
92----- Norbert	Depth to rock, slope.	Thin layer-----	Slope, depth to rock, percs slowly.	Slope, percs slowly, rooting depth.	Slope, depth to rock, percs slowly.	Slope, erodes easily, percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
93*: Norbert----- Rock outcrop.	Depth to rock, slope.	Thin layer-----	Slope, depth to rock, percs slowly.	Slope, percs slowly, rooting depth.	Slope, depth to rock, percs slowly.	Slope, erodes easily, rooting depth.
94*: Perma----- Castner-----	Slope, seepage.	Seepage, large stones.	Slope, frost action.	Slope, droughty.	Slope, small stones.	Slope, droughty.
Belain-----	Slope, depth to rock.	Thin layer-----	Slope, depth to rock, frost action.	Slope, droughty, rooting depth.	Slope, depth to rock, large stones.	Large stones, slope, rooting depth.
95----- Phillips	Slope, seepage, depth to rock.	Thin layer-----	Slope, depth to rock, frost action.	Slope, erodes easily, rooting depth.	Slope, depth to rock.	Slope, erodes easily, rooting depth.
96----- Phillips	Favorable-----	Hard to pack----	Slope, percs slowly.	Percs slowly, slow intake, slope.	Percs slowly, erodes easily.	Erodes easily, percs slowly.
97*: Phillips-----	Slope-----	Hard to pack----	Slope, percs slowly.	Percs slowly, slow intake, slope.	Percs slowly, erodes easily.	Slope, erodes easily, percs slowly.
Elloam-----	Favorable-----	Hard to pack----	Slope, percs slowly.	Percs slowly, slow intake, slope.	Percs slowly, erodes easily.	Erodes easily, percs slowly.
98*: Phillips-----	Favorable-----	Piping, hard to pack.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly----	Excess sodium.
Elloam-----	Slope-----	Hard to pack----	Slope, percs slowly.	Percs slowly, slow intake, slope.	Percs slowly, erodes easily.	Slope, erodes easily, percs slowly.
99*: Phillips-----	Slope-----	Piping, hard to pack.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly----	Slope, excess sodium.
Kevin-----	Favorable-----	Hard to pack----	Slope, percs slowly.	Percs slowly, slow intake, slope.	Percs slowly, erodes easily.	Erodes easily, percs slowly.
100*: Phillips-----	Favorable-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Percs slowly----	Percs slowly.
Kevin-----	Slope-----	Hard to pack----	Slope, percs slowly.	Percs slowly, slow intake, slope.	Percs slowly, erodes easily.	Slope, erodes easily, percs slowly.
101. Pits	Slope-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Percs slowly----	Slope, percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
102----- Reeder	Seepage, depth to rock.	Thin layer-----	Not needed-----	Rooting depth	Depth to rock	Rooting depth.
103----- Reeder	Slope, seepage, depth to rock.	Thin layer-----	Not needed-----	Rooting depth, slope.	Depth to rock	Rooting depth.
104: Rubble land.  Rock outcrop.						
105----- Savage	Favorable-----	Hard to pack---	Frost action---	Slow intake, erodes easily.	Favorable-----	Favorable.
106----- Savage	Favorable-----	Hard to pack---	Frost action, slope.	Slow intake, slope, erodes easily.	Favorable-----	Favorable.
107*: Savage-----	Favorable-----	Hard to pack---	Frost action, slope.	Slow intake, slope, erodes easily.	Favorable-----	Favorable.
Gerdrum-----	Favorable-----	Piping, excess salt.	Slope, percs slowly, excess salt.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
108----- Scobey	Favorable-----	Low strength, shrink-swell, hard to pack.	Complex slope, percs slowly.	Complex slope, percs slowly.	Percs slowly---	Percs slowly.
109*: Scobey-----	Favorable-----	Low strength, shrink-swell, hard to pack.	Complex slope, percs slowly.	Complex slope, percs slowly.	Percs slowly---	Percs slowly.
Kevin-----	Favorable-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Percs slowly---	Percs slowly.
110*: Scobey-----	Slope-----	Low strength, shrink-swell, hard to pack.	Complex slope, percs slowly.	Complex slope, percs slowly.	Percs slowly---	Slope, percs slowly.
Kevin-----	Slope-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Percs slowly---	Slope, percs slowly.
111----- Shaak	Favorable-----	Hard to pack---	Slope, percs slowly, excess salt.	Slow intake, percs slowly, slope.	Percs slowly, small stones, erodes easily.	Erodes easily, percs slowly.
112*: Shaak-----	Favorable-----	Hard to pack---	Slope, percs slowly, excess salt.	Slow intake, percs slowly, slope.	Percs slowly, small stones, erodes easily.	Erodes easily, percs slowly.
Gerdrum-----	Favorable-----	Piping, excess salt.	Slope, percs slowly, excess salt.	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
113----- Shawmut	Seepage-----	Favorable-----	Slope-----	Slope, droughty.	Favorable-----	Droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
114----- Shawmut	Slope, seepage.	Favorable-----	Slope-----	Slope, droughty.	Favorable-----	Slope, droughty.
115*: Silverchief-----	Slope-----	Hard to pack, low strength.	Slope-----	Slope, slow intake.	Slope-----	Slope.
Whitecow-----	Slope-----	Seepage-----	Slope-----	Slope-----	Slope, large stones.	Slope, large stones.
Macmeal-----	Slope-----	Favorable-----	Slope-----	Slope, droughty.	Slope, large stones.	Slope, droughty.
116*: Straw-----	Seepage-----	Low strength, hard to pack, piping.	Favorable-----	Erodes easily--	Slope, piping, erodes easily.	Slope, erodes easily.
Korent-----	Seepage-----	Piping-----	Frost action--	Erodes easily--	Favorable-----	Erodes easily.
117*: Straw-----	Seepage-----	Piping-----	Floods-----	Floods-----	Favorable-----	Erodes easily.
Korent-----	Seepage-----	Seepage, wetness, piping.	Floods-----	Erodes easily, floods.	Wetness, soil blowing.	Erodes easily.
118*: Straw-----	Seepage-----	Piping-----	Floods-----	Floods-----	Favorable-----	Erodes easily.
Nesda-----	Seepage-----	Seepage-----	Floods-----	Floods, droughty.	Large stones, small stones, too sandy.	Droughty.
119----- Telstad	Favorable-----	Low strength--	Slope, percs slowly.	Percs slowly, erodes easily.	Percs slowly--	Percs slowly, erodes easily.
120*, 122*: Telstad-----	Favorable-----	Low strength--	Slope, percs slowly.	Percs slowly, erodes easily.	Percs slowly--	Percs slowly, erodes easily.
Joplin-----	Favorable-----	Favorable-----	Percs slowly--	Percs slowly, slope, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
121*: Telstad-----	Slope-----	Low strength--	Slope, percs slowly.	Percs slowly, erodes easily.	Percs slowly, erodes easily.	Slope, percs slowly, erodes easily.
Joplin-----	Slope-----	Favorable-----	Percs slowly, slope.	Percs slowly, slope, erodes easily.	Percs slowly, erodes easily.	Percs slowly, slope, erodes easily.
123*: Thoeny-----	Favorable-----	Hard to pack, low strength.	Slope, percs slowly, excess sodium.	Slope, slow intake, excess sodium.	Percs slowly--	Erodes easily, excess sodium, percs slowly.
Elloam-----	Favorable-----	Piping, hard to pack.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly--	Excess sodium.
124*: Thoeny-----	Slope-----	Hard to pack, low strength.	Slope, percs slowly, excess sodium.	Slope, slow intake, excess sodium.	Percs slowly--	Slope, erodes easily, excess sodium.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
124*: Kevin-----	Slope-----	Piping-----	Complex slope, percs slowly.	Slope, percs slowly.	Percs slowly---	Slope, percs slowly.
Elloam-----	Slope-----	Piping, hard to pack.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly---	Slope, excess sodium.
125----- Turner	Seepage-----	Seepage-----	Slope-----	Slope, droughty, erodes easily.	Too sandy-----	Droughty, erodes easily.
126*: Turner-----	Slope, seepage.	Seepage-----	Slope-----	Slope, droughty, erodes easily.	Too sandy-----	Slope, droughty, erodes easily.
Beaverton-----	Slope, seepage.	Seepage-----	Slope, cutbanks cave.	Slope, droughty.	Small stones---	Slope, droughty, erodes easily.
127*: Twilight-----	Slope, seepage, depth to rock.	Seepage, thin layer.	Not needed-----	Slope, soil blowing, rooting depth.	Soil blowing, depth to rock.	Rooting depth.
Riedel-----	Depth to rock, seepage, slope.	Thin layer-----	Not needed-----	Slope, soil blowing, rooting depth.	Depth to rock, soil blowing.	Slope, rooting depth.
128*: Twilight-----	Slope, seepage, depth to rock.	Seepage, thin layer.	Not needed-----	Slope, soil blowing, rooting depth.	Slope, soil blowing, depth to rock.	Slope, rooting depth.
Riedel-----	Depth to rock, seepage, slope.	Thin layer-----	Not needed-----	Slope, soil blowing, rooting depth.	Depth to rock, slope, soil blowing.	Slope, rooting depth.
129. Typic Fluvaquents						
130. Typic Ustifluents						
131. Ustic Torrifuents						
132----- Vanda	Favorable-----	Piping, hard to pack.	Percs slowly, excess salt, excess sodium.	Percs slowly, excess salt, excess sodium.	Percs slowly---	Excess sodium, percs slowly, excess salt.
133*: Vanda-----	Favorable-----	Piping, hard to pack.	Percs slowly, excess salt, excess sodium.	Percs slowly, excess salt, excess sodium.	Percs slowly---	Excess sodium, percs slowly, excess salt.
Nobe-----	Favorable-----	Excess salt, hard to pack, piping.	Percs slowly, excess sodium.	Percs slowly, excess sodium, excess salt.	Percs slowly, erodes easily.	Erodes easily, excess sodium, excess salt.
134*: Vanda-----	Slope-----	Piping, hard to pack.	Percs slowly, excess sodium, slope.	Percs slowly, excess sodium, slope.	Percs slowly---	Slope, excess sodium, percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
134*: Nobe-----	Slope-----	Excess salt, hard to pack, piping.	Slope, percs slowly, excess sodium.	Slope, percs slowly, excess sodium.	Percs slowly, erodes easily.	Slope, erodes easily, excess sodium.
135----- Vida	Slope-----	Piping-----	Slope, percs slowly.	Percs slowly, slope.	Percs slowly---	Slope, percs slowly.
136*: Vida-----	Slope-----	Piping-----	Slope, percs slowly.	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Zahill-----	Slope-----	Favorable-----	Slope-----	Slope, erodes easily.	Slope-----	Slope, erodes easily.
137----- Wabek	Slope, seepage.	Seepage-----	Not needed-----	Droughty, slope.	Slope, too sandy.	Slope, droughty.
138*: Warneke-----	Slope, depth to rock.	Thin layer-----	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth, droughty.
Whitecow-----  Rock outcrop.	Slope-----	Seepage-----	Slope-----	Slope-----	Slope, large stones.	Slope, large stones.
139*: Whitecow-----	Slope-----	Seepage-----	Slope-----	Slope-----	Slope, large stones.	Slope, large stones.
Warneke-----	Slope, depth to rock.	Thin layer-----	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth, droughty.
140*: Whitecow-----	Slope-----	Seepage-----	Slope-----	Slope-----	Slope, large stones.	Slope, large stones.
141----- Williams	Favorable-----	Favorable-----	Not needed-----	Favorable-----	Favorable-----	Favorable.
142*: Williams-----	Favorable-----	Favorable-----	Not needed-----	Favorable-----	Favorable-----	Favorable.
Vida-----	Favorable-----	Piping-----	Slope, percs slowly.	Percs slowly, slope.	Percs slowly---	Percs slowly.
143*: Williams-----	Slope-----	Favorable-----	Not needed-----	Slope-----	Favorable-----	Erodes easily.
Vida-----	Slope-----	Piping-----	Slope, percs slowly.	Percs slowly, slope.	Percs slowly---	Slope, percs slowly.
144----- Windham	Slope-----	Piping-----	Slope-----	Slope, droughty.	Slope-----	Slope, droughty.
145----- Work	Seepage-----	Hard to pack---	Slope-----	Slope, erodes easily.	Favorable-----	Favorable.
146----- Work	Slope, seepage.	Hard to pack---	Slope-----	Slope, erodes easily.	Favorable-----	Slope, erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
147----- Yamac	Seepage-----	Piping-----	Slope-----	Slope, erodes easily.	Favorable-----	Erodes easily.
148*: Yamac-----	Seepage-----	Piping-----	Slope-----	Slope, erodes easily.	Favorable-----	Erodes easily.
Benz-----	Favorable-----	Piping-----	Percs slowly, excess sodium, slope.	Excess sodium, percs slowly, slope.	Percs slowly---	Percs slowly, excess sodium, excess salt.
149*: Yamac-----	Slope, seepage.	Piping-----	Slope-----	Slope, erodes easily.	Slope-----	Slope, erodes easily.
Wabek-----	Slope, seepage.	Seepage-----	Not needed-----	Droughty, slope.	Slope, too sandy.	Slope, droughty.
150----- Zahill	Slope-----	Favorable-----	Slope-----	Slope, erodes easily.	Slope-----	Slope, erodes easily.
151*: Zahill-----	Slope-----	Favorable-----	Slope-----	Slope, erodes easily.	Slope-----	Slope, erodes easily.
Vida-----	Slope-----	Piping-----	Slope, percs slowly.	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.

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

TABLE 11.--ENGINEERING INDEX PROPERTIES

[The symbol &gt; 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 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1*: Absher-----	0-7	Clay loam-----	CL	A-6, A-7	0	95-100	75-100	70-100	55-95	35-45	15-25
	7-20	Silty clay, clay, clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-60	20-40
	20-60	Clay loam, clay, silty clay.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-60	20-40
Nobe-----	0-7	Clay-----	CL, CH	A-7	0	100	100	90-100	80-95	45-55	25-35
	7-60	Silty clay, clay	CL, CH	A-7	0	100	100	95-100	90-95	40-55	20-35
2-----	0-9	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-55	20-30	NP-5
Assinniboine	9-21	Sandy clay loam	SC, CL	A-6	0	100	100	80-90	35-55	25-35	10-15
	21-60	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-55	20-30	NP-5
3-----	0-6	Loam-----	CL-ML, CL	A-4, A-6	0-5	85-100	85-100	80-95	60-75	25-35	5-15
Attewan	6-20	Clay loam, sandy clay loam.	CL	A-6	0-5	85-100	85-100	85-95	70-80	30-40	10-15
	20-25	Loam, gravelly loam, clay loam.	ML, SM	A-4	0-10	60-100	50-85	45-90	35-70	25-35	NP-10
	25-60	Very gravelly sand, very gravelly loamy sand.	GP, GP-GM	A-1	0-25	15-65	5-50	5-20	0-15	---	NP
4*: Attewan-----	0-6	Loam-----	CL-ML, CL	A-4, A-6	0-5	85-100	85-100	80-95	60-75	25-35	5-15
	6-20	Clay loam, sandy clay loam.	CL	A-6	0-5	85-100	85-100	85-95	70-80	30-40	10-15
	20-25	Loam, gravelly loam, clay loam.	ML, SM	A-4	0-10	60-100	50-85	45-90	35-70	25-35	NP-10
	25-60	Very gravelly sand, very gravelly loamy sand.	GP, GP-GM	A-1	0-25	15-65	5-50	5-20	0-15	---	NP
Beaverell-----	0-3	Gravelly loam---	GM, GM-GC, SM, SM-SC	A-2, A-4	0-15	55-75	50-65	40-60	25-50	20-30	NP-10
	3-11	Gravelly clay loam, gravelly sandy clay loam, gravelly loam.	GC	A-6, A-2	0-15	55-75	50-65	40-60	20-50	25-35	10-15
	11-17	Gravelly sandy loam, very gravelly sandy loam.	GM	A-1	0-15	35-55	25-55	15-35	10-20	---	NP
	17-60	Stratified very gravelly sand to loamy sand.	GM, GP-GM, GP	A-1	0-15	30-60	20-50	10-35	0-15	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
5*: Attewan-----	0-6	Loam-----	CL-ML, CL	A-4, A-6	0-5	85-100	85-100	80-90	60-75	25-35	5-15
	6-20	Clay loam, sandy clay loam.	CL	A-6	0-5	85-100	85-100	85-95	70-80	30-40	10-15
	20-25	Loam, gravelly loam, clay loam.	ML, SM	A-4	0-10	60-100	50-85	45-90	35-70	25-35	NP-10
	25-60	Very gravelly sand, very gravelly loamy sand.	GP, GP-GM	A-1	0-25	15-65	5-50	5-20	0-15	---	NP
Wabek-----	0-8	Gravelly loam---	SM	A-4	0	70-80	60-70	40-50	35-45	25-40	NP-10
	8-60	Very gravelly coarse sand, very gravelly loamy coarse sand.	SP GP	A-1	0	40-60	35-50	10-40	0-5	---	NP
6. Badland											
7----- Barkof	0-7	Clay-----	CL, CH	A-7	0	100	100	90-100	75-90	45-60	20-30
	7-28	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-90	45-60	20-30
	28	Weathered bedrock.	---	---	---	---	---	---	---	---	---
8*: Barkof-----	0-7	Clay-----	CL, CH	A-7	0	100	100	90-100	75-90	45-60	20-30
	7-28	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-90	45-60	20-30
	28	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Norbert-----	0-7	Clay-----	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	7-14	Clay, silty clay	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9*: Barkof-----	0-7	Clay-----	CL, CH	A-7	0	100	100	90-100	75-90	45-60	20-30
	7-28	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-90	45-60	20-30
	28	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Norbert-----	0-7	Clay-----	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	7-14	Clay, silty clay	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
10*: Barkof-----	0-7	Clay-----	CL, CH	A-7	0	100	100	90-100	75-90	45-60	20-30
	7-28	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-90	45-60	20-30
	28-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Windham-----	0-6	Gravelly loam---	ML, SM	A-4	0-15	70-95	60-75	50-80	35-65	25-35	NP-10
	6-60	Very gravelly clay loam, very gravelly loam.	GM-GC, GC	A-2, A-4, A-6	0-15	35-70	25-60	20-55	15-50	25-35	5-15
11----- Bascovy	0-6	Clay-----	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	6-10	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	10-15	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	15-23	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	23	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
12*: Bascovy-----	0-6	Clay-----	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	6-10	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	10-15	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	15-23	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	23	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Lisam-----	0-17	Clay-----	CH	A-7	0	100	100	90-100	80-95	50-75	25-50
	17-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Dilts-----	0-16	Clay-----	CH	A-7	0	100	100	90-100	75-95	50-75	25-50
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
13----- Bearpaw	0-6	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
	6-23	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	90-100	70-85	45-55	20-30
	23-39	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
	39-60	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
14*, 15*: Bearpaw-----	0-6	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
	6-23	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	90-100	70-85	45-55	20-30
	23-39	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
	39-60	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
Elloam-----	0-3	Clay loam-----	CL	A-6	0-5	95-100	75-100	70-100	55-80	30-40	10-15
	3-17	Clay loam, clay	CL	A-6, A-7	0-5	95-100	75-100	70-100	55-95	35-45	15-25
	17-28	Clay loam, loam	CL, SC	A-6, A-7	0-5	95-100	75-100	65-100	45-80	30-45	10-20
	28-62	Clay loam, loam	CL, SM, SC, ML	A-7	0-5	95-100	75-100	65-100	45-80	40-50	15-20
16*, 17*: Bearpaw-----	0-6	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
	6-23	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	90-100	70-85	45-55	20-30
	23-39	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
	39-60	Clay loam-----	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-80	25-45	10-20
Vida-----	0-4	Clay loam-----	CL	A-4, A-6	0-15	90-100	90-100	85-95	70-80	20-40	10-20
	4-34	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
	34-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
18----- Belain	0-4	Loam-----	ML, CL-ML	A-4	0-5	95-100	85-100	85-95	60-75	20-30	NP-10
	4-11	Sandy loam, loam	ML, SM	A-4	0-5	95-100	85-95	65-90	35-70	25-35	NP-5
	11-22	Gravelly sandy loam, gravelly loam.	ML, SM, GM	A-2, A-4	0-5	60-85	50-75	35-70	20-55	25-35	NP-5
	22-28	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	0-5	35-60	25-50	15-45	10-35	25-35	NP-5
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
19----- Benz	0-13	Loam-----	ML	A-4	0	100	100	85-100	60-90	25-40	NP-10
	13-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	65-80	25-40	5-20
20----- Bowdoin	0-6	Clay-----	CH	A-7	0	100	100	90-100	80-95	60-85	30-55
	6-60	Clay-----	CH	A-7	0	100	100	90-100	80-95	60-85	30-55
21----- Cabba	0-12	Loam-----	CL, SC	A-6	0	100	100	95-100	45-90	25-35	10-15
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22*: Cabba-----	0-12 12	Loam----- Weathered bedrock.	CL, SC ---	A-6 ---	0 ---	100 ---	100 ---	95-100 ---	45-90 ---	25-35 ---	10-15 ---
Rock outcrop.											
23*: Cabba-----	0-12 12	Loam----- Weathered bedrock.	CL, SC ---	A-6 ---	0 ---	100 ---	100 ---	95-100 ---	45-90 ---	25-35 ---	10-15 ---
Windham-----	0-6 6-60	Gravelly loam--- Very gravelly clay loam, very gravelly loam.	ML, SM GM-GC, GC	A-4 A-2, A-4, A-6	0-15 0-15	70-95 35-70	60-75 25-60	50-80 20-55	35-65 15-50	25-35 25-35	NP-10 5-15
24*: Cabba-----	0-12 12	Loam----- Weathered bedrock.	CL, SC ---	A-6 ---	0 ---	100 ---	100 ---	95-100 ---	45-90 ---	25-35 ---	10-15 ---
Zahill-----	0-3 3-60	Clay loam----- Clay loam, loam	CL CL, CL-ML	A-6 A-4, A-6	0-10 0-10	90-100 90-100	90-100 90-100	85-95 85-95	70-80 70-80	20-40 25-40	10-20 5-20
25*: Cabbart-----	0-4 4-12 12	Loam----- Loam, clay loam, silty clay loam. Weathered bedrock.	CL-ML CL ---	A-4 A-6 ---	0 0 ---	100 100 ---	100 100 ---	85-95 85-100 ---	60-75 65-95 ---	20-30 30-40 ---	5-10 10-15 ---
Delpoint-----	0-4 4-16 16-32 32	Loam----- Loam, clay loam, silty clay loam. Loam, clay loam, silty clay loam. Weathered bedrock.	ML, CL-ML CL, CL-ML CL, CL-ML ---	A-4 A-4, A-6 A-4, A-6 ---	0 0 0 ---	100 100 100 ---	100 100 100 ---	85-95 85-95 85-95 ---	60-75 65-90 65-90 ---	25-35 20-40 20-40 ---	5-10 5-15 5-15 ---
26*: Cabbart-----	0-4 4-12 12	Loam----- Loam, clay loam, silty clay loam. Weathered bedrock.	CL-ML CL ---	A-4 A-6 ---	0 0 ---	100 100 ---	100 100 ---	85-95 85-100 ---	60-75 65-95 ---	20-30 30-40 ---	5-10 10-15 ---
Hillon-----	0-4 4-60	Clay loam----- Loam, clay loam	CL CL	A-6 A-6	0-5 0-5	85-100 85-100	85-100 80-100	85-95 80-90	70-80 65-80	25-35 25-35	10-20 10-20
27*: Cabbart-----	0-4 4-12 12	Loam----- Loam, clay loam, silty clay loam. Weathered bedrock.	CL-ML CL ---	A-4 A-6 ---	0 0 ---	100 100 ---	100 100 ---	85-95 85-100 ---	60-75 65-95 ---	20-30 30-40 ---	5-10 10-15 ---
Rock outcrop.											

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
28*: Cabbart-----	0-4	Loam-----	CL-ML	A-4	0	100	100	85-95	60-75	20-30	5-10
	4-12	Loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-100	65-95	30-40	10-15
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Yamac-----	0-4	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
	4-60	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
Rock outcrop.											
29----- Castner	0-6	Gravelly loam---	GM, GM-GC	A-4, A-2	0-5	60-85	50-75	45-70	30-50	25-35	5-10
	6-13	Very channery loam, channery loam, cobbly loam.	GM	A-2, A-4, A-1	20-50	30-65	25-60	20-50	15-40	25-35	NP-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
30*: Castner-----	0-6	Gravelly loam---	GM, GM-GC	A-4, A-2	0-5	60-85	50-75	45-70	30-50	25-35	5-10
	6-13	Very channery loam, channery loam, cobbly loam.	GM	A-2, A-4, A-1	20-50	30-65	25-60	20-50	15-40	25-35	NP-10
	13-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Perma-----	0-5	Gravelly loam---	GM, GM-GC, SM, SM-SC	A-4	15-35	60-80	55-75	50-65	35-50	20-30	NP-10
	5-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM, GM-GC	A-2, A-1	15-55	50-60	40-50	30-40	15-35	20-30	NP-10
Rock outcrop.											
31, 32----- Chinook	0-6	Fine sandy loam	SM	A-4	0	100	100	70-85	35-50	15-30	NP-5
	6-54	Fine sandy loam	SM	A-4	0	100	100	70-85	35-50	15-30	NP-5
	54-60	Fine sandy loam, loamy fine sand.	SM	A-4, A-2	0	100	100	60-80	25-45	---	NP
33*: Chinook-----	0-6	Fine sandy loam	SM	A-4	0	100	100	70-85	35-50	15-30	NP-5
	6-54	Fine sandy loam	SM	A-4	0	100	100	70-85	35-50	15-30	NP-5
	54-60	Fine sandy loam, loamy fine sand.	SM	A-4, A-2	0	100	100	60-80	25-45	---	NP
Phillips-----	0-7	Loam-----	ML, CL-ML	A-4	0-5	90-95	80-95	80-95	65-75	25-35	5-10
	7-15	Clay, clay loam	CL	A-6, A-7	0-5	90-95	80-95	90-100	75-95	35-50	15-25
	15-36	Clay loam-----	CL	A-6, A-7	0-5	90-95	80-95	90-100	70-80	30-45	10-20
	36-78	Clay loam-----	CL	A-6, A-7	0-5	90-95	80-95	90-100	70-80	30-45	10-20
34----- Cozberg	0-7	Fine sandy loam	SM	A-4	0	95-100	95-100	70-85	35-50	15-25	NP-5
	7-26	Fine sandy loam, very fine sandy loam, sandy loam.	SM-SC, CL-ML	A-4	0	95-100	80-100	60-90	35-60	20-30	5-10
	26-60	Loamy sand, sand, gravelly loamy sand.	SM, SP-SM	A-1, A-2	0	85-100	60-95	40-70	15-30	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
35----- Creed	0-6	Loam-----	CL-ML, SM-SC	A-4	0	90-100	75-100	65-95	45-75	20-30	5-10
	6-12	Silty clay, clay, silty clay loam.	CL	A-6, A-7	0	90-100	75-100	70-100	60-95	35-50	15-25
	12-28	Silty clay loam, clay loam, sandy clay loam.	CL, SC	A-6	0	90-100	75-100	60-100	35-90	30-40	15-20
	28-60	Stratified loam to silty clay loam.	CL	A-6	0	90-100	75-100	65-100	50-90	25-40	10-20
36*: Creed-----	0-6	Loam-----	CL-ML, SM-SC	A-4	0	90-100	75-100	65-95	45-75	20-30	5-10
	6-12	Silty clay, clay, silty clay loam.	CL	A-6, A-7	0	90-100	75-100	70-100	60-95	35-50	15-25
	12-28	Silty clay loam, clay loam, sandy clay loam.	CL, SC	A-6	0	90-100	75-100	60-100	35-90	30-40	15-20
	28-60	Stratified loam to silty clay loam.	CL	A-6	0	90-100	75-100	65-100	50-90	25-40	10-20
Gerdrum-----	0-7	Clay loam-----	CL	A-6, A-7	0	90-100	90-100	90-100	75-95	35-45	15-20
	7-22	Clay, clay loam, silty clay loam.	CL, CH	A-7	0	90-100	90-100	90-100	75-95	40-55	20-30
	22-46	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0	90-100	90-100	80-95	45-75	30-45	10-20
	46-68	Gravelly sandy loam.	SM	A-2, A-1	0	60-85	50-75	30-55	15-30	---	NP
37----- Delpoint	0-4	Loam-----	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	4-16	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	65-90	20-40	5-15
	16-32	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	65-90	20-40	5-15
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
38*: Delpoint-----	0-4	Loam-----	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	4-16	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	65-90	20-40	5-15
	16-32	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-95	65-90	20-40	5-15
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Cabbart-----	0-4	Loam-----	CL-ML	A-4	0	100	100	85-95	60-75	20-30	5-10
	4-12	Loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-100	65-95	30-40	10-15
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
39----- Dimmick	0-60	Clay-----	CH	A-7	0	100	100	90-100	75-95	50-70	25-45

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
40----- Elloam	0-3	Clay loam-----	CL	A-6	0-5	95-100	75-100	70-100	55-80	30-40	10-15
	3-17	Clay loam, clay	CL	A-6, A-7	0-5	95-100	75-100	70-100	55-95	35-45	15-25
	17-28	Clay loam, loam	CL, SC	A-6, A-7	0-5	95-100	75-100	65-100	45-80	30-45	10-20
	28-62	Clay loam, loam	CL, SM, SC, ML	A-7	0-5	95-100	75-100	65-100	45-80	40-50	15-20
41----- Ethrige	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	25-45	10-20
	6-28	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	40-55	20-30
	28-60	Stratified loam to silty clay.	CL	A-6, A-7	0	100	100	95-100	85-95	25-45	10-20
42*: Ethrige-----	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	25-45	10-20
	6-28	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	40-55	20-30
	28-60	Stratified loam to silty clay.	CL	A-6, A-7	0	100	100	95-100	85-95	25-45	10-20
Gerdrum-----	0-7	Clay loam-----	CL	A-6, A-7	0	90-100	90-100	90-100	75-95	35-45	15-20
	7-22	Clay, clay loam, silty clay loam.	CL, CH	A-7	0	90-100	90-100	90-100	75-95	40-55	20-30
	22-46	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0	90-100	90-100	80-95	45-75	30-45	10-20
	46-68	Gravelly sandy loam.	SM	A-2, A-1	0	60-85	50-75	30-55	15-30	---	NP
43, 44, 45----- Farnuf	0-5	Loam-----	ML	A-4	0	90-100	90-100	75-100	55-90	25-35	NP-10
	5-24	Clay loam, loam, silty clay loam.	CL	A-6	0	90-100	75-100	65-95	50-90	25-40	10-20
	24-60	Loam, clay loam	CL, SC	A-6	0	90-100	75-100	65-95	45-80	25-40	10-20
46----- Gerdrum	0-7	Clay loam-----	CL	A-6, A-7	0	90-100	90-100	90-100	75-95	35-45	15-20
	7-22	Clay, clay loam, silty clay loam.	CL, CH	A-7	0	90-100	90-100	90-100	75-95	40-55	20-30
	22-46	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0	90-100	90-100	80-95	45-75	30-45	10-20
	46-68	Gravelly sandy loam.	SM	A-2, A-1	0	60-85	50-75	30-55	15-30	---	NP
47----- Glendive	0-24	Fine sandy loam	SM, SM-SC, ML	A-4	0	100	100	70-80	40-55	20-35	5-10
	24-60	Stratified loamy fine sand to loam.	SM	A-4, A-2	0	95-100	75-100	60-90	25-45	15-30	NP-5
48----- Hanly	0-3	Loamy fine sand	SM	A-2	0	100	100	50-75	15-30	---	NP
	3-60	Stratified fine sandy loam to sand.	SM, SP-SM	A-2, A-3	0	100	100	50-85	5-25	---	NP
49----- Harlem	0-10	Loam-----	CL, ML	A-6, A-7	0	100	100	90-100	70-80	35-45	10-20
	10-46	Stratified clay to silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	20-40
	46-66	Stratified silt loam to fine sandy loam.	CL, CL-ML	A-6, A-4	0	100	100	85-95	60-75	20-40	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
50----- Harlem	0-10	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	80-95	35-45	10-20
	10-46	Stratified clay to silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	20-40
	46-66	Stratified silt loam to fine sandy loam.	CL, CL-ML	A-6, A-4	0	100	100	85-95	60-75	20-40	5-15
51----- Harlem	0-10	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-20
	10-46	Stratified clay loam to silty clay.	CL, CH	A-7	0	100	100	95-100	75-95	40-55	20-35
	46-60	Stratified loam to silty clay loam.	CL	A-6	0	100	100	80-90	65-85	25-40	10-20
52----- Harlem	0-10	Silty clay	CL, CH	A-7	0	100	100	90-100	75-90	40-65	20-40
	10-46	Stratified clay to silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	20-40
	46-60	Stratified silt loam to fine sandy loam.	CL, CL-ML	A-6, A-4	0	100	100	85-95	60-75	20-40	5-15
53----- Harlem	0-6	Silty clay	CL, CH	A-7	0	100	100	90-100	80-95	40-65	20-40
	6-46	Stratified clay loam to silty clay.	CL, CH	A-7	0	100	100	95-100	75-95	40-55	20-35
	46-60	Stratified loam to silty clay loam.	CL	A-6	0	100	100	80-90	65-85	25-40	10-20
54*: Harlem Variant----	0-7	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	25-45	10-20
	7-28	Silty clay loam, silty clay.	CL	A-7	0	100	100	95-100	85-95	35-45	20-30
	28-44	Silty clay loam, silty clay.	CL	A-7	0	100	100	95-100	85-95	35-45	20-30
	44-60	Stratified loam to silty clay.	CL, CH	A-6, A-7	0	100	100	85-100	70-80	30-55	10-30
Lardell-----	0-8	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	8-29	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	35-45	15-25
	29-60	Stratified fine sandy loam to silty clay loam.	CL	A-6	0	100	100	80-90	65-85	25-40	10-20
55----- Havre	0-8	Loam	CL, CL-ML	A-4, A-6	0	100	100	80-95	60-90	20-40	5-15
	8-60	Stratified fine sandy loam to clay loam.	ML, CL-ML	A-4	0	100	100	80-95	50-70	15-25	NP-10
56----- Havre	0-8	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	20-30	NP-10
	8-60	Stratified fine sandy loam to clay loam.	ML	A-4	0	100	100	75-100	50-70	15-25	NP-5
57----- Havre	0-8	Silty clay loam	CL	A-6	0	100	100	95-100	75-95	25-40	10-20
	8-60	Stratified fine sandy loam to clay loam.	ML, CL-ML	A-4	0	100	100	80-95	50-70	15-25	NP-10
58----- Havre	0-10	Silty clay loam	CL	A-6	0	100	100	90-100	85-95	25-40	10-20
	10-60	Stratified fine sandy loam to clay loam.	ML	A-4	0	100	100	75-100	50-70	15-25	NP-5

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
59*: Havre-----	0-8	Loam-----	ML, CL-ML	A-4	0	100	100	80-95	60-75	20-30	NP-10
	8-60	Stratified fine sandy loam to clay loam.	CL-ML	A-4	0	100	100	80-95	50-70	15-25	NP-10
Hanly-----	0-3	Loamy fine sand	SM	A-2	0	100	100	50-75	15-30	---	NP
	3-60	Stratified fine sandy loam to sand.	SM, SP-SM	A-2, A-3	0	100	100	50-85	5-25	---	NP
Glendive-----	0-7	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4, A-2	0	100	100	65-85	30-55	20-30	NP-10
	7-60	Stratified loamy fine sand to loam.	SM	A-2, A-4	0	95-100	75-100	60-80	25-45	20-30	NP-5
60*: Havre Variant----	0-7	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	25-40	10-20
	7-19	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	25-40	10-20
	19-60	Stratified fine sandy loam to silty clay loam.	ML, SM	A-4	0	100	100	75-100	35-90	25-35	NP-10
Lardell-----	0-8	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	8-29	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	35-45	15-25
	29-60	Stratified fine sandy loam to silty clay loam.	CL	A-6	0	100	100	80-90	65-85	25-40	10-20
61, 62----- Hedoes	0-4	Loam-----	ML, SM	A-4	0-15	85-100	75-100	65-95	45-75	25-35	NP-5
	4-17	Loam, sandy loam	ML, SM	A-4	0-15	90-100	85-100	65-95	45-75	25-35	NP-5
	17-34	Coarse sandy loam, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0-15	85-95	75-85	45-60	20-30	---	NP
	34-60	Very gravelly coarse sandy loam, gravelly sandy loam.	GM	A-1	0-15	45-65	30-55	15-35	10-20	---	NP
63*, 64*: Hedoes-----	0-4	Loam-----	ML, SM	A-4	0-15	85-100	75-100	65-95	45-75	25-35	NP-5
	4-17	Loam, sandy loam	ML, SM	A-4	0-15	90-100	85-100	65-95	45-75	25-35	NP-5
	17-34	Coarse sandy loam, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0-15	85-95	75-85	45-60	20-30	---	NP
	34-60	Very gravelly coarse sandy loam, gravelly sandy loam.	GM	A-1	0-15	45-65	30-55	15-35	10-20	---	NP
Belain-----	0-4	Loam-----	ML, CL-ML	A-4	0-5	95-100	85-100	85-95	60-75	20-30	NP-10
	4-11	Sandy loam, loam	ML, SM	A-4	0-5	95-100	85-95	65-90	35-70	25-35	NP-5
	11-22	Gravelly sandy loam, gravelly loam.	ML, SM, GM	A-2, A-4	0-5	60-85	50-75	35-70	20-55	25-35	NP-5
	22-28	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	0-5	35-60	25-50	15-45	10-35	25-35	NP-5
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
65*: Hedoes-----	0-4	Loam-----	ML, SM	A-4	0-15	85-100	75-100	65-95	45-75	25-35	NP-5
	4-17	Loam, sandy loam	ML, SM	A-4	0-15	90-100	85-100	65-95	45-75	25-35	NP-5
	17-34	Coarse sandy loam, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0-15	85-95	75-85	45-60	20-30	---	NP
	34-60	Very gravelly coarse sandy loam, gravelly sandy loam.	GM	A-1	0-15	45-65	30-55	15-35	10-20	---	NP
Belain-----	0-4	Loam-----	ML, CL-ML	A-4	0-5	95-100	85-100	85-95	60-75	20-30	NP-10
	4-11	Sandy loam, loam	ML, SM	A-4	0-5	95-100	85-95	65-90	35-70	25-35	NP-5
	11-22	Gravelly sandy loam, gravelly loam.	ML, SM, GM	A-2, A-4	0-5	60-85	50-75	35-70	20-55	25-35	NP-5
	22-28	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	0-5	35-60	25-50	15-45	10-35	25-35	NP-5
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Castner-----	0-6	Gravelly loam---	GM, GM-GC	A-4, A-2	0-5	60-85	50-75	45-70	30-50	25-35	5-10
	6-13	Very channery loam, channery loam, cobbly loam.	GM	A-2, A-4, A-1	20-50	30-65	25-60	20-50	15-40	25-35	NP-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
66*: Hedoes-----	0-4	Loam-----	ML, SM	A-4	0-15	85-100	75-100	65-95	45-75	25-35	NP-5
	4-17	Loam, sandy loam	ML, SM	A-4	0-15	90-100	85-100	65-95	45-75	25-35	NP-5
	17-34	Coarse sandy loam, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0-15	85-95	75-85	45-60	20-30	---	NP
	34-60	Very gravelly coarse sandy loam, gravelly sandy loam.	GM	A-1	0-15	45-65	30-55	15-35	10-20	---	NP
Benz-----	0-13	Loam-----	ML	A-4	0	100	100	85-100	60-90	25-40	NP-10
	13-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	65-80	25-40	5-20
67----- Hillon	0-4	Clay loam-----	CL	A-6	0-5	85-100	85-100	85-95	70-80	25-35	10-20
	4-60	Loam, clay loam	CL	A-6	0-5	85-100	80-100	80-90	65-80	25-35	10-20
68*: Hillon-----	0-4	Clay loam-----	CL	A-6	0-5	85-100	85-100	85-95	70-80	25-35	10-20
	4-60	Loam, clay loam	CL	A-6	0-5	85-100	80-100	80-90	65-80	25-35	10-20
Kevin-----	0-7	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	7-30	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	30-60	Clay loam-----	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-80	30-45	10-20
69*: Hillon-----	0-4	Clay loam-----	CL	A-6	0-5	85-100	85-100	85-95	70-80	25-35	10-20
	4-60	Loam, clay loam	CL	A-6	0-5	85-100	80-100	80-90	65-80	25-35	10-20
Scobey-----	0-6	Clay loam-----	CL	A-6, A-7	0-5	85-100	75-95	70-90	65-80	25-40	10-20
	6-19	Clay, clay loam	CH, CL	A-7	0-5	85-100	85-95	80-95	65-90	50-60	25-35
	19-60	Clay loam-----	CL	A-6, A-7	0-5	85-100	75-95	70-90	65-80	25-40	10-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
70*, 71*: Judith-----	0-7	Loam-----	ML	A-4	0-5	90-100	90-100	85-95	60-75	20-35	NP-10
	7-33	Clay loam, loam, gravelly clay loam.	CL, SC	A-6	0-5	65-100	55-100	45-95	35-80	25-40	10-15
	33-60	Very gravelly loam.	GM	A-1	0-10	45-55	25-35	20-35	15-25	20-30	NP-5
Windham-----	0-6	Gravelly loam---	ML, SM	A-4	0-15	70-95	60-75	50-80	35-65	25-35	NP-10
	6-60	Very gravelly clay loam, very gravelly loam.	GM-GC, GC	A-2, A-4, A-6	0-15	35-70	25-60	20-55	15-50	25-35	5-15
72----- Kevin	0-3	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	3-30	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	30-60	Clay loam-----	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-80	30-45	10-20
73*: Kevin-----	0-3	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	3-30	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	30-60	Clay loam-----	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-80	30-45	10-20
Elloam-----	0-3	Clay loam-----	CL	A-6	0-5	95-100	75-100	70-100	55-80	30-40	10-15
	3-17	Clay loam, clay	CL	A-6, A-7	0-5	95-100	75-100	70-100	55-95	35-45	15-25
	17-28	Clay loam, loam	CL, SC	A-6, A-7	0-5	95-100	75-100	65-100	45-80	30-45	10-20
	28-62	Clay loam, loam	CL, SM, SC, ML	A-7	0-5	95-100	75-100	65-100	45-80	40-50	15-20
74*: Kevin-----	0-3	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	3-30	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	30-60	Clay loam-----	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-80	30-45	10-20
Hillon-----	0-4	Clay loam-----	CL	A-6	0-5	85-100	85-100	85-95	70-80	25-35	10-20
	4-60	Loam, clay loam	CL	A-6	0-5	85-100	80-100	80-90	65-80	25-35	10-20
75*: Korent-----	0-7	Loam-----	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	7-60	Loam, silt loam, sandy clay loam.	CL	A-6	0	100	100	80-95	50-75	25-35	10-15
Nesda-----	0-11	Sandy loam-----	ML, SM	A-4	0-5	90-100	85-100	65-95	35-75	---	NP
	11-60	Very gravelly sand, very cobble sand, very gravelly loamy sand.	GP	A-1	15-75	20-40	10-20	5-15	0-5	---	NP
76----- Lardell	0-8	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	8-29	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	35-45	15-25
	29-60	Stratified fine sandy loam to silty clay loam.	CL	A-6	0	100	100	80-90	65-85	25-40	10-20
77, 78----- Lihen	0-10	Loamy fine sand	SM	A-2	0	100	85-100	45-75	15-30	---	NP
	10-30	Loamy fine sand, loamy sand, fine sand.	SM	A-2	0	100	85-100	45-75	15-35	---	NP
	30-60	Loamy fine sand, loamy sand, fine sand.	SM	A-2	0	100	85-100	45-75	15-35	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
79*: Lisam-----	0-17 17	Clay----- Weathered bedrock.	CH ---	A-7 ---	0 ---	100 ---	100 ---	90-100 ---	80-95 ---	50-75 ---	25-50 ---
Dilts-----	0-7 7-16	Clay----- Shaly clay, clay, shaly silty clay.	CH CH	A-7 A-7	0 0-5	100 90-100	100 75-100	90-100 60-100	75-95 55-95	50-75 50-75	25-50 25-50
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
80*: Lisam-----	0-17 17	Clay----- Weathered bedrock.	CH ---	A-7 ---	0 ---	100 ---	100 ---	90-100 ---	80-95 ---	50-75 ---	25-50 ---
Dilts-----	0-7 7-16	Clay----- Shaly clay, clay, shaly silty clay.	CH CH	A-7 A-7	0 0-5	100 90-100	100 75-100	90-100 60-100	75-95 55-95	50-75 50-75	25-50 25-50
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
81*: Lisam-----	0-17 17	Clay----- Weathered bedrock.	CH ---	A-7 ---	0 ---	100 ---	100 ---	90-100 ---	80-95 ---	50-75 ---	25-50 ---
Hillon-----	0-4 4-60	Clay loam----- Loam, clay loam	CL CL	A-6 A-6	0-5 0-5	85-100 85-100	85-100 80-100	85-95 80-90	70-80 65-80	25-35 25-35	10-20 10-20
82*: Lisam-----	0-17 17	Clay----- Weathered bedrock.	CH ---	A-7 ---	0 ---	100 ---	100 ---	90-100 ---	80-95 ---	50-75 ---	25-50 ---
Wabek-----	0-8 8-60	Gravelly loam--- Very gravelly coarse sand, gravelly loamy coarse sand, sand.	SM SP, GP	A-4 A-1	0 0	70-80 40-60	60-70 35-50	40-50 10-40	35-45 0-5	25-40 ---	NP-10 NP
83----- Lolo	0-6 6-22 22-60	Loam----- Gravelly loam--- Very gravelly loam, very gravelly fine sandy loam.	ML GM GM	A-4 A-2, A-4 A-1	0-10 0-10 0-10	90-100 55-70 30-45	90-100 50-60 30-35	80-90 40-55 25-30	60-75 25-45 15-25	25-35 20-35 20-35	NP-10 NP-10 NP-10
84*: Macneal----- (north aspect)	0-7 7-48 48-60	Gravelly loam--- Very channery clay loam, very gravelly clay loam. Very channery clay loam, very flaggy clay loam.	ML, SM GC, SC GC	A-4 A-6, A-2 A-6, A-2	5-25 5-25 5-45	75-85 40-85 50-70	65-75 30-60 40-60	55-70 25-55 35-55	40-55 20-45 30-50	25-35 30-40 30-40	NP-5 10-15 10-15

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
84*: Macmeal----- {south aspect)	0-5	Gravelly loam---	ML, SM	A-4	5-25	75-85	65-75	55-70	40-55	25-35	NP-5
	5-48	Very channery clay loam, very gravelly clay loam.	GC, SC	A-6, A-2	5-25	40-85	30-60	25-55	20-45	30-40	10-15
	48-60	Very channery clay loam, very flaggy clay loam.	GC	A-6, A-2	5-45	50-70	40-60	35-55	30-50	30-40	10-15
85*: Marmarth-----	0-6	Clay loam-----	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-80	20-40	5-20
	6-30	Clay loam, loam, fine sandy loam.	CL, CL-ML	A-6, A-4	0	100	100	90-100	60-80	20-40	5-20
	30-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Cabbart-----	0-4	Loam-----	CL-ML	A-4	0	100	100	85-95	60-75	20-30	5-10
	4-12	Loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-100	65-95	30-40	10-15
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
86----- Martinsdale	0-7	Clay loam-----	ML, CL, CL-ML	A-4, A-6	0-5	95-100	85-95	55-90	50-80	20-35	NP-15
	7-54	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	85-95	75-95	65-95	40-80	30-40	10-15
	54-60	Sandy clay loam, clay loam, gravelly clay loam.	SM-SC, SC, CL, CL-ML	A-4, A-6	0-5	75-95	65-95	60-90	40-70	25-35	5-15
87*: Martinsdale-----	0-7	Clay loam-----	ML, CL, CL-ML	A-4, A-6	0-5	95-100	85-95	55-90	50-80	20-35	NP-15
	7-54	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	85-95	75-95	65-95	40-80	30-40	10-15
	54-60	Sandy clay loam, clay loam, gravelly clay loam.	SM-SC, SC, CL, CL-ML	A-4, A-6	0-5	75-95	65-95	60-90	40-70	25-35	5-15
Judith-----	0-5	Loam-----	ML	A-4	0-5	90-100	90-100	85-95	60-75	20-35	NP-10
	5-33	Clay loam, loam, gravelly clay loam.	CL, SC	A-6	0-5	65-100	55-100	45-95	35-80	25-40	10-15
	33-60	Very gravelly loam.	GM	A-1	0-10	45-55	25-35	20-35	15-25	20-30	NP-5
88----- Marvan	0-7	Clay-----	CH	A-7	0	100	100	95-100	75-95	50-65	25-40
	7-60	Clay, silty clay	CH	A-7	0	100	100	95-100	75-95	50-65	25-40
89*: Marvan-----	0-7	Clay-----	CH	A-7	0	100	100	95-100	75-95	50-65	25-40
	7-60	Clay, silty clay	CH	A-7	0	100	100	95-100	75-95	50-65	25-40
Bascovy-----	0-6	Clay-----	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	6-10	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	10-15	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	15-23	Clay, silty clay	CH	A-7	0	90-100	75-100	75-95	55-95	50-65	25-35
	23	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
90----- Nishon	0-12	Loam-----	CL, CL-ML	A-4, A-6	0	100	100	85-95	65-75	20-35	5-15
	12-60	Clay, silty clay, clay loam	CL, CH	A-6, A-7	0	100	100	90-100	75-95	35-55	20-35
91----- Nishon	0-5	Clay loam-----	CL	A-6, A-7	0	100	100	85-100	60-80	30-45	10-20
	5-60	Clay-----	CL, CH	A-6, A-7	0	100	100	90-100	75-95	35-55	20-35
92----- Norbert	0-10	Clay-----	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	10-14	Clay, silty clay	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
93*: Norbert-----	0-10	Clay-----	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	10-14	Clay, silty clay	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
94*: Perma-----	0-5	Gravelly loam---	GM, GM-GC, SM, SM-SC	A-4	15-35	60-80	55-75	50-65	35-50	20-30	NP-10
	5-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM, GM-GC,	A-2, A-1	15-55	50-60	40-50	30-40	15-35	20-30	NP-10
Castner-----	0-6	Gravelly loam---	GM, GM-GC	A-4, A-2	0-5	60-85	50-75	45-70	30-50	25-35	5-10
	6-13	Very channery loam, channery loam, cobbly loam.	GM	A-2, A-4, A-1	20-50	30-65	25-60	20-50	15-40	25-35	NP-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Belain-----	0-4	Loam-----	ML, CL-ML	A-4	0-5	95-100	85-100	85-95	60-75	20-30	NP-10
	4-11	Sandy loam, loam	ML, SM	A-4	0-5	95-100	85-95	65-90	35-70	25-35	NP-5
	11-22	Gravelly sandy loam, gravelly loam.	ML, SM, GM	A-2, A-4	0-5	60-85	50-75	35-70	20-55	25-35	NP-5
	22-28	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	0-5	35-60	25-50	15-45	10-35	25-35	NP-5
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
95, 96----- Phillips	0-7	Loam-----	ML, CL-ML	A-4	0-5	90-95	80-95	80-95	65-75	25-35	5-10
	7-15	Clay, clay loam	CL	A-6, A-7	0-5	90-95	80-95	90-100	75-95	35-50	15-25
	15-36	Clay loam-----	CL	A-6, A-7	0-5	90-95	80-95	90-100	70-80	30-45	10-20
	36-78	Clay loam-----	CL	A-6, A-7	0-5	90-95	80-95	90-100	70-80	30-45	10-20
97*, 98*: Phillips-----	0-7	Loam-----	ML, CL-ML	A-4	0-5	90-95	80-95	80-95	65-75	25-35	5-10
	7-15	Clay, clay loam	CL	A-6, A-7	0-5	90-95	80-95	90-100	75-95	35-50	15-25
	15-36	Clay loam-----	CL	A-6, A-7	0-5	90-95	80-95	90-100	70-80	30-45	10-20
	36-78	Clay loam-----	CL	A-6, A-7	0-5	90-95	80-95	90-100	70-80	30-45	10-20
Elloam-----	0-3	Clay loam-----	CL	A-6	0-5	95-100	75-100	70-100	55-80	30-40	10-15
	3-17	Clay loam, clay	CL	A-6, A-7	0-5	95-100	75-100	70-100	55-95	35-45	15-25
	17-28	Clay loam, loam	CL, SC	A-6, A-7	0-5	95-100	75-100	65-100	45-80	30-45	10-20
	28-62	Clay loam, loam	CL, SM, SC, ML	A-7	0-5	95-100	75-100	65-100	45-80	40-50	15-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
99*, 100*: Phillips-----	0-7	Loam-----	ML, CL-ML	A-4	0-5	90-95	80-95	80-95	65-75	25-35	5-10
	7-15	Clay, clay loam	CL	A-6, A-7	0-5	90-95	80-95	90-100	75-95	35-50	15-25
	15-36	Clay loam-----	CL	A-6, A-7	0-5	90-95	80-95	90-100	70-80	30-45	10-20
	36-78	Clay loam-----	CL	A-6, A-7	0-5	90-95	80-95	90-100	70-80	30-45	10-20
Kevin-----	0-3	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	3-30	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	30-60	Clay loam-----	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-80	30-45	10-20
101. Pits											
102, 103----- Reeder	0-7	Loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	65-85	20-40	5-20
	7-28	Clay loam, loam	CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	60-80	25-50	5-30
	28-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
104: Rubble land. Rock outcrop.											
105----- Savage	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-25
	6-14	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-60	20-40
	14-60	Silty clay, silty clay loam, clay.	CL, CH	A-7	0	100	100	95-100	85-95	40-60	20-40
106----- Savage	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-25
	6-14	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-60	20-40
	14-60	Silty clay, silty clay loam, clay.	CL, CH	A-7	0	100	100	95-100	85-95	40-60	20-40
107*: Savage-----	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-25
	6-14	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-60	20-40
	14-60	Silty clay, silty clay loam, clay.	CL, CH	A-7	0	100	100	95-100	85-95	40-60	20-40
Gerdrum-----	0-7	Clay loam-----	ML, CL-ML	A-4	0	90-100	90-100	85-95	60-75	25-35	5-10
	7-22	Clay, clay loam, silty clay loam.	CL, CH	A-7	0	90-100	90-100	90-100	75-95	40-55	20-30
	22-46	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0	90-100	90-100	80-95	45-75	30-45	10-20
	46-60	Gravelly sandy loam.	SM	A-2, A-1	0	60-85	50-75	30-55	15-30	---	NP
108----- Scobey	0-6	Clay loam-----	CL	A-6, A-7	0-5	85-100	75-95	70-90	65-80	25-40	10-20
	6-19	Clay, clay loam	CH, CL	A-7	0-5	85-100	85-95	80-95	65-90	50-60	25-35
	19-60	Clay loam-----	CL	A-6, A-7	0-5	85-100	75-95	70-90	65-80	25-40	10-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
109*, 110*: Scobey-----	0-6	Clay loam-----	CL	A-6, A-7	0-5	85-100	75-95	70-90	65-80	25-40	10-20
	6-19	Clay, clay loam	CH, CL	A-7	0-5	85-100	85-95	80-95	65-90	50-60	25-35
	19-60	Clay loam-----	CL	A-6, A-7	0-5	85-100	75-95	70-90	65-80	25-40	10-20
Kevin-----	0-3	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	3-30	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	30-60	Clay loam-----	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-80	30-45	10-20
111----- Shaak	0-6	Loam-----	CL	A-6	0	90-100	90-100	85-95	65-90	25-35	10-15
	6-20	Clay, silty clay	CL, CH	A-7	0	90-100	90-100	90-100	75-95	45-60	25-35
	20-42	Silty clay, gravelly sandy clay loam, clay loam.	CL, SC	A-6, A-7	0-5	75-100	65-90	55-85	40-65	35-50	15-25
	42-60	Very gravelly loam, very gravelly clay loam, very gravelly sandy loam.	GM, GC, GM-GC	A-4, A-6, A-2, A-1	0-5	35-60	25-50	15-45	10-40	20-40	NP-15
112*: Shaak-----	0-6	Loam-----	CL	A-6	0	90-100	90-100	85-95	65-90	25-35	10-15
	6-20	Clay, silty clay	CL, CH	A-7	0	90-100	90-100	90-100	75-95	45-60	25-35
	20-42	Silty clay, gravelly sandy clay loam, clay loam.	CL, SC	A-6, A-7	0-5	75-100	65-90	55-85	40-65	35-50	15-25
	42-60	Very gravelly loam, very gravelly clay loam, very gravelly sandy loam.	GM, GC, GM-GC	A-4, A-6, A-2, A-1	0-5	35-60	25-50	15-45	10-40	20-40	NP-15
Gerdrum-----	0-7	Clay loam-----	CL	A-6, A-7	0	90-100	90-100	90-100	75-95	35-45	15-20
	7-22	Clay, clay loam, silty clay loam.	CL, CH	A-7	0	90-100	90-100	90-100	75-95	40-55	20-30
	22-46	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0	90-100	90-100	80-95	45-75	30-45	10-20
	46-60	Gravelly sandy loam.	SM	A-2, A-1	0	60-85	50-75	30-55	15-30	---	NP
113, 114----- Shawmut	0-3	Gravelly loam---	ML, GM, SM	A-4, A-2	0-10	65-85	55-75	45-70	20-55	20-35	NP-10
	3-15	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly loam.	GC, GM-GC	A-2, A-4, A-6	10-25	40-65	30-55	20-50	15-45	20-35	5-15
	15-60	Very gravelly loam.	GM, SM	A-2, A-4, A-1	10-25	45-70	30-55	25-50	20-50	20-35	NP-10
115*: Silverchief-----	0-5	Loam-----	ML, CL-ML	A-4	0-5	100	90-100	75-95	55-75	20-30	NP-10
	5-20	Clay, silty clay	CL, CH	A-7	0-5	95-100	90-95	90-95	80-95	40-60	20-35
	20-27	Gravelly clay, gravelly silty clay.	CL, CH	A-7	5-10	75-90	55-75	50-75	50-70	40-60	20-35
	27-60	Very gravelly sandy clay loam, very gravelly silty clay loam.	GC, CL	A-6, A-2	15-30	45-70	35-60	30-60	15-55	25-40	10-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
115*: Whitewcow-----	0-3	Gravelly loam---	GM, ML, SM	A-4	0-15	65-85	55-75	45-70	35-55	25-35	NP-10
	3-20	Gravelly loam, very gravelly loam.	GM, ML	A-2, A-4, A-1	0-15	40-85	30-75	25-70	20-55	25-35	NP-10
	20-60	Very gravelly loam.	GM	A-1	0-15	25-35	15-25	15-25	10-20	25-35	NP-10
Macmeal-----	0-7	Gravelly loam---	ML, SM	A-4	5-25	75-85	65-75	55-70	40-55	25-35	NP-5
	7-48	Very channery clay loam, very gravelly clay loam.	GC, SC	A-6, A-2	5-25	40-85	30-60	25-55	20-45	30-40	10-15
	48-60	Very channery clay loam, very flaggy clay loam.	GC	A-6, A-2	5-45	50-70	40-60	35-55	30-50	30-40	10-15
116*: Straw-----	0-7	Loam-----	CL	A-4, A-6	0	100	100	85-100	60-90	20-40	10-20
	7-21	Silt loam-----	ML	A-4	0	100	100	90-100	70-90	25-40	5-10
	21-60	Stratified silty clay loam to loamy sand.	SM	A-2, A-4	0	100	100	65-90	25-50	---	NP
Korent-----	0-7	Loam-----	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	7-60	Loam, silt loam, sandy clay loam.	CL	A-6	0	100	100	80-95	50-75	25-35	10-15
117*: Straw-----	0-7	Loam-----	CL	A-6	0	100	100	85-95	60-75	25-30	10-15
	7-21	Silt loam-----	ML	A-4	0	100	100	90-100	70-90	35-40	5-10
	21-60	Stratified silty clay loam to loamy clay.	SM	A-2, A-4	0	100	100	65-90	25-50	---	NP
Korent-----	0-7	Loam-----	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	7-60	Loam, silt loam, sandy clay loam.	CL	A-6	0	100	100	80-95	50-75	25-35	10-15
118*: Straw-----	0-7	Loam-----	CL	A-6	0	100	100	85-95	60-75	25-30	10-15
	7-21	Silt loam-----	ML	A-4	0	100	100	90-100	70-90	35-40	5-10
	21-60	Stratified silty clay to loamy sand.	SM	A-2, A-4	0	100	100	65-90	25-50	---	NP
Nesda-----	0-11	Loam-----	ML, SM	A-4	0-5	90-100	85-100	65-85	35-50	---	NP
	11-60	Very gravelly sand, very cobbly sand, very gravelly loamy sand.	GP	A-1	15-75	20-40	10-20	5-15	0-5	---	NP
119----- Telstad	0-7	Loam-----	CL-ML, ML	A-4	0-10	95-100	90-100	80-95	55-75	25-35	5-10
	7-18	Clay loam, loam	CL, ML	A-6, A-7	0-10	95-100	90-100	90-100	70-80	35-45	10-20
	18-60	Clay loam-----	CL, ML	A-6, A-7	0-10	95-100	90-100	90-100	70-80	35-45	10-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
120*, 121*: Telstad-----	0-7	Loam-----	CL-ML, ML	A-4	0-10	95-100	90-100	80-95	55-75	25-35	5-10
	7-18	Clay loam, loam	CL, ML	A-6, A-7	0-10	95-100	90-100	90-100	70-80	35-45	10-20
	18-60	Clay loam-----	CL, ML	A-6, A-7	0-10	95-100	90-100	90-100	70-80	35-45	10-20
Joplin-----	0-6	Loam-----	CL-ML, ML	A-4	0-5	95-100	95-100	85-90	60-75	25-35	5-10
	6-31	Loam, clay loam, gravelly loam.	CL-ML, CL, GM-GC, GC	A-4, A-6, A-2	0-5	55-95	50-95	45-90	30-75	25-40	5-15
	31-60	Loam, clay loam, gravelly loam.	CL-ML, CL, GM-GC, GC	A-4, A-6, A-2	0-5	55-95	50-95	45-90	30-75	25-40	5-15
122*: Telstad-----	0-7	Gravelly loam---	GM, GM-GC ML, CL-ML	A-2, A-4	0-10	55-80	50-70	40-65	25-55	25-35	5-10
	7-60	Clay loam, loam	CL, ML	A-6, A-7	0-10	95-100	90-100	90-100	70-80	35-45	10-20
Joplin-----	0-6	Gravelly loam---	CL-ML, ML, GM-GC, GM	A-4, A-2	0-5	55-85	50-75	45-70	30-55	25-35	5-10
	6-31	Loam, clay loam, gravelly loam.	CL-ML, CL, GM-GC, GC	A-4, A-6, A-2	0-5	55-95	50-95	45-90	30-75	25-40	5-15
	31-60	Loam, clay loam, gravelly loam.	CL-ML, CL, GM-GC, GC	A-4, A-6, A-2	0-5	55-95	50-95	45-90	30-75	25-40	5-15
123*: Thoeny-----	0-6	Loam-----	CL	A-6	0-5	95-100	85-95	85-95	65-75	25-35	10-15
	6-12	Clay, clay loam	CL, CH	A-6, A-7	0-5	95-100	85-95	85-95	75-95	35-55	15-30
	12-17	Clay loam, clay	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
	17-52	Clay loam, clay	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
	52-60	Clay loam-----	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
Elloam-----	0-3	Clay loam-----	CL	A-6	0-5	95-100	75-100	70-100	55-80	30-40	10-15
	3-17	Clay loam, clay	CL	A-6, A-7	0-5	95-100	75-100	70-100	55-95	35-45	15-25
	17-28	Clay loam, loam	CL, SC	A-6, A-7	0-5	95-100	75-100	65-100	45-80	30-45	10-20
	28-62	Clay loam, loam	CL, SM, SC, ML	A-7	0-5	95-100	75-100	65-100	45-80	40-50	15-20
124*: Thoeny-----	0-6	Loam-----	CL	A-6	0-5	95-100	85-95	85-95	65-75	25-35	10-15
	6-12	Clay, clay loam	CL, CH	A-6, A-7	0-5	95-100	85-95	85-95	75-95	35-55	15-30
	12-17	Clay loam, clay	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
	17-52	Clay loam, clay	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
	52-60	Clay loam-----	CL	A-6, A-7	0-5	95-100	85-95	85-95	70-80	30-45	15-25
Kevin-----	0-3	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	3-30	Clay loam-----	CL	A-6	0-5	90-100	85-100	80-95	70-80	25-40	10-20
	30-60	Clay loam-----	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-80	30-45	10-20
Elloam-----	0-3	Clay loam-----	CL	A-6	0-5	95-100	75-100	70-100	55-80	30-40	10-15
	3-17	Clay loam, clay	CL	A-6, A-7	0-5	95-100	75-100	70-100	55-95	35-45	15-25
	17-28	Clay loam, loam	CL, SC	A-6, A-7	0-5	95-100	75-100	65-100	45-80	30-45	10-20
	28-62	Clay loam, loam	CL, SM, SC, ML	A-7	0-5	95-100	75-100	65-100	45-80	40-50	15-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
125----- Turner	0-7	Loam-----	CL-ML, ML	A-4	0-5	90-100	85-100	80-90	55-75	25-35	5-10
	7-26	Clay loam, sandy clay loam, gravelly loam.	CL	A-6	0-5	70-100	60-100	55-90	50-80	30-40	10-20
	26-30	Gravelly loamy sand.	GM, SM	A-1	10-20	55-75	50-65	25-35	10-20	---	NP
	30-60	Very gravelly loamy sand, very gravelly sand.	GP, GP-GM	A-1	5-20	35-50	25-50	15-35	0-10	---	NP
126*: Turner-----	0-7	Loam-----	CL-ML, ML	A-4	0-5	90-100	85-100	80-90	55-75	25-35	5-10
	7-26	Clay loam, sandy clay loam, gravelly loam.	CL	A-6	0-5	70-100	60-100	55-90	50-80	30-40	10-20
	26-30	Gravelly loamy sand.	GM, SM	A-1	10-20	55-75	50-65	25-35	10-20	---	NP
	30-60	Very gravelly loamy sand, very gravelly sand.	GP, GP-GM	A-1	5-20	35-50	25-50	15-35	0-10	---	NP
Beaverton-----	0-7	Gravelly loam---	GM-GC, GC, SC	A-2, A-4, A-6	0-10	60-75	50-60	45-60	30-50	20-40	5-15
	7-20	Very gravelly clay loam, gravelly clay loam.	GC, GP-GC	A-2, A-6	0-20	30-70	20-60	15-60	10-50	25-35	10-15
	20-60	Very gravelly loamy sand, very gravelly sand.	GP-GM, GP, GW, SP	A-1	0-20	30-55	20-35	10-25	0-10	---	NP
127*, 128*: Twilight-----	0-35	Fine sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	35-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Riedel-----	0-5	Fine sandy loam	SM, ML	A-4	0	95-100	85-100	60-85	35-55	20-30	NP-5
	5-24	Fine sandy loam, sandy loam, channery sandy loam.	SM, ML	A-2, A-4	0	80-100	60-90	40-85	25-55	20-30	NP-5
	24-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
129. Typic Fluvaquents											
130. Typic Ustifluents											
131. Ustic Torrifluents											
132----- Vanda	0-6	Clay-----	CL, CH	A-7	0	100	100	90-100	75-95	45-60	30-40
	6-60	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	80-95	45-60	30-40
133*, 134*: Vanda-----	0-6	Clay-----	CL, CH	A-7	0	100	100	90-100	75-95	45-60	30-40
	6-60	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	80-95	45-60	30-40
Nobe-----	0-3	Clay-----	CL, CH	A-7	0	100	100	90-100	80-95	45-55	25-35
	3-60	Silty clay, clay	CL, CH	A-7	0	100	100	95-100	90-95	40-55	20-35

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
135----- Vida	0-4	Clay loam-----	CL	A-4, A-6	0-15	90-100	90-100	85-95	70-80	20-40	10-20
	4-34	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
	34-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
136*: Vida-----	0-4	Clay loam-----	CL	A-4, A-6	0-15	90-100	90-100	85-95	70-80	20-40	10-20
	4-34	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
	34-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
Zahill-----	0-3	Clay loam-----	CL	A-6	0-10	90-100	90-100	85-95	70-80	20-40	10-20
	3-36	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	90-100	85-95	70-80	25-40	5-20
	36-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	90-100	85-95	70-80	25-40	5-20
137----- Wabek	0-8	Gravelly loam---	SM	A-4	0	70-80	60-70	40-50	35-45	25-40	NP-10
	8-60	Very gravelly coarse sand, very gravelly loamy coarse sand, sand.	SP GP	A-1	0	40-60	35-50	10-40	0-5	---	NP
138*: Warneke-----	0-4	Gravelly loam---	GM, ML, SM	A-4	0-15	65-85	55-75	45-70	35-55	25-35	NP-10
	4-15	Very gravelly loam, very channery loam.	GM	A-1, A-2, A-4	0-15	40-60	30-50	25-45	20-40	25-35	NP-10
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Whitecow-----	0-3	Gravelly loam---	GM, ML, SM	A-4	0-15	65-85	55-75	45-70	35-55	25-35	NP-10
	3-20	Gravelly loam, very gravelly loam.	GM, ML	A-2, A-4, A-1	0-15	40-85	30-75	25-70	20-55	25-35	NP-10
	20-60	Very gravelly loam.	GM	A-1	0-15	25-35	15-25	15-25	10-20	25-35	NP-10
Rock outcrop.											
139*: Whitecow-----	0-3	Gravelly loam---	GM, ML, SM	A-4	0-15	65-85	55-75	45-70	35-55	25-35	NP-10
	3-20	Gravelly loam, very gravelly loam.	GM, ML	A-2, A-4, A-1	0-15	40-85	30-75	25-70	20-55	25-35	NP-10
	20-60	Very gravelly loam.	GM	A-1	0-15	25-35	15-25	15-25	10-20	25-35	NP-10
Warneke-----	0-4	Gravelly loam---	GM, ML, SM	A-4	0-15	65-85	55-75	45-70	35-55	25-35	NP-10
	4-15	Very gravelly loam, very channery loam.	GM	A-1, A-2, A-4	0-15	40-60	30-50	25-45	20-40	25-35	NP-10
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
140*: Whitecow-----	0-3	Gravelly loam---	GM, ML, SM	A-4	0-15	65-85	55-75	45-70	35-55	25-35	NP-10
	3-20	Gravelly loam, very gravelly loam.	GM, ML	A-2, A-4, A-1	0-15	40-85	30-75	25-70	20-55	25-35	NP-10
	20-60	Very gravelly loam.	GM	A-1	0-15	25-35	15-25	15-25	10-20	25-35	NP-10

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
140*: Whitecow-----	0-3	Gravelly loam---	GM, ML, SM	A-4	0-15	65-85	55-75	45-70	35-55	25-35	NP-10
	3-20	Gravelly loam, very gravelly loam.	GM, ML	A-2, A-4, A-1	0-15	40-85	30-75	25-70	20-55	25-35	NP-10
	20-60	Very gravelly loam.	GM	A-1	0-15	25-35	15-25	15-25	10-20	25-35	NP-10
141----- Williams	0-6	Loam-----	CL-ML, CL	A-4, A-6, A-7	0-5	95-100	95-100	85-95	60-90	25-45	5-20
	6-20	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	60-80	30-50	10-30
	20-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	60-80	30-50	10-30
142*, 143*: Williams-----	0-6	Loam-----	CL-ML, CL	A-4, A-6, A-7	0-5	95-100	95-100	85-95	60-90	25-45	5-20
	6-20	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	60-80	30-50	10-30
	20-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	60-80	30-50	10-30
Vida-----	0-4	Loam-----	CL-ML	A-4	0-15	90-100	85-95	80-90	60-75	20-30	5-10
	4-34	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
	34-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
144----- Windham	0-6	Cobbly loam----	CL-ML, CL, SC, SM-SC	A-4, A-6	15-30	80-95	70-85	60-80	45-70	25-35	5-15
	6-60	Very gravelly clay loam, very gravelly loam.	GM-GC, GC	A-2, A-4, A-6	0-15	35-70	25-60	20-55	15-50	25-35	5-15
145, 146----- Work	0-6	Clay loam-----	CL	A-6	0-10	90-100	90-100	90-100	70-80	30-40	10-20
	6-13	Clay, clay loam	CL, CH	A-7	0-10	90-100	90-100	90-100	75-90	40-55	20-30
	13-29	Clay loam, loam	CL, CL-ML	A-6, A-4	0-10	90-100	90-100	85-95	60-75	25-35	5-15
	29-60	Gravelly clay loam, gravelly loam, clay loam.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-10	60-90	50-85	45-80	35-70	25-40	5-20
147----- Yamac	0-4	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
	4-11	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
	11-60	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
148*: Yamac-----	0-4	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
	4-11	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
	11-60	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
Benz-----	0-13	Loam-----	ML	A-4	0	100	100	85-100	60-90	25-40	NP-10
	13-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	65-80	25-40	5-20
149*: Yamac-----	0-4	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
	4-11	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
	11-60	Loam-----	ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-40	NP-15
Wabek-----	0-8	Gravelly loam---	SM	A-4	0	70-80	60-700	40-50	35-45	25-40	NP-10
	8-60	Very gravelly coarse sand, very gravelly loamy coarse sand.	SP GP	A-1	0	40-60	35-50	10-40	0-5	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
150----- Zahill	0-3	Clay loam-----	CL	A-6	0-10	90-100	90-100	85-95	70-80	20-40	10-20
	3-36	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	90-100	85-95	70-80	25-40	5-20
	36-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	90-100	85-95	70-80	25-40	5-20
151*: Zahill-----	0-3	Clay loam-----	CL	A-6	0-10	90-100	90-100	85-95	70-80	20-40	10-20
	3-36	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	90-100	85-95	70-80	25-40	5-20
	36-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-10	90-100	90-100	85-95	70-80	25-40	5-20
Vida-----	0-4	Clay loam-----	CL	A-4, A-6	0-15	90-100	90-100	85-95	70-80	20-40	8-20
	4-22	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20
	22-60	Clay loam, loam	CL, CL-ML	A-4, A-6	0-15	90-100	90-100	85-95	70-80	25-40	5-20

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

TABLE 12.--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" 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	Permeability		Available water capacity		Reaction pH	Salinity Mmos/cm	Shrink-swell potential	Erosion factors		Wind erodibility group
		In/hr	In/in	In/in	In/in				K	T	
1*: Absher-----	0-3 7-20 20-60	<0.06 <0.06 <0.06	0.14-0.18 0.12-0.16 0.12-0.16	6.6-8.4 >7.3 >7.8	4-8 4-16 >8	High----- High----- High-----	0.49 0.49 0.49	5	7		
Nobe-----	0-7 7-60	<0.06 <0.06	0.07-0.09 0.07-0.09	6.6-8.4 7.9-9.0	4-8 16-25	High----- High-----	0.37 0.43	5	4		
2----- Assinniboine	0-9 9-21 21-60	2.0-6.0 0.6-2.0 2.0-6.0	0.10-0.14 0.12-0.16 0.10-0.14	6.6-7.3 7.4-7.8 7.9-8.4	<2 <2 <2	Low----- Low----- Low-----	0.24 0.32 0.32	5	3		
3----- Attewan	0-6 6-20 20-25 25-60	0.6-2.0 0.6-2.0 0.6-2.0 >6.0	0.14-0.20 0.12-0.18 0.11-0.19 0.01-0.04	6.6-7.3 6.6-7.8 7.4-8.4 7.4-8.4	<2 <2 <2 <2	Low----- Moderate Low----- Low-----	0.37 0.32 0.37 0.10	3	5		
4*: Attewan-----	0-6 6-20 20-25 25-60	0.6-2.0 0.6-2.0 0.6-2.0 >6.0	0.14-0.20 0.12-0.18 0.11-0.19 0.01-0.04	6.6-7.3 6.6-7.8 7.4-8.4 7.4-8.4	<2 <2 <2 <2	Low----- Moderate Low----- Low-----	0.37 0.32 0.37 0.10	3	5		
Beaverell-----	0-3 3-11 11-17 17-60	0.6-2.0 0.6-2.0 0.6-2.0 >6.0	0.11-0.14 0.07-0.11 0.05-0.10 0.02-0.06	6.6-7.8 6.6-7.8 7.4-7.8 7.4-7.8	<2 <2 <2 <2	Low----- Low----- Low----- Low-----	0.32 0.32 0.17 0.10	2	5		
5*: Attewan-----	0-6 6-20 20-25 25-60	0.6-2.0 0.6-2.0 0.6-2.0 >6.0	0.14-0.20 0.12-0.18 0.11-0.19 0.01-0.04	6.6-7.3 6.6-7.8 7.4-8.4 7.4-8.4	<2 <2 <2 <2	Low----- Moderate Low----- Low-----	0.37 0.32 0.37 0.10	3	5		
Wabek-----	0-8 8-60	2.0-6.0 >20	0.20-0.22 0.02-0.04	6.6-7.3 7.4-7.8	<2 <2	Low----- Low-----	0.28 0.10	2	5		
6. Badland											
7----- Barkof	0-7 7-28 28-60	0.06-0.2 0.06-0.2 ---	0.12-0.18 0.12-0.18 ---	7.4-8.4 7.9-9.0 ---	<2 2-4 ---	High----- High----- ---	0.37 0.32 ---	2	4		
8*: Barkof-----	0-7 7-28 28-60	0.06-0.2 0.06-0.2 ---	0.12-0.18 0.12-0.18 ---	7.4-8.4 7.9-9.0 ---	<2 2-4 ---	High----- High----- ---	0.37 0.32 ---	2	4		
Norbert-----	0-10 10-14 14	<0.06 <0.06 ---	0.12-0.16 0.12-0.16 ---	7.4-8.4 7.4-8.4 ---	<4 2-4 ---	High----- High----- ---	0.37 0.32 ---	1	4		
9*: Barkof-----	0-7 7-28 28-60	0.06-0.2 0.06-0.2 ---	0.12-0.18 0.12-0.18 ---	7.4-8.4 7.9-9.0 ---	<2 2-4 ---	High----- High----- ---	0.37 0.32 ---	2	4		
Norbert-----	0-7 7-14 14	<0.06 <0.06 ---	0.12-0.16 0.12-0.16 ---	7.4-8.4 7.4-8.4 ---	<4 2-4 ---	High----- High----- ---	0.37 0.32 ---	1	4		

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability		Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
		In	In/hr					K	T	
	In	In/hr	In/in	pH	Mmhos/cm					
10*: Barkof-----	0-7	<.06-0.2	0.12-0.18	7.4-8.4	<2	High-----	0.37	2	4	
	7-28	<.06-0.2	0.12-0.18	7.9-9.0	2-4	High-----	0.32			
	28-60	---	---	---	---	-----	---			
Windham-----	0-6	0.6-2.0	0.11-0.16	7.4-8.4	<4	Low-----	0.32	2	5	
	6-60	0.6-2.0	0.05-0.09	7.9-8.4	<4	Low-----	0.20			
11----- Bascovy	0-6	<0.06	0.11-0.17	6.6-8.4	2-4	High-----	0.37	2	4	
	6-10	<0.06	0.11-0.17	6.1-7.8	2-4	High-----	0.37			
	10-15	<0.06	0.11-0.17	6.1-7.8	2-4	High-----	0.37			
	15-23	<0.06	0.11-0.17	5.1-7.3	2-8	High-----	0.37			
	23	---	---	---	---	-----	---			
12*: Bascovy-----	0-6	<0.06	0.11-0.17	6.6-8.4	2-4	High-----	0.37	2	4	
	6-10	<0.06	0.11-0.17	6.1-7.8	2-4	High-----	0.37			
	10-15	<0.06	0.11-0.17	6.1-7.8	2-4	High-----	0.37			
	15-23	<0.06	0.11-0.17	5.1-7.3	2-8	High-----	0.37			
	23	---	---	---	---	-----	---			
Lisam-----	0-17	0.06-0.2	0.14-0.18	6.6-8.4	2-4	High-----	0.32	1	4	
	17-60	---	---	---	---	-----	---			
Dilts-----	0-16	0.06-0.2	0.15-0.18	4.5-7.3	<2	High-----	0.32	1	4	
	16-60	---	---	---	---	-----	---			
13----- Bearpaw	0-6	0.2-0.6	0.15-0.18	6.1-7.8	<2	Moderate	0.37	5	6	
	6-23	0.2-0.6	0.15-0.18	6.6-8.4	<2	High-----	0.43			
	23-39	0.2-0.6	0.15-0.18	7.4-8.4	2-4	Moderate	0.43			
	39-60	0.06-0.2	0.15-0.18	7.4-9.0	2-8	Moderate	0.49			
14*, 15*: Bearpaw-----	0-6	0.2-0.6	0.15-0.18	6.1-7.8	<2	Moderate	0.37	5	6	
	6-23	0.2-0.6	0.15-0.18	6.6-8.4	<2	High-----	0.43			
	23-39	0.2-0.6	0.15-0.18	7.4-8.4	2-4	Moderate	0.43			
	39-60	0.06-0.2	0.15-0.18	7.4-9.0	2-8	Moderate	0.49			
Elloam-----	0-3	0.6-2.0	0.12-0.18	6.1-7.8	<2	Moderate	0.32	5	6	
	3-17	0.06-0.2	0.10-0.12	6.6-8.4	2-8	High-----	0.28			
	17-28	0.06-0.2	0.10-0.12	7.9-9.0	>4	Moderate	0.28			
	28-62	<0.06	0.08-0.12	>7.8	>4	Moderate	0.28			
16*, 17*: Bearpaw-----	0-6	0.2-0.6	0.15-0.18	6.1-7.8	<2	Moderate	0.37	5	6	
	6-23	0.2-0.6	0.15-0.18	6.6-8.4	<2	High-----	0.43			
	23-39	0.2-0.6	0.15-0.18	7.4-8.4	2-4	Moderate	0.43			
	39-60	0.06-0.2	0.15-0.18	7.4-9.0	2-8	Moderate	0.49			
Vida-----	0-4	0.6-2.0	0.12-0.20	6.6-7.8	<2	Moderate	0.32	5	6	
	4-34	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.37			
	34-60	0.06-0.2	0.12-0.20	8.4-9.0	<2	Moderate	0.37			
18----- Belain	0-4	0.6-2.0	0.14-0.20	6.1-7.8	<2	Low-----	0.37	2	5	
	4-11	0.6-2.0	0.10-0.20	6.6-8.4	<2	Low-----	0.20			
	11-22	0.6-2.0	0.08-0.15	6.6-8.4	<2	Low-----	0.20			
	22-28	2.0-6.0	0.06-0.09	7.4-8.4	<2	Low-----	0.15			
	28	---	---	---	---	-----	---			
19----- Benz	0-13	0.6-2.0	0.14-0.18	6.6-9.0	4-8	Low-----	0.37	5	6	
	13-60	0.06-0.2	0.10-0.18	>8.5	8-16	Moderate	0.37			
20----- Bowdoin	0-6	<0.06	0.10-0.13	7.9-8.4	8-16	High-----	0.37	5	4	
	6-60	<0.06	0.10-0.13	>7.9	8-16	High-----	0.37			
21----- Cabba	0-12	0.6-2.0	0.15-0.22	7.4-8.4	<4	Moderate	0.37	4	6	
	12	---	---	---	---	-----	---			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
22*: Cabba-----	0-12 12	0.6-2.0 ---	0.15-0.22 ---	6.6-7.8 ---	<4 ---	Moderate -----	0.37 ---	2	6
Rock outcrop.									
23*: Cabba-----	0-12 12	0.6-2.0 ---	0.15-0.22 ---	6.6-7.8 ---	<4 ---	Moderate -----	0.37 ---	2	6
Windham-----	0-6 6-60	0.6-2.0 0.6-2.0	0.11-0.16 0.05-0.09	7.4-8.4 7.9-8.4	<4 <4	Low----- Low-----	0.32 0.20	2	5
24*: Cabba-----	0-12 12	0.6-2.0 ---	0.15-0.22 ---	6.6-7.8 ---	<4 ---	Moderate -----	0.37 ---	2	6
Zahill-----	0-3 3-60	0.6-2.0 0.2-0.6	0.12-0.20 0.12-0.20	7.4-8.4 7.4-8.4	<2 <2	Moderate Moderate	0.32 0.37	5	6
25*: Cabbart-----	0-4 4-12 12	0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.18 ---	7.4-8.4 7.4-8.4 ---	2-4 2-8 ---	Low----- Moderate -----	0.37 0.37 ---	2	5
Delpoint-----	0-4 4-16 16-32 32	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.20 0.12-0.20 ---	6.6-7.8 6.6-8.4 6.6-8.4 ---	<4 <4 <4 ---	Low----- Moderate Moderate -----	0.37 0.37 0.37 ---	3	5
26*: Cabbart-----	0-4 4-12 12	0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.18 ---	7.4-8.4 7.4-8.4 ---	2-4 2-8 ---	Low----- Moderate -----	0.37 0.37 ---	2	5
Hillon-----	0-4 4-60	0.6-2.0 0.06-0.2	0.15-0.18 0.15-0.18	6.6-8.4 7.4-9.0	<2 <2	Moderate Moderate	0.32 0.32	5	6
27*: Cabbart-----	0-4 4-12 12	0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.18 ---	7.4-8.4 7.4-8.4 ---	2-4 2-8 ---	Low----- Moderate -----	0.37 0.37 ---	2	5
Rock outcrop.									
28*: Cabbart-----	0-4 4-12 12	0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.18 ---	7.4-8.4 7.4-8.4 ---	2-4 2-8 ---	Low----- Moderate -----	0.37 0.37 ---	2	5
Yamac-----	0-4 4-60	0.6-2.0 0.6-2.0	0.14-0.20 0.14-0.20	6.6-7.8 7.4-8.4	<2 <2	Low----- Low-----	0.37 0.37	5	5
Rock outcrop.									
29----- Castner	0-6 6-13 13	0.6-2.0 0.6-2.0 ---	0.08-0.12 0.04-0.09 ---	6.6-7.8 6.6-8.4 ---	<2 <2 ---	Low----- Low----- -----	0.24 0.24 ---	1	5
30*: Castner-----	0-6 6-13 13	0.6-2.0 0.6-2.0 ---	0.08-0.12 0.04-0.09 ---	6.6-7.8 6.6-8.4 ---	<2 <2 ---	Low----- Low----- -----	0.24 0.24 ---	1	5
Perma-----	0-5 5-60	0.6-2.0 0.6-2.0	0.08-0.15 0.03-0.08	6.1-7.3 7.4-8.4	<2 <2	Low----- Low-----	0.32 0.15	2	5

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
30*: Rock outcrop.									
31, 32----- Chinook	0-6 6-54 54-60	2.0-6.0 2.0-6.0 2.0-6.0	0.10-0.15 0.10-0.15 0.06-0.12	6.6-7.8 6.6-8.4 7.4-8.4	<2 <2 <2	Low----- Low----- Low-----	0.20 0.20 0.20	5	3
33*: Chinook-----	0-6 6-54 54-60	2.0-6.0 2.0-6.0 2.0-6.0	0.10-0.15 0.10-0.15 0.06-0.12	6.6-7.8 6.6-8.4 7.4-8.4	<2 <2 <2	Low----- Low----- Low-----	0.20 0.20 0.20	5	3
Phillips-----	0-7 7-15 15-36 36-78	0.6-2.0 0.06-0.2 0.06-0.2 0.06-0.2	0.14-0.20 0.12-0.14 0.12-0.16 0.10-0.14	6.1-7.3 6.6-8.4 7.4-8.4 7.4-8.4	<2 <2 <2 4-8	Low----- Moderate Moderate Moderate	0.43 0.37 0.43 0.43	5	5
34----- Cozberg	0-7 7-26 26-60	2.0-6.0 2.0-6.0 6.0-20	0.12-0.16 0.12-0.16 0.06-0.10	6.6-7.8 6.6-7.8 7.4-8.4	<2 <2 <2	Low----- Low----- Low-----	0.20 0.20 0.20	5	3
35----- Creed	0-6 6-12 12-28 28-60	0.6-2.0 0.06-0.2 0.06-0.2 0.06-0.2	0.14-0.18 0.12-0.18 0.14-0.18 0.14-0.18	6.6-7.8 6.6-8.4 7.9-9.0 7.9-9.0	<4 4-8 4-16 4-16	Low----- High----- Moderate Moderate	0.37 0.28 0.32 0.32	5	5
36*: Creed-----	0-6 6-12 12-28 28-60	0.6-2.0 0.06-0.2 0.06-0.2 0.06-0.2	0.14-0.18 0.12-0.18 0.14-0.18 0.14-0.18	6.6-7.8 6.6-8.4 7.9-9.0 7.9-9.0	<4 4-8 4-16 4-16	Low----- High----- Moderate Moderate	0.37 0.28 0.32 0.32	5	5
Gerdrum-----	0-7 7-22 22-46 46-68	0.2-0.6 0.06-0.2 0.06-0.2 0.6-2.0	0.12-0.18 0.12-0.19 0.10-0.16 0.10-0.16	6.6-7.8 7.4-9.0 7.9-9.0 7.9-9.0	<2 2-8 >8 >8	Moderate High----- Moderate Low-----	0.37 0.32 0.32 0.28	5	4
37----- Delpoint	0-4 4-16 16-32 32	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.20 0.12-0.20 ---	6.6-7.8 6.6-8.4 6.6-8.4 ---	<4 <4 <4 ---	Low----- Moderate Moderate ---	0.37 0.37 0.37 ---	3	5
38*: Delpoint-----	0-4 4-16 16-32 32	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.20 0.12-0.20 ---	6.6-7.8 6.6-8.4 6.6-8.4 ---	<4 <4 <4 ---	Low----- Moderate Moderate ---	0.37 0.37 0.37 ---	3	5
Cabbart-----	0-4 4-12 12	0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.18 ---	7.4-8.4 7.4-8.4 ---	2-4 2-8 ---	Low----- Moderate ---	0.37 0.37 ---	2	5
39----- Dimmick	0-60	<0.06	0.13-0.18	6.6-7.8	<2	High-----	0.28	5	4
40----- Elloam	0-7 7-17 17-28 28-62	0.6-2.0 0.06-0.2 0.06-0.2 <0.06	0.12-0.18 0.10-0.12 0.10-0.12 0.08-0.12	6.1-7.8 6.6-8.4 7.9-9.0 >7.8	<2 2-8 >4 >4	Moderate High----- Moderate Moderate	0.32 0.28 0.28 0.28	5	6
41----- Ethridge	0-6 6-28 28-60	0.2-0.6 0.06-0.2 0.06-0.2	0.16-0.20 0.12-0.16 0.16-0.20	6.6-7.8 6.6-7.8 7.9-9.0	<2 <2 2-4	Moderate High----- Moderate	0.32 0.37 0.37	5	7

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
42*: Ethrige-----	0-6	0.2-0.6	0.16-0.20	6.6-7.8	<2	Moderate	0.32	5	7
	6-28	0.06-0.2	0.12-0.16	6.6-7.8	<2	High-----	0.37		
	28-60	0.06-0.2	0.16-0.20	7.9-9.0	2-4	Moderate	0.37		
Gerdrum-----	0-7	0.2-0.6	0.12-0.18	6.6-7.8	<2	Moderate	0.37	5	4
	7-22	0.06-0.2	0.12-0.19	7.4-9.0	2-8	High-----	0.32		
	22-46	0.06-0.2	0.10-0.16	7.9-9.0	>8	Moderate	0.32		
	46-68	0.6-2.0	0.10-0.16	7.9-9.0	>8	Low-----	0.28		
43, 44, 45----- Farnuf	0-5	0.6-2.0	0.15-0.20	6.1-7.8	<2	Low-----	0.32	5	6
	5-24	0.6-2.0	0.14-0.20	6.1-7.8	<2	Moderate	0.32		
	24-60	0.6-2.0	0.14-0.20	7.4-8.4	<2	Moderate	0.32		
46----- Gerdrum	0-7	0.2-0.6	0.12-0.18	6.6-7.8	<2	Moderate	0.37	5	4
	7-22	0.06-0.2	0.12-0.19	7.4-9.0	2-8	High-----	0.32		
	22-46	0.06-0.2	0.10-0.16	7.9-9.0	>8	Moderate	0.32		
	46-68	0.6-2.0	0.10-0.16	7.9-9.0	>8	Low-----	0.28		
47----- Glendive	0-24	0.6-2.0	0.12-0.18	6.6-8.4	<4	Low-----	0.20	5	3
	24-60	0.6-2.0	0.10-0.16	7.4-9.0	2-8	Low-----	0.20		
48----- Hanly	0-3	6.0-20	0.08-0.12	6.6-7.8	<2	Low-----	0.17	5	2
	3-60	6.0-20	0.05-0.14	6.6-7.8	<2	Low-----	0.17		
49----- Harlem	0-10	0.06-0.2	0.12-0.18	7.4-8.4	<4	Moderate	0.37	5	6
	10-46	0.06-0.2	0.14-0.18	7.4-8.4	<4	High-----	0.37		
	46-68	0.06-0.2	0.16-0.20	7.9-9.0	<8	Low-----	0.37		
50----- Harlem	0-10	0.06-0.2	0.14-0.18	7.4-8.4	<4	Moderate	0.37	5	7
	10-46	0.06-0.2	0.14-0.18	7.4-8.4	<4	High-----	0.37		
	46-60	0.06-0.2	0.16-0.20	7.9-9.0	<8	Low-----	0.37		
51----- Harlem	0-10	0.06-0.2	0.12-0.18	7.4-8.4	4-8	Moderate	0.37	5	4
	10-46	0.06-0.2	0.10-0.15	7.4-9.0	8-16	High-----	0.37		
	46-60	0.06-0.2	0.07-0.09	>7.9	8-16	Moderate	0.37		
52----- Harlem	0-10	0.06-0.2	0.14-0.18	7.4-8.4	<4	High-----	0.32	5	4
	10-46	0.06-0.2	0.14-0.18	7.4-8.4	<4	High-----	0.37		
	46-60	0.06-0.2	0.16-0.20	7.9-9.0	<8	Low-----	0.37		
53----- Harlem	0-6	0.06-0.2	0.10-0.16	7.4-8.4	4-8	High-----	0.32	5	4
	6-46	0.06-0.2	0.10-0.15	7.4-9.0	8-16	High-----	0.37		
	46-60	0.06-0.2	0.07-0.09	>7.9	8-16	Moderate	0.37		
54*: Harlem Variant--	0-7	0.06-0.2	0.11-0.17	7.9-9.0	>8	Moderate	0.37	5	7
	7-28	0.06-0.2	0.10-0.17	7.9-9.0	>8	High-----	0.28		
	28-44	0.06-0.2	0.10-0.17	7.9-9.0	>8	High-----	0.28		
	44-60	0.06-0.2	0.10-0.17	7.9-9.0	>8	Moderate	0.28		
Lardell-----	0-8	0.2-0.6	0.07-0.09	7.9-9.0	>16	High-----	0.37	5	4
	8-29	0.2-0.6	0.07-0.09	7.9-9.0	>16	Moderate	0.37		
	29-60	0.06-0.2	0.07-0.09	>7.9	>16	Moderate	0.37		
55----- Havre	0-8	0.6-2.0	0.16-0.22	7.4-8.4	<4	Low-----	0.37	5	5
	8-60	0.6-2.0	0.14-0.20	7.4-8.4	<8	Low-----	0.28		
56----- Havre	0-8	0.2-2.0	0.10-0.14	7.4-9.0	4-16	Low-----	0.28	5	7
	8-60	0.6-2.0	0.10-0.14	7.4-9.0	4-16	Low-----	0.28		
57----- Havre	0-8	0.2-0.6	0.14-0.18	7.4-8.4	<4	Moderate	0.37	5	7
	8-60	0.6-2.0	0.14-0.20	7.4-8.4	<8	Low-----	0.28		
58----- Havre	0-10	0.2-0.6	0.10-0.14	7.4-9.0	4-16	Moderate	0.37	5	5
	10-60	0.6-2.0	0.10-0.14	7.4-9.0	4-16	Low-----	0.28		

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
59*:									
Havre-----	0-8	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-----	0.37	5	5
	8-60	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low-----	0.28		
Hanly-----	0-3	6.0-20	0.08-0.12	6.6-7.8	<2	Low-----	0.17	5	2
	3-60	6.0-20	0.05-0.14	6.6-7.8	<2	Low-----	0.17		
Glendive-----	0-7	0.6-2.0	0.12-0.18	6.6-8.4	<4	Low-----	0.20	5	3
	7-60	0.6-2.0	0.14-0.16	7.4-9.0	2-8	Low-----	0.20		
60*:									
Havre Variant---	0-7	0.2-0.6	0.10-0.12	7.9-9.0	8-16	Moderate	0.32	5	7
	7-19	0.2-0.6	0.10-0.12	7.9-9.0	8-16	Moderate	0.32		
	19-60	0.2-0.6	0.09-0.12	7.9-9.0	8-16	Low-----	0.28		
Lardell-----	0-8	0.2-0.6	0.07-0.09	7.9-9.0	>16	High-----	0.37	5	4
	8-29	0.2-0.6	0.07-0.09	7.9-9.0	>16	Moderate	0.37		
	29-60	0.06-0.2	0.07-0.09	>7.9	>16	Moderate	0.37		
61, 62-----									
Hedoes-----	0-4	0.6-2.0	0.14-0.19	6.6-7.3	<2	Low-----	0.32	3	5
	4-17	0.6-2.0	0.10-0.20	6.6-8.4	<2	Low-----	0.28		
	17-34	2.0-6.0	0.06-0.16	7.4-8.4	<4	Low-----	0.15		
	34-60	2.0-6.0	0.04-0.06	7.4-8.4	<4	Low-----	0.15		
63*, 64*:									
Hedoes-----	0-4	0.6-2.0	0.14-0.19	6.6-7.3	<2	Low-----	0.32	3	5
	4-17	0.6-2.0	0.10-0.20	6.6-8.4	<2	Low-----	0.28		
	17-34	2.0-6.0	0.06-0.16	7.4-8.4	<4	Low-----	0.15		
	34-60	2.0-6.0	0.04-0.06	7.4-8.4	<4	Low-----	0.15		
Belain-----	0-4	0.6-2.0	0.14-0.20	6.1-7.8	<2	Low-----	0.37	2	5
	4-11	0.6-2.0	0.10-0.20	6.6-8.4	<2	Low-----	0.20		
	11-22	0.6-2.0	0.08-0.15	6.6-8.4	<2	Low-----	0.20		
	22-28	2.0-6.0	0.06-0.09	7.4-8.4	<2	Low-----	0.15		
	28	---	---	---	---	---	---		
65*:									
Hedoes-----	0-4	0.6-2.0	0.14-0.19	6.6-7.3	<2	Low-----	0.32	3	5
	4-17	0.6-2.0	0.10-0.20	6.6-8.4	<2	Low-----	0.28		
	17-34	2.0-6.0	0.06-0.16	7.4-8.4	<4	Low-----	0.15		
	34-60	2.0-6.0	0.04-0.06	7.4-8.4	<4	Low-----	0.15		
Belain-----	0-4	0.6-2.0	0.14-0.20	6.1-7.8	<2	Low-----	0.37	2	5
	4-11	0.6-2.0	0.10-0.20	6.6-8.4	<2	Low-----	0.20		
	11-22	0.6-2.0	0.08-0.15	6.6-8.4	<2	Low-----	0.20		
	22-28	2.0-6.0	0.06-0.09	7.4-8.4	<2	Low-----	0.15		
	28	---	---	---	---	---	---		
Castner-----	0-6	0.6-2.0	0.08-0.12	6.6-7.8	<2	Low-----	0.24	1	5
	6-13	0.6-2.0	0.04-0.09	6.6-8.4	<2	Low-----	0.24		
	13	---	---	---	---	---	---		
66*:									
Hedoes-----	0-4	0.6-2.0	0.14-0.19	6.6-7.3	<2	Low-----	0.32	3	5
	4-17	0.6-2.0	0.10-0.20	6.6-8.4	<2	Low-----	0.28		
	17-34	2.0-6.0	0.06-0.16	7.4-8.4	<4	Low-----	0.15		
	34-60	2.0-6.0	0.04-0.06	7.4-8.4	<4	Low-----	0.15		
Benz-----	0-13	0.6-2.0	0.14-0.18	6.6-9.0	4-8	Low-----	0.37	5	6
	13-60	0.06-0.2	0.10-0.18	>8.5	8-16	Moderate	0.37		
67-----									
Hillon-----	0-4	0.6-2.0	0.15-0.18	6.6-8.4	<2	Moderate	0.32	5	6
	4-60	0.06-0.2	0.15-0.18	7.4-9.0	<2	Moderate	0.32		
68*:									
Hillon-----	0-4	0.6-2.0	0.15-0.18	6.6-8.4	<2	Moderate	0.32	5	6
	4-60	0.06-0.2	0.15-0.18	7.4-9.0	<2	Moderate	0.32		

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
68*: Kevin-----	0-3	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6
	3-30	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.32		
	30-60	0.06-0.2	0.14-0.18	7.9-9.0	<2	Moderate	0.37		
69*: Hillon-----	0-4	0.6-2.0	0.15-0.18	6.6-8.4	<2	Moderate	0.32	5	6
	4-60	0.06-0.2	0.15-0.18	7.4-9.0	<2	Moderate	0.32		
Scobey-----	0-6	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.32	5	6
	6-19	0.2-0.6	0.12-0.16	6.6-7.8	<2	High-----	0.28		
	19-60	0.06-0.2	0.14-0.18	7.4-9.0	<2	Moderate	0.32		
70*, 71*: Judith-----	0-7	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-----	0.37	3	5
	7-33	0.6-2.0	0.12-0.18	7.9-9.0	<4	Moderate	0.37		
	33-60	0.6-2.0	0.08-0.10	7.9-9.0	<4	Low-----	0.28		
Windham-----	0-6	0.6-2.0	0.11-0.16	7.4-8.4	<4	Low-----	0.32	2	5
	6-60	0.6-2.0	0.05-0.09	7.9-8.4	<4	Low-----	0.20		
72----- Kevin	0-3	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6
	3-30	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.32		
	30-60	0.06-0.2	0.14-0.18	7.9-9.0	<2	Moderate	0.37		
73*: Kevin-----	0-3	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6
	3-30	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.32		
	30-60	0.06-0.2	0.14-0.18	7.9-9.0	<2	Moderate	0.37		
Elloam-----	0-3	0.6-2.0	0.12-0.18	6.1-7.8	<2	Moderate	0.32	5	6
	3-17	0.06-0.2	0.10-0.12	6.6-8.4	2-8	High-----	0.28		
	17-28	0.06-0.2	0.10-0.12	7.9-9.0	>4	Moderate	0.28		
	28-62	<0.06	0.08-0.12	>7.8	>4	Moderate	0.28		
74*: Kevin-----	0-3	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6
	3-30	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.32		
	30-60	0.06-0.2	0.14-0.18	7.9-9.0	<2	Moderate	0.37		
Hillon-----	0-4	0.6-2.0	0.15-0.18	6.6-8.4	<2	Moderate	0.32	5	6
	4-60	0.06-0.2	0.15-0.18	7.4-9.0	<2	Moderate	0.32		
75*: Korent-----	0-7	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low-----	0.37	5	5
	7-60	0.6-2.0	0.12-0.22	7.9-8.4	<2	Low-----	0.37		
Nesda-----	0-11	0.6-2.0	0.14-0.20	6.6-7.8	<2	Low-----	0.20	2	5
	11-60	>6.0	0.02-0.04	7.4-8.4	<2	Low-----	0.10		
76----- Lardell	0-8	0.2-0.6	0.07-0.09	7.9-9.0	>16	High-----	0.37	5	4
	8-29	0.2-0.6	0.07-0.09	7.9-9.0	>16	Moderate	0.37		
	29-60	0.06-0.2	0.07-0.09	>7.9	>16	Moderate	0.37		
77, 78----- Lihen	0-10	6.0-20	0.06-0.12	6.6-7.8	<2	Low-----	0.17	5	2
	10-30	6.0-20	0.06-0.12	6.6-7.8	<2	Low-----	0.17		
	30-60	6.0-20	0.08-0.14	7.4-8.4	<2	Low-----	0.17		
79*: Lisam-----	0-17	0.06-0.2	0.14-0.18	6.6-8.4	2-4	High-----	0.32	1	4
	17	---	---	---	---	---	---		
Dilts-----	0-7	0.06-0.2	0.15-0.18	5.6-7.3	<2	High-----	0.32	1	4
	7-16	0.06-0.2	0.09-0.12	4.5-5.0	<2	High-----	0.32		
	16	---	---	---	---	---	---		

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
80*: Lisam-----	0-17 17	<0.2 ---	0.14-0.18 ---	6.6-8.4 ---	2-4 ---	High----- -----	0.32 ---	1	4
Dilts-----	0-7 7-16 16	<0.2 <0.2 ---	0.15-0.18 0.09-0.12 ---	5.6-7.3 4.5-5.0 ---	<2 <2 ---	High----- High----- -----	0.32 0.32 ---	1	4
Rock outcrop.									
81*: Lisam-----	0-17 17	<0.2 ---	0.14-0.18 ---	6.6-8.4 ---	2-4 ---	High----- -----	0.32 ---	1	4
Hillon-----	0-4 4-60	0.6-2.0 0.06-0.2	0.15-0.18 0.15-0.18	6.6-8.4 7.4-9.0	<2 <2	Moderate Moderate	0.32 0.32	5	6
82*: Lisam-----	0-17 17	<0.2 ---	0.14-0.18 ---	6.6-8.4 ---	2-4 ---	High----- -----	0.32 ---	1	4
Wabek-----	0-8 8-60	2.0-6.0 >20	0.20-0.22 0.02-0.04	6.6-7.3 7.4-7.8	<2 <2	Low----- Low-----	0.28 0.10	2	5
83----- Lolo	0-6 6-22 22-60	2.0-6.0 2.0-6.0 2.0-6.0	0.10-0.18 0.10-0.14 0.06-0.08	6.6-7.3 6.6-7.3 6.6-8.4	<2 <2 <2	Low----- Low----- Low-----	0.24 0.24 0.20	3	5
84*: Macmeal----- (North aspect)	0-7 7-48 48-60	0.6-2.0 0.2-0.6 0.2-0.6	0.10-0.13 0.05-0.08 0.05-0.08	6.1-7.3 6.1-7.3 7.4-8.4	<2 <2 <2	Low----- Low----- Low-----	0.28 0.24 0.24	2	5
Macmeal----- (South aspect)	0-5 5-48 48-60	0.6-2.0 0.2-0.6 0.2-0.6	0.10-0.13 0.05-0.08 0.05-0.08	6.1-7.3 6.1-7.3 7.4-8.4	<2 <2 <2	Low----- Low----- Low-----	0.28 0.24 0.24	2	5
85*: Marmarth-----	0-6 6-30 30-60	0.6-2.0 0.6-2.0 ---	0.20-0.22 0.14-0.18 ---	6.1-7.3 6.6-8.4 ---	<2 <2 ---	Moderate Moderate -----	0.28 0.28 ---	3	6
Cabbart-----	0-4 4-12 12	0.6-2.0 0.6-2.0 ---	0.14-0.20 0.12-0.18 ---	7.4-8.4 7.4-8.4 ---	2-4 2-8 ---	Low----- Moderate -----	0.37 0.37 ---	2	5
86----- Martinsdale	0-7 7-54 54-60	0.6-2.0 0.2-0.6 0.2-0.6	0.17-0.20 0.17-0.18 0.14-0.18	6.6-7.8 6.6-8.4 7.4-9.0	<2 <2 2-8	Low----- Moderate Moderate	0.37 0.37 0.37	5	5
87*: Martinsdale-----	0-7 7-54 54-60	0.6-2.0 0.2-0.6 0.2-0.6	0.17-0.20 0.17-0.18 0.14-0.18	6.6-7.8 6.6-8.4 7.4-9.0	<2 <2 2-8	Low----- Moderate Moderate	0.37 0.37 0.37	5	5
Judith-----	0-5 5-33 33-60	0.6-2.0 0.6-2.0 0.6-2.0	0.16-0.20 0.12-0.18 0.08-0.10	7.4-8.4 7.9-9.0 7.9-9.0	<2 <4 <4	Low----- Moderate Low-----	0.37 0.37 0.28	3	5
88----- Marvan	0-7 7-60	0.06-0.2 <0.06	0.12-0.18 0.12-0.18	7.9-8.4 7.9-9.0	<4 2-8	High----- High-----	0.37 0.37	5	4
89*: Marvan-----	0-7 7-60	0.06-0.2 <0.06	0.12-0.18 0.12-0.18	7.9-8.4 7.9-9.0	<4 2-8	High----- High-----	0.37 0.37	5	4

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability		Available water capacity		Reaction		Salinity		Shrink-swell potential	Erosion factors		Wind erodibility group
		In	In/hr	In/in	pH	Mmhos/cm	K	T					
89*: Bascovy-----	0-6	<0.06	0.11-0.17	6.6-8.4	2-4	High-----	0.37	2	4				
	6-10	<0.06	0.11-0.17	6.1-7.8	2-4	High-----	0.37						
	10-15	<0.06	0.11-0.17	6.1-7.8	2-4	High-----	0.37						
	15-23	<0.06	0.11-0.17	5.1-7.3	2-8	High-----	0.37						
	23	---	---	---	---	---	---						
90----- Nishon	0-12	0.6-2.0	0.18-0.22	6.1-7.8	<2	Low-----	0.43	5	6				
	12-60	0.06-0.2	0.12-0.18	6.6-9.0	<2	High-----	0.32						
91----- Nishon	0-5	0.6-2.0	0.12-0.20	6.1-7.8	<2	Moderate	0.37	5	6				
	5-60	0.06-0.2	0.12-0.18	6.6-9.0	<2	High-----	0.32						
92----- Norbert	0-10	<0.06	0.12-0.16	7.4-8.4	<4	High-----	0.37	1	4				
	10-14	<0.06	0.12-0.16	7.4-8.4	2-4	High-----	0.32						
	14	---	---	---	---	---	---						
93*: Norbert-----	0-10	<0.06	0.12-0.16	7.4-8.4	<4	High-----	0.37	1	4				
	10-14	<0.06	0.12-0.16	7.4-8.4	2-4	High-----	0.32						
	14	---	---	---	---	---	---						
Rock outcrop.													
94*: Perma-----	0-5	0.6-2.0	0.08-0.15	6.1-7.3	<2	Low-----	0.32	2	5				
	5-60	0.6-2.0	0.03-0.08	7.4-8.4	<2	Low-----	0.15						
Castner-----	0-6	0.6-2.0	0.08-0.12	6.6-7.8	<2	Low-----	0.24	1	5				
	6-13	0.6-2.0	0.04-0.09	6.6-8.4	<2	Low-----	0.24						
	13	---	---	---	---	---	---						
Belain-----	0-4	0.6-2.0	0.14-0.20	6.1-7.8	<2	Low-----	0.37	2	5				
	4-11	0.6-2.0	0.10-0.20	6.6-8.4	<2	Low-----	0.20						
	11-22	0.6-2.0	0.08-0.15	6.6-8.4	<2	Low-----	0.20						
	22-28	2.0-6.0	0.06-0.09	7.4-8.4	<2	Low-----	0.15						
	28	---	---	---	---	---	---						
95, 96----- Phillips	0-7	0.6-2.0	0.14-0.20	6.1-7.3	<2	Low-----	0.43	5	5				
	7-15	0.06-0.2	0.12-0.14	6.6-8.4	<2	Moderate	0.37						
	15-36	0.06-0.2	0.12-0.16	7.4-8.4	<2	Moderate	0.43						
	36-78	0.06-0.2	0.10-0.14	7.4-8.4	4-8	Moderate	0.43						
97*, 98*: Phillips-----	0-7	0.6-2.0	0.14-0.20	6.1-7.3	<2	Low-----	0.43	5	5				
	7-15	0.06-0.2	0.12-0.14	6.6-8.4	<2	Moderate	0.37						
	15-36	0.06-0.2	0.12-0.16	7.4-8.4	<2	Moderate	0.43						
	36-78	0.06-0.2	0.10-0.14	7.4-8.4	4-8	Moderate	0.43						
Elloam-----	0-3	0.6-2.0	0.12-0.18	6.1-7.8	<2	Moderate	0.32	5	6				
	3-17	0.06-0.2	0.10-0.12	6.6-8.4	2-8	High-----	0.28						
	17-28	0.06-0.2	0.10-0.12	7.9-9.0	>4	Moderate	0.28						
	28-62	<0.06	0.08-0.12	>7.8	>4	Moderate	0.28						
99*, 100*: Phillips-----	0-7	0.6-2.0	0.14-0.20	6.1-7.3	<2	Low-----	0.43	5	5				
	7-15	0.06-0.2	0.12-0.14	6.6-8.4	<2	Moderate	0.37						
	15-36	0.06-0.2	0.12-0.16	7.4-8.4	<2	Moderate	0.43						
	36-78	0.06-0.2	0.10-0.14	7.4-8.4	4-8	Moderate	0.43						
Kevin-----	0-3	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6				
	3-30	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.32						
	30-60	0.06-0.2	0.14-0.18	7.9-9.0	<2	Moderate	0.37						
101. Pits													

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
102, 103----- Reeder	0-7 7-28 28-60	0.6-2.0 0.6-2.0 ---	0.20-0.23 0.15-0.18 ---	6.1-7.3 6.6-8.4 ---	<2 <2 ---	Moderate Moderate -----	0.28 0.28 ---	3	6
104: Rubble land. Rock outcrop.									
105----- Savage	0-6 6-14 14-60	0.6-2.0 0.2-0.6 0.2-0.6	0.14-0.20 0.16-0.20 0.16-0.20	6.6-7.8 6.6-8.4 7.4-8.4	<2 2-8 2-8	Moderate High----- High-----	0.37 0.37 0.37	5	7
106----- Savage	0-6 6-14 14-60	0.6-2.0 0.2-0.6 0.2-0.6	0.14-0.20 0.16-0.20 0.16-0.20	6.6-7.8 6.6-8.4 7.4-8.4	<2 2-8 2-8	Moderate High----- High-----	0.37 0.37 0.37	5	7
107*: Savage-----	0-6 6-14 14-60	0.6-2.0 0.2-0.6 0.2-0.6	0.14-0.20 0.16-0.20 0.16-0.20	6.6-7.8 6.6-8.4 7.4-8.4	<2 2-8 2-8	Moderate High----- High-----	0.37 0.37 0.37	5	7
Gerdrum-----	0-7 7-22 22-46 46-60	0.6-2.0 0.06-0.2 0.06-0.2 0.6-2.0	0.12-0.18 0.12-0.19 0.10-0.16 0.10-0.16	6.6-7.8 7.4-9.0 7.9-9.0 7.9-9.0	<2 2-8 >8 >8	Low----- High----- Moderate Low-----	0.43 0.32 0.32 0.28	5	5
108----- Scobey	0-6 6-19 19-60	0.6-2.0 0.2-0.6 0.06-0.2	0.14-0.18 0.12-0.16 0.14-0.18	6.6-7.8 6.6-7.8 7.4-9.0	<2 <2 <2	Moderate High----- Moderate	0.32 0.28 0.32	5	6
109*, 110*: Scobey-----	0-6 6-19 19-60	0.6-2.0 0.2-0.6 0.06-0.2	0.14-0.18 0.12-0.16 0.14-0.18	6.6-7.8 6.6-7.8 7.4-9.0	<2 <2 <2	Moderate High----- Moderate	0.32 0.28 0.32	5	6
Kevin-----	0-7 7-30 30-60	0.6-2.0 0.2-0.6 0.06-0.2	0.14-0.18 0.14-0.18 0.14-0.18	6.6-8.4 6.6-8.4 7.9-9.0	<2 <2 <2	Moderate Moderate Moderate	0.32 0.32 0.37	5	6
111----- Shaak	0-6 6-20 20-42 42-60	0.6-2.0 0.06-0.2 0.06-0.2 0.06-0.2	0.18-0.22 0.12-0.15 0.14-0.19 0.07-0.10	6.1-7.8 7.4-8.4 7.9-8.4 7.9-8.4	<2 2-4 2-8 2-8	Low----- High----- Moderate Low-----	0.43 0.32 0.43 0.28	5	6
112*: Shaak-----	0-6 6-20 20-42 42-60	0.6-2.0 0.06-0.2 0.06-0.2 0.06-0.2	0.18-0.22 0.12-0.15 0.14-0.19 0.07-0.10	6.1-7.8 7.4-8.4 7.9-8.4 7.9-8.4	<2 2-4 2-8 2-8	Low----- High----- Moderate Low-----	0.43 0.32 0.43 0.28	5	6
Gerdrum-----	0-7 7-22 22-46 46-60	0.2-0.6 0.06-0.2 0.06-0.2 0.6-2.0	0.12-0.18 0.12-0.19 0.10-0.16 0.10-0.16	6.6-7.8 7.4-9.0 7.9-9.0 7.9-9.0	<2 2-8 >8 >8	Moderate High----- Moderate Low-----	0.37 0.32 0.32 0.28	5	4
113, 114----- Shawmut	0-3 3-15 15-60	0.6-2.0 0.6-2.0 0.6-2.0	0.11-0.16 0.06-0.10 0.08-0.11	6.6-7.8 6.6-8.4 7.9-8.4	<2 <2 <2	Low----- Low----- Low-----	0.37 0.24 0.24	3	5
115*: Silverchief-----	0-5 5-20 20-27 27-60	0.6-2.0 0.2-0.6 0.2-0.6 0.2-0.6	0.14-0.20 0.12-0.18 0.10-0.17 0.05-0.10	6.1-7.3 6.6-7.8 6.6-7.8 7.4-8.4	<2 <2 <2 <2	Low----- High----- High----- Moderate	0.28 0.24 0.28 0.20	5	5

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
115*: Whitcow-----	0-3	0.6-2.0	0.12-0.17	7.4-8.4	<2	Low-----	0.32	3	5
	3-20	0.6-2.0	0.08-0.17	7.4-8.4	<2	Low-----	0.28		
	20-60	0.6-2.0	0.04-0.06	7.4-8.4	<2	Low-----	0.24		
Macmeal-----	0-7	0.6-2.0	0.10-0.13	6.1-7.3	<2	Low-----	0.28	2	5
	7-48	0.2-0.6	0.05-0.08	6.1-7.3	<2	Low-----	0.24		
	48-60	0.2-0.6	0.05-0.08	7.4-8.4	<2	Low-----	0.24		
116*: Straw-----	0-7	0.6-2.0	0.12-0.22	6.6-8.4	<2	Moderate	0.32	5	6
	7-21	0.6-2.0	0.18-0.22	7.4-8.4	<2	Low-----	0.37		
	21-60	2.0-6.0	0.04-0.08	7.4-8.4	<2	Low-----	0.15		
Korent-----	0-7	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low-----	0.37	5	5
	7-60	0.6-2.0	0.12-0.22	7.9-8.4	<2	Low-----	0.37		
117*: Straw-----	0-7	0.6-2.0	0.14-0.20	6.6-8.4	<2	Low-----	0.37	5	5
	7-21	0.6-2.0	0.18-0.22	7.4-8.4	<2	Low-----	0.37		
	21-60	2.0-6.0	0.02-0.04	7.4-8.4	<2	Low-----	0.15		
Korent-----	0-7	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low-----	0.37	5	5
	7-60	0.6-2.0	0.12-0.22	7.9-8.4	<2	Low-----	0.37		
118*: Straw-----	0-7	0.6-2.0	0.14-0.20	6.6-8.4	<2	Low-----	0.37	5	5
	7-21	0.6-2.0	0.18-0.22	7.4-8.4	<2	Low-----	0.37		
	21-66	2.0-6.0	0.04-0.08	7.4-8.4	<2	Low-----	0.15		
Nesda-----	0-11	0.6-2.0	0.14-0.20	6.6-7.8	<2	Low-----	0.32	2	5
	11-60	>6.0	0.02-0.04	7.4-8.4	<2	Low-----	0.10		
119----- Telstad	0-7	0.6-2.0	0.14-0.20	6.6-7.8	<2	Low-----	0.37	5	5
	7-18	0.6-2.0	0.12-0.16	7.4-8.4	<2	Moderate	0.43		
	18-60	0.06-0.2	0.12-0.16	7.9-8.4	2-4	Moderate	0.43		
120*, 121*: Telstad-----	0-7	0.6-2.0	0.14-0.20	6.6-7.8	<2	Low-----	0.37	5	5
	7-18	0.6-2.0	0.12-0.16	7.4-8.4	<2	Moderate	0.43		
	18-60	0.06-0.2	0.12-0.16	7.9-8.4	2-4	Moderate	0.43		
Joplin-----	0-6	0.6-2.0	0.14-0.20	6.6-7.8	<2	Low-----	0.37	5	5
	6-31	0.6-2.0	0.12-0.18	6.6-8.4	<2	Moderate	0.32		
	31-60	0.06-0.2	0.12-0.18	7.4-8.4	2-8	Moderate	0.32		
122*: Telstad-----	0-7	0.6-2.0	0.12-0.18	6.6-7.8	<2	Moderate	0.32	5	6
	7-60	0.6-2.0	0.12-0.16	7.4-8.4	<2	Moderate	0.43		
Joplin-----	0-6	0.6-2.0	0.10-0.18	6.6-7.8	<2	Low-----	0.32	5	6
	6-31	0.6-2.0	0.12-0.18	6.6-8.4	<2	Moderate	0.32		
	31-60	0.06-0.2	0.12-0.18	7.4-8.4	2-8	Moderate	0.32		
123*: Thoeny-----	0-6	0.6-2.0	0.16-0.20	5.6-7.8	0-4	Low-----	0.49	5	5
	6-12	<0.06	0.10-0.14	7.4-9.0	4-8	High-----	0.28		
	12-17	<0.06	0.10-0.14	7.4-9.0	4-8	Moderate	0.32		
	17-52	<0.06	0.10-0.14	>7.4	4-16	Moderate	0.32		
	52-60	<0.06	0.10-0.14	>7.4	4-16	Moderate	0.32		
Elloam-----	0-3	0.6-2.0	0.12-0.18	6.1-7.8	<2	Moderate	0.32	5	6
	3-17	<0.2	0.10-0.12	6.6-8.4	2-8	High-----	0.28		
	17-28	<0.2	0.10-0.12	7.9-9.0	>4	Moderate	0.28		
	28-62	<0.06	0.08-0.12	>7.8	>4	Moderate	0.28		

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability		Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
		In	In/hr					K	T	
		In/hr	In/in	pH	Mmhos/cm					
124*: Thoeny-----	0-6	0.6-2.0	0.16-0.20	5.6-7.8	0-4	Low-----	0.49	5	5	
	6-12	<0.06	0.10-0.14	7.4-9.0	4-8	High-----	0.28			
	12-17	<0.06	0.10-0.14	7.4-9.0	4-8	Moderate	0.32			
	17-52	<0.06	0.10-0.14	>7.4	4-16	Moderate	0.32			
	52-60	<0.06	0.10-0.14	>7.4	4-16	Moderate	0.32			
Kevin-----	0-7	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.32	5	6	
	7-30	0.2-0.6	0.14-0.18	6.6-8.4	<2	Moderate	0.32			
	30-60	0.06-0.2	0.14-0.18	7.9-9.0	<2	Moderate	0.37			
Elloam-----	0-7	0.6-2.0	0.12-0.18	6.1-7.8	<2	Moderate	0.32	5	6	
	7-17	<0.2	0.10-0.12	6.6-8.4	2-8	High-----	0.28			
	17-28	<0.2	0.10-0.12	7.9-9.0	>4	Moderate	0.28			
	28-62	<0.06	0.08-0.12	>7.8	>4	Moderate	0.28			
125-----	0-7	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-----	0.37	3	5	
Turner	7-26	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	26-30	6.0-20	0.03-0.05	7.4-8.4	<2	Low-----	0.15			
	30-60	6.0-20	<0.03	7.4-8.4	<2	Low-----	0.10			
126*: Turner-----	0-7	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low-----	0.37	3	5	
	7-26	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.32			
	26-30	6.0-20	0.03-0.05	7.4-8.4	<2	Low-----	0.15			
	30-60	6.0-20	<0.03	7.4-8.4	<2	Low-----	0.10			
Beaverton-----	0-7	0.6-2.0	0.11-0.15	6.6-8.4	<2	Low-----	0.37	3	5	
	7-20	0.6-2.0	0.07-0.11	6.6-8.4	<2	Low-----	0.37			
	20-60	>6.0	0.02-0.06	6.6-8.4	<2	Low-----	0.15			
127*, 128*: Twilight-----	0-35	0.6-2.0	0.10-0.14	6.6-8.4	<2	Low-----	0.24	3	3	
	35-60	---	---	---	---	---	---			
Riedel-----	0-5	0.6-2.0	0.13-0.16	7.4-8.4	<2	Low-----	0.24	3	3	
	5-24	0.6-2.0	0.09-0.14	7.4-8.4	<2	Low-----	0.24			
	24-60	---	---	---	---	---	---			
129. Typic Fluvaquents										
130. Typic Ustifluvents										
131. Ustic Torrifluvents										
132-----	0-6	<0.06	0.08-0.12	>8.5	8-16	High-----	0.24	5	8	
Vanda	6-60	<0.06	0.08-0.12	>8.5	8-16	High-----	0.24			
133*, 134*: Vanda-----	0-6	<0.06	0.08-0.12	>8.5	8-16	High-----	0.24	5	8	
	6-60	<0.06	0.08-0.12	>8.5	8-16	High-----	0.24			
Nobe-----	0-3	<0.06	0.07-0.09	6.6-8.4	4-8	High-----	0.37	5	4	
	3-60	<0.06	0.07-0.09	7.4-9.0	16-25	High-----	0.43			
135-----	0-4	0.6-2.0	0.12-0.20	6.6-7.8	<2	Moderate	0.32	5	6	
Vida	4-34	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.37			
	34-60	0.06-0.2	0.12-0.20	8.4-9.0	<2	Moderate	0.37			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmos/cm				
136*: Vida-----	0-4	0.6-2.0	0.12-0.20	6.6-7.8	<2	Moderate	0.32	5	6
	4-34	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.37		
	34-60	0.06-0.2	0.12-0.20	8.4-9.0	<2	Moderate	0.37		
Zahill-----	0-3	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.32	5	6
	3-36	0.2-0.6	0.12-0.20	7.4-8.4	<2	Moderate	0.37		
	36-60	0.06-0.2	0.12-0.20	7.4-8.4	<2	Moderate	0.43		
137----- Wabek	0-8	2.0-6.0	0.20-0.22	6.6-7.3	<2	Low-----	0.28	2	5
	8-60	>20	0.02-0.04	7.4-8.4	<2	Low-----	0.10		
138*: Warneke-----	0-4	0.6-2.0	0.12-0.17	7.4-8.4	<2	Low-----	0.32	1	5
	4-15	0.6-2.0	0.08-0.11	7.9-8.4	<2	Low-----	0.28		
	15	---	---	---	---	---	---		
Whitecow-----	0-3	0.6-2.0	0.12-0.17	7.4-8.4	<2	Low-----	0.32	3	5
	3-20	0.6-2.0	0.08-0.17	7.4-8.4	<2	Low-----	0.28		
	20-60	0.6-2.0	0.04-0.06	7.4-8.4	<2	Low-----	0.24		
Rock outcrop.									
139*: Whitecow-----	0-3	0.6-2.0	0.12-0.17	7.4-8.4	<2	Low-----	0.32	3	5
	3-20	0.6-2.0	0.08-0.17	7.4-8.4	<2	Low-----	0.28		
	20-60	0.6-2.0	0.04-0.06	7.4-8.4	<2	Low-----	0.24		
Warneke-----	0-4	0.6-2.0	0.12-0.17	7.4-8.4	<2	Low-----	0.32	1	5
	4-15	0.6-2.0	0.08-0.11	7.9-8.4	<2	Low-----	0.28		
	15	---	---	---	---	---	---		
140*: Whitecow-----	0-3	0.6-2.0	0.12-0.17	7.4-8.4	<2	Low-----	0.32	3	5
	3-20	0.6-2.0	0.08-0.17	7.4-8.4	<2	Low-----	0.28		
	20-60	0.6-2.0	0.04-0.06	7.4-8.4	<2	Low-----	0.24		
141----- Williams	0-6	0.6-2.0	0.17-0.24	6.6-7.3	<2	Low-----	0.28	5	6
	6-20	0.6-2.0	0.16-0.20	6.6-7.8	<2	Moderate	0.28		
	20-60	0.2-0.6	0.15-0.18	7.9-8.4	<2	Moderate	0.37		
142*, 143*: Williams-----	0-6	0.6-2.0	0.17-0.24	6.6-7.3	<2	Low-----	0.28	5	6
	6-20	0.6-2.0	0.16-0.20	6.6-7.8	<2	Moderate	0.28		
	20-60	0.2-0.6	0.15-0.18	7.9-8.4	<2	Moderate	0.37		
Vida-----	0-4	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low-----	0.37	5	5
	4-34	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.37		
	34-60	0.06-0.2	0.12-0.20	8.4-9.0	<2	Moderate	0.37		
144----- Windham	0-6	0.6-2.0	0.09-0.11	7.4-8.4	<4	Low-----	0.24	2	6
	6-60	0.6-2.0	0.05-0.09	7.9-8.4	<4	Low-----	0.20		
145, 146----- Work	0-6	0.6-2.0	0.13-0.18	6.6-7.8	<2	Moderate	0.32	5	6
	6-13	0.2-0.6	0.13-0.18	6.6-7.8	<2	High-----	0.37		
	13-29	0.6-2.0	0.13-0.20	7.4-8.4	<4	Moderate	0.32		
	29-60	0.6-2.0	0.12-0.14	7.4-8.4	<4	Moderate	0.28		
147----- Yamac	0-4	0.6-2.0	0.14-0.20	6.6-7.8	<2	Low-----	0.37	5	5
	4-11	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low-----	0.37		
	11-60	0.6-2.0	0.14-0.20	7.9-9.0	<4	Low-----	0.37		

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
							K	T	
	In	In/hr	In/in	pH	Mmhos/cm				
148*: Yamac-----	0-4	0.6-2.0	0.14-0.20	6.6-7.8	<2	Low-----	0.37	5	5
	4-11	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low-----	0.37		
	11-60	0.6-2.0	0.14-0.20	7.9-9.0	<4	Low-----	0.37		
Benz-----	0-13	0.6-2.0	0.14-0.18	6.6-9.0	4-8	Low-----	0.37	5	6
	13-60	0.06-0.2	0.10-0.18	>8.5	8-16	Moderate	0.37		
149*: Yamac-----	0-4	0.6-2.0	0.14-0.20	6.6-7.8	<2	Low-----	0.37	5	5
	4-11	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low-----	0.37		
	11-60	0.6-2.0	0.14-0.20	7.9-9.0	<4	Low-----	0.37		
Wabek-----	0-8	2.0-6.0	0.20-0.22	6.6-7.3	<2	Low-----	0.28	2	5
	8-60	>20	0.02-0.04	7.4-7.8	<2	Low-----	0.10		
150----- Zahill	0-3	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.32	5	6
	3-36	0.2-0.6	0.12-0.20	7.4-8.4	<2	Moderate	0.37		
	36-60	0.06-0.2	0.12-0.20	7.4-8.4	<2	Moderate	0.43		
151*: Zahill-----	0-3	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.32	5	6
	3-36	0.2-0.6	0.12-0.20	7.4-8.4	<2	Moderate	0.37		
	36-60	0.06-0.2	0.12-0.20	7.4-8.4	<2	Moderate	0.43		
Vida-----	0-4	0.6-2.0	0.12-0.20	6.6-7.8	<2	Moderate	0.32	5	6
	4-22	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.37		
	22-60	0.06-0.2	0.12-0.20	8.4-9.0	<2	Moderate	0.37		

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

TABLE 13.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," and "apparent" 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
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					<u>Ft</u>			<u>In</u>		
1*: Absher-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
Nobe-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
2----- Assinniboine	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
3----- Attewan	A	None-----	---	---	>6.0	---	---	>60	---	Moderate.
4*: Attewan-----	A	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Beaverell-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
5*: Attewan-----	A	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Wabek-----	A	None-----	---	---	>6.0	---	---	>60	---	Low.
6. Badland										
7----- Barkof	D	None-----	---	---	>6.0	---	---	20-40	Rippable	Low.
8*, 9*: Barkof-----	D	None-----	---	---	>6.0	---	---	20-40	Rippable	Low.
Norbert-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
10*: Barkof-----	D	None-----	---	---	>6.0	---	---	20-40	Rippable	Low.
Windham-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
11----- Bascovy	D	None-----	---	---	>6.0	---	---	20-40	Rippable	Low.
12*: Bascovy-----	D	None-----	---	---	>6.0	---	---	20-40	Rippable	Low.
Lisam-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
Dilts-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
13----- Bearpaw	B	None-----	---	---	>6.0	---	---	>60	---	Low.
14*, 15*: Bearpaw-----	B	None-----	---	---	>6.0	---	---	>60	---	Low.
Elloam-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
16*, 17*: Bearpaw-----	B	None-----	---	---	>6.0	---	---	>60	---	Low.
Vida-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
18----- Belain	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					<u>Ft</u>			<u>In</u>		
19----- Benz	D	None-----	---	---	>6.0	---	---	>60	---	Moderate.
20----- Bowdoin	D	Rare-----	---	---	>6.0	---	---	>60	---	Low.
21----- Cabba	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
22*: Cabba----- Rock outcrop.	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
23*: Cabba----- Windham-----	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
24*: Cabba----- Zahill-----	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
25*: Cabbart----- Delpoint-----	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
	C	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate.
26*: Cabbart----- Hillon-----	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
27*: Cabbart----- Rock outcrop.	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
28*: Cabbart----- Yamac----- Rock outcrop.	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
29----- Castner	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate.
30*: Castner----- Perma----- Rock outcrop.	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate.
	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
31, 32----- Chinook	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
33*: Chinook----- Phillips-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
	C	None-----	---	---	>6.0	---	---	>60	---	Low.
34----- Cozberg	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness	
35----- Creed	D	None-----	---	---	>6.0	---	---	>60	---	Low.
36*: Creed-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
Gerdrum-----	---	None-----	---	---	>6.0	---	---	>60	---	Low.
37----- Delpoint	C	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate.
38*: Delpoint-----	C	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate.
Cabbart-----	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
39----- Dimmick	D	Frequent-----	Long-----	Apr-Jun	0-3.0	Apparent	Sep-Jun	>60	---	Moderate.
40----- Elloam	D	None-----	---	---	>6.0	---	---	>60	---	Low.
41----- Ethridge	B	None-----	---	---	>6.0	---	---	>60	---	Low.
42*: Ethridge-----	B	None-----	---	---	>6.0	---	---	>60	---	Low.
Gerdrum-----	---	None-----	---	---	>6.0	---	---	>60	---	Low.
43, 44, 45----- Farnuf	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
46----- Gerdrum	---	None-----	---	---	>6.0	---	---	>60	---	Low.
47----- Glendive	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate.
48----- Hanly	A	Occasional	Brief-----	Mar-Jun	>6.0	---	---	>60	---	Low.
49, 50, 52----- Harlem	C	Rare-----	---	---	>6.0	---	---	>60	---	Low.
51, 53----- Harlem	C/D	Rare-----	---	---	3.5-5.0	Apparent	May-Sep	>60	---	Low.
54*: Harlem Variant---	C	Rare-----	---	---	2.0-4.0	Apparent	Jun-Sep	>60	---	Low.
Lardell-----	C	Rare-----	---	---	1.0-5.0	Apparent	May-Aug	>60	---	Moderate.
55, 57----- Havre	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate.
56, 58----- Havre	C	Rare-----	---	---	3.5-5.0	Apparent	May-Aug	>60	---	Moderate.
59*: Havre-----	B	Occasional	Brief-----	Apr-Jun	>6.0	---	---	>60	---	Moderate.
Hanly-----	A	Occasional	Brief-----	Mar-Jun	>6.0	---	---	>60	---	Low.
Glendive-----	B	Occasional	Brief-----	Apr-Jun	>6.0	---	---	>60	---	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness	
60*: Havre variant-----	C	Rare-----	---	---	2.0-4.0	Apparent	Jul-Sep	>60	---	Moderate.
Lardell-----	C	Rare-----	---	---	1.0-5.0	Apparent	May-Aug	>60	---	Moderate.
61, 62----- Hedoes	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
63*, 64*: Hedoes-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Belain-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate.
65*: Hedoes-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Belain-----	B	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate.
Castner-----	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate.
66*: Hedoes-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Benz-----	D	None-----	---	---	>6.0	---	---	>60	---	Moderate.
67----- Hillon	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
68*: Hillon-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Kevin-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
69*: Hillon-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Scobey-----	C	None-----	---	---	>6.0	---	---	>60	---	Low.
70*, 71*: Judith-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Windham-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
72----- Kevin	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
73*: Kevin-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Elloam-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
74*: Kevin-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Hillon-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
75*: Korent-----	B	Occasional	Brief-----	Mar-Jun	>6.0	---	---	>60	---	Moderate.
Nesda-----	A	Occasional	Brief-----	Apr-Jun	>6.0	---	---	>60	---	Low.
76----- Lardell	C	Rare-----	---	---	1.0-5.0	Apparent	May-Aug	>60	---	Moderate.
77, 78----- Lihen	A	None-----	---	---	>6.0	---	---	>60	---	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness	
79*: Lisam-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
Dilts-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
80*: Lisam-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
Dilts-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
Rock outcrop.										
81*: Lisam-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
Hillon-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
82*: Lisam-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
Wabek-----	A	None-----	---	---	>6.0	---	---	>60	---	Low.
83----- Lolo	A	None-----	---	---	>6.0	---	---	>60	---	Moderate.
84*: Macmeal-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
85*: Marmarth-----	B	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate.
Cabbart-----	C	None-----	---	---	>6.0	---	---	10-20	Rippable	Moderate.
86----- Martinsdale	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
87*: Martinsdale-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Judith-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
88----- Marvan	D	None-----	---	---	>6.0	---	---	>60	---	Low.
89*: Marvan-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
Bascovy-----	D	None-----	---	---	>6.0	---	---	20-40	Rippable	Low.
90, 91----- Nishon	D	Frequent---	Long to very long.	Apr-Nov	0.5-3.0	Perched	Apr-Aug	>60	---	Moderate.
92----- Norbert	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
93*: Norbert-----	D	None-----	---	---	>6.0	---	---	10-20	Rippable	Low.
Rock outcrop.										
94*: Perma-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Castner-----	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate.
Belain-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					<u>Ft</u>			<u>In</u>		
95, 96----- Phillips	C	None-----	---	---	>6.0	---	---	>60	---	Low.
97*, 98*: Phillips-----	C	None-----	---	---	>6.0	---	---	>60	---	Low.
Elloam-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
99*, 100*: Phillips-----	C	None-----	---	---	>6.0	---	---	>60	---	Low.
Kevin-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
101. Pits										
102, 103----- Reeder	B	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate.
104: Rubble land.  Rock outcrop.										
105, 106----- Savage	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
107*: Savage-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Gerdrum-----	---	None-----	---	---	>6.0	---	---	>60	---	Low.
108----- Scobey	C	None-----	---	---	>6.0	---	---	>60	---	Low.
109*, 110*: Scobey-----	C	None-----	---	---	>6.0	---	---	>60	---	Low.
Kevin-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
111----- Shaak	D	None-----	---	---	>6.0	---	---	>60	---	Low.
112*: Shaak-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
Gerdrum-----	---	None-----	---	---	>6.0	---	---	>60	---	Low.
113, 114----- Shawmut	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
115*: Silverchief-----	C	None-----	---	---	>6.0	---	---	>60	---	Low.
Whitecow-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Macmeal-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
116*: Straw-----	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate.
Korent-----	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate.
117*: Straw-----	B	Occasional	Brief-----	Mar-Jun	>6.0	---	---	>60	---	Moderate.
Korent-----	B	Occasional	Brief-----	Mar-Jun	>6.0	---	---	>60	---	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness	
118*: Straw-----	B	Occasional	Brief-----	Mar-Jun	>6.0	---	---	>60	---	Moderate.
Nesda-----	A	Occasional	Brief-----	Apr-Jun	>6.0	---	---	>60	---	Low.
119----- Telstad	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
120*, 121*, 122*: Telstad-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Joplin-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
123*: Thoeny-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
Elloam-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
124*: Thoeny-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
Kevin-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Elloam-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
125----- Turner	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
126*: Turner-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Beaverton-----	A	None-----	---	---	>6.0	---	---	>60	---	Moderate.
127*, 128*: Twilight-----	B	None-----	---	---	>6.0	---	---	20-40	Rippable	Low.
Riedel-----	B	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate.
129. Typic Fluvaquents										
130. Typic Ustifluvents										
131. Ustic Torrifluvents										
132----- Vanda	D	None-----	---	---	>6.0	---	---	>60	---	Low.
133*, 134*: Vanda-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
Nobe-----	D	None-----	---	---	>6.0	---	---	>60	---	Low.
135----- Vida	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
136*: Vida-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Zahill-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
137----- Wabek	A	None-----	---	---	>6.0	---	---	>60	---	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					<u>Ft</u>			<u>In</u>		
138*: Warneke-----	D	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate.
Whitecow----- Rock outcrop.	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
139*: Whitecow-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Warneke-----	D	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate.
140*: Whitecow-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
141----- Williams	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
142*, 143*: Williams-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Vida-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
144----- Windham	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
145, 146----- Work	C	None-----	---	---	>6.0	---	---	>60	---	Low.
147----- Yamac	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
148*: Yamac-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Benz-----	D	None-----	---	---	>6.0	---	---	>60	---	Moderate.
149*: Yamac-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Wabek-----	A	None-----	---	---	>6.0	---	---	>60	---	Low.
150----- Zahill	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
151*: Zahill-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.
Vida-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate.

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

TABLE 14.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Absher-----	Fine, montmorillonitic Borollic Natrargids
Assinniboine-----	Fine-loamy, mixed Aridic Argiborolls
Attewan-----	Fine-loamy over sandy or sandy-skeletal, mixed Aridic Argiborolls
Barkof-----	Fine, montmorillonitic frigid Vertic Ustochrepts
Bascovy-----	Fine, montmorillonitic Borollic Vertic Camborthids
Bearpaw-----	Fine, montmorillonitic Typic Argiborolls
Beaverell-----	Loamy-skeletal, mixed Aridic Argiborolls
Beaverton-----	Loamy-skeletal, mixed Typic Argiborolls
Belain-----	Coarse-loamy, mixed Typic Haploborolls
Benz-----	Fine-loamy, mixed (calcareous), frigid Ustic Torrifuvents
Bowdoin-----	Very-fine, montmorillonitic (calcareous), frigid Ustertic Torrifuvents
Cabba-----	Loamy, mixed (calcareous), frigid, shallow Typic Ustorthents
Cabbart-----	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Castner-----	Loamy-skeletal, mixed Lithic Haploborolls
Chinook-----	Coarse-loamy, mixed Aridic Haploborolls
Cozberg-----	Coarse-loamy, mixed Aridic Haploborolls
Creed-----	Fine, montmorillonitic Borollic Natrargids
Delpoint-----	Fine-loamy, mixed Borollic Camborthids
Dilts-----	Clayey, montmorillonitic, acid, frigid, shallow Ustic Torriorthents
Dimmick-----	Fine, montmorillonitic, frigid Vertic Haplaquolls
Elloam-----	Fine, montmorillonitic Borollic Natrargids
Ethridge-----	Fine, montmorillonitic Aridic Argiborolls
Farnuf-----	Fine-loamy, mixed Typic Argiborolls
Gerdrum-----	Fine, montmorillonitic Borollic Natrargids
Glendive-----	Coarse-loamy, mixed (calcareous), frigid Ustic Torrifuvents
Hanly-----	Sandy, mixed, frigid Ustic Torrifuvents
Harlem-----	Fine, montmorillonitic (calcareous), frigid Ustic Torrifuvents
Harlem Variant-----	Fine, montmorillonitic (calcareous), frigid Typic Fluvaquents
Havre-----	Fine-loamy, mixed (calcareous), frigid Ustic Torrifuvents
Havre Variant-----	Fine-loamy, mixed (calcareous), frigid Typic Fluvaquents
Hédoes-----	Coarse-loamy, mixed Pachic Haploborolls
Hillon-----	Fine-loamy, mixed (calcareous), frigid Ustic Torriorthents
Joplin-----	Fine-loamy, mixed Aridic Argiborolls
Judith-----	Fine-loamy, carbonatic Typic Calciborolls
Kevin-----	Fine-loamy, mixed Aridic Argiborolls
Korent-----	Fine-loamy, mixed (calcareous), frigid Mollic Ustifuvents
Lardell-----	Fine-loamy, mixed, frigid Aquollic Salorthids
Lihen-----	Sandy, mixed Entic Haploborolls
Lisam-----	Clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents
Lolo-----	Loamy-skeletal, mixed Pachic Haploborolls
Macmeal-----	Loamy-skeletal, mixed Typic Eutroboralfs
Marmarth-----	Fine-loamy, mixed Aridic Argiborolls
Martinsdale-----	Fine-loamy, mixed Typic Argiborolls
Marvan-----	Fine, montmorillonitic (calcareous), frigid Ustertic Torriorthents
Nesda-----	Sandy-skeletal, mixed Fluventic Haploborolls
Nishon-----	Fine, montmorillonitic, frigid Typic Albaqualfs
Nobe-----	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Norbert-----	Clayey, montmorillonitic (calcareous), frigid, shallow Typic Ustorthents
Perma-----	Loamy-skeletal, mixed Typic Haploborolls
Phillips-----	Fine, montmorillonitic Borollic Paleargids
Reeder-----	Fine-loamy, mixed Typic Argiborolls
Riedel-----	Coarse loamy, mixed (calcareous) frigid Ustic Torriorthents
Savage-----	Fine, montmorillonitic Typic Argiborolls
Scobey-----	Fine, montmorillonitic Aridic Argiborolls
Shaak-----	Fine, montmorillonitic Abruptic Argiborolls
Shawmut-----	Loamy-skeletal, mixed Typic Argiborolls
Silverchief-----	Fine, mixed Typic Eutroboralfs
Straw-----	Fine-loamy, mixed Cumulic Haploborolls
Telstad-----	Fine-loamy, mixed Aridic Argiborolls
Thoeny-----	Fine, montmorillonitic Borollic Natrargids
Turner-----	Fine-loamy over sandy or sandy-skeletal, mixed Typic Argiborolls
Twillight-----	Coarse-loamy, mixed Borollic Camborthids
Vanda-----	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Vida-----	Fine-loamy, mixed Typic Argiborolls
Wabek-----	Sandy-skeletal, mixed Entic Haploborolls
Warneke-----	Loamy-skeletal, carbonatic, frigid Lithic Ustochrepts
Whitcow-----	Loamy-skeletal, carbonatic, frigid Typic Ustochrepts
Williams-----	Fine-loamy, mixed Typic Argiborolls

TABLE 14.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Windham-----	Loamy-skeletal, carbonatic Typic Calciborolls
Work-----	Fine, montmorillonitic Typic Argiborolls
Yamac-----	Fine-loamy, mixed Borollic Camborthids
Zahill-----	Fine-loamy, mixed (calcareous), frigid Typic Ustorhents



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