United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the North Dakota Agricultural Experiment Station, North Dakota Cooperative Extension Service, and North Dakota State Soil Conservation Committee

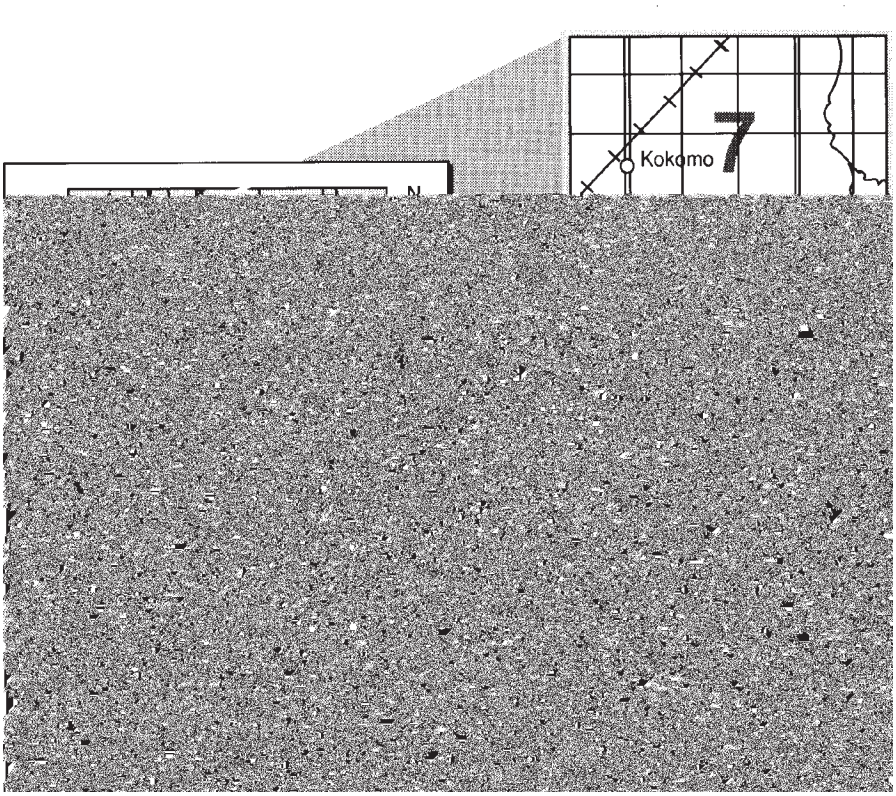
# Soil Survey of Logan County, North Dakota

The soil properties and interpretations included in this survey were current as of 1992. The most current information is available through the Natural Resources Conservation Service Soil Data Mart Website at http://soildatamart.nrcs.usda.gov/ and/or the Natural Resources Conservation Service Web Soil Survey at http://websoilsurvey.nrcs.usda.gov/app.

# How to Use This Soil Survey

**General Soil Map (STATSGO)**

**Detailed Soil Maps**

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**Cover: Shell Buttes are sandstone capped buttes in southwestern Logan County. Soils surrounding this area developed from soft weathered bedrock.**

*Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.*

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# Foreword

# Where to Get Updated Information

**USDA-Natural Resources Conservation Service**
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# Soil Survey of
# Logan County, North Dakota

## General Nature of the Survey Area

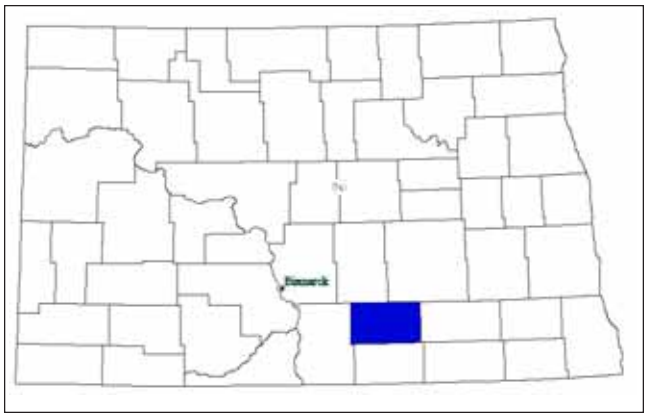


Figure 1. Location of Logan County in North Dakota.

## How This Survey Was Made

### Climate

**Figure 2. Profile of Hamerly loam. The dark colored surface layer is underlain by a light colored layer that has an accumulation of lime.**

## Survey Procedures

Table 1.-Temperature and Precipitation

(Recorded in the period 1961-90 at Napoleon, North Dakota.)

| Month | Temperature | | | | | | Precipitation | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | avg daily max | avg daily min | avg | 2 years in 10 will have max temp. >than | 2 years in 10 will have min temp. <than | avg no. of growing degree days* | avg (in.) | 2 yrs in 10 will have less than (in.) | 2 yrs in 10 will have more than (in.) | average number of days with 0.10 inch or more |
| January | 18.1 | -2.9 | 7.6 | 48 | -34 | 0 | 0.47 | 0.21 | 0.69 | 1 |
| February | 24.2 | 2.9 | 13.5 | 51 | -30 | 1 | 0.42 | 0.17 | 0.63 | 1 |
| March | 36.6 | 15.6 | 26.1 | 69 | -18 | 21 | 0.95 | 0.41 | 1.41 | 2 |
| April | 53.6 | 30.0 | 41.8 | 85 | 6 | 148 | 1.75 | 0.51 | 2.75 | 4 |
| May | 67.4 | 41.8 | 54.6 | 91 | 21 | 445 | 2.43 | 1.35 | 3.38 | 5 |
| June | 76.7 | 51.9 | 64.3 | 96 | 36 | 728 | 3.00 | 1.33 | 4.43 | 6 |
| July | 84.0 | 56.9 | 70.5 | 102 | 41 | 871 | 2.72 | 1.17 | 4.03 | 4 |
| August | 82.3 | 54.2 | 68.2 | 101 | 37 | 865 | 2.01 | 0.87 | 2.98 | 4 |
| September | 70.3 | 43.0 | 56.6 | 96 | 23 | 494 | 1.89 | 0.61 | 2.94 | 3 |
| October | 58.0 | 32.1 | 45.0 | 85 | 12 | 213 | 1.19 | 0.27 | 1.91 | 2 |
| November | 38.9 | 17.8 | 28.3 | 68 | -13 | 20 | 0.46 | 0.12 | 0.83 | 1 |
| December | 22.7 | 2.5 | 12.6 | 52 | -30 | 0 | 0.44 | 0.24 | 0.64 | 1 |
| Yearly : | | | | | | | | | | |
| Average | 52.7 | 28.8 | 40.8 | — | — | — | — | — | — | — |
| Extreme | 108 | -40 | — | 103 | -36 | — | — | — | — | — |
| Total | — | — | — | — | — | 3,806 | 17.73 | 13.58 | 21.01 | 34 |

* 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 (Threshold: 40.0 deg. F)

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Napoleon, North Dakota.)

| Probability | Temperature | | |
|---|---|---|---|
| | 24F or lower | 28F or lower | 32F or lower |
| Last freezing temperature in spring : | | | |
| 1 year in 10 later than— | May 14 | May 25 | June 5 |
| 2 year in 10 later than— | May 8 | May 20 | May 30 |
| 5 year in 10 later than— | April 27 | May 10 | May 18 |
| First freezing temperature in fall : | | | |
| 1 yr in 10 earlier than— | September 19 | September 12 | September 7 |
| 2 yr in 10 earlier than— | September 25 | September 18 | September 12 |
| 5 yr in 10 earlier than— | October 6 | September 29 | September 21 |

Table 3.—Growing Season

(Recorded in the period 1961-90 at Napoleon, North Dakota.)

| Probability | Daily Minimum Temperature | | |
|---|---|---|---|
| | # days > 24F | # days > 28F | # days > 32F |
| 9 years in 10 | 131 | 116 | 104 |
| 8 years in 10 | 139 | 123 | 111 |
| 5 years in 10 | 153 | 137 | 125 |
| 2 years in 10 | 167 | 150 | 139 |
| 1 year in 10 | 174 | 157 | 146 |

# General Soil Map Units (STATSGO)

## 32—Sioux-Arvilla Association, level to steep

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Sioux | L | 0-35 | E | 40-45 |
| Arvilla | SL | 0-25 | SE | 25-30 |
| MINOR COMPONENTS | | | | |
| Renshaw | L | 0-6 | SE | 10-15 |
| Southam | SICL | 0-1 | VP | 5-10 |
| Buse | L | 3-15 | W | 1-5 |
| Lohnes | LCOS | 0-15 | W | 1-5 |

LCOS, loamy coarse sand; SL, sandy loam;L, loam;SICL, silty clay loam
VP, very poor; W, well; SE, somewhat excessive; E, excessive

### Description

### Major Limitations for Agricultural Use

## 33—Arvilla-Maddock Association, level to undulating

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE* * | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Arvilla | SL | 0-6 | SE | 40-45 |
| Maddock | LFS | 0-6 | W | 15-20 |
| MINOR COMPONENTS | | | | |
| Marysland | L | 0-1 | P | 10-15 |
| Barnes | L | 1-6 | W | 5-10 |
| Sioux | L | 1-9 | E | 5-10 |
| Wyndmere | FSL | 0-1 | SP | 5-10 |

SL, sandy loam; LFS, loamy fine sand;FSL, fine sandy loam;L, loam
SP, somewhat poor; P, poor; W, well;SE, somewhat excessive;E, excessive

**Description**

**Major Limitations for Agricultural Use**

## 37—Barnes-Buse Association, nearly level to steep

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Barnes | L | 3-35 | W | 40-45 |
| Buse | L | 6-35 | W | 35-40 |
| MINOR COMPONENTS | | | | |
| Parnell | L | 0-1 | VP | 5-10 |
| Sioux | L | 0-1 | E | 1-5 |
| Southam | SICL | 0-1 | VP | 1-5 |
| Svea | L | 3-15 | W | 1-5 |

L, loam; SICL, silty clay loam
VP, very poor; W, well; E, excessive

**Description**

**Major Limitations for Agricultural Use**

## 42—Barnes-Buse-Southam Association, level to rolling

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Barnes | L | 3-15 | W | 35-40 |
| Buse | L | 3-15 | W | 35-40 |
| Southam | SICL | 0-1 | VP | 10-15 |
| MINOR COMPONENTS | | | | |
| Parnell | SICL | 0-1 | VP | 5-10 |
| Svea | L | 3-6 | W | 0-5 |
| Vallers | L | 0-3 | P | 0-5 |
| Nutley | SIC | 0-6 | W | 0-5 |

L, loam; SICL, silty clay loam;SIC, silty clay
VP, very poor; P, poor; W, well

### Description

### Major Limitations for Agricultural Use

## 45—Barnes-Svea-Buse Association, level to gently rolling

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Barnes | L | 0-9 | W | 50-55 |
| Svea | L | 0-6 | W | 15-20 |
| Buse | L | 3-9 | W | 10-15 |
| MINOR COMPONENTS | | | | |
| Parnell | L | 0-1 | VP | 5-10 |
| Hamerly | L | 0-3 | SP | 1-5 |
| Nutley | SIC | 0-6 | W | 1-5 |
| Cavour | SIL | 1-6 | MW | 1-5 |

L, loam; SIL, silt loam;SIC, silty clay
VP, very poor;SP, somewhat poor; MW, moderately well;W, well

**Description**

**Major Limitations for Agricultural Use**

## 47—Barnes-Buse-Svea Association, level to hilly

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Barnes | L | 0-15 | W | 40-45 |
| Buse | L | 3-25 | W | 25-30 |
| Svea | L | 0-6 | W | 10-15 |
| MINOR COMPONENTS | | | | |
| Southam | SICL | 0-1 | VP | 5-10 |
| Hamerly | L | 0-1 | SP | 1-5 |
| Sioux | L | 6-15 | E | 1-5 |

L, loam; SICL, silty clay loam
VP, very poor; SP, somewhat poor; W, well;E, excessive

### Description

### Major Limitations for Agricultural Use

## 75—Williams-Zahl-Bowbells Association, level to gently rolling

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Williams | L | 0-9 | W | 55-60 |
| Zahl | L | 3-9 | W | 15-20 |
| Bowbells | L | 0-6 | W | 10-15 |
| MINOR COMPONENTS | | | | |
| Bowdle | L | 0-6 | W | 1-5 |
| Parnell | SICL | 0-1 | VP | 1-5 |
| Tonka | SIL | 0-1 | P | 1-5 |
| Noonan | L | 0-6 | W | 1-5 |

L, loam; SIL, silt loam;SICL, silty clay loam
VP, very poor; P, poor; W, well

### Description

### Major Limitations for Agricultural Use

## 76—Williams-Zahl Association, undulating to rolling

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Williams | L | 3-15 | W | 50-55 |
| Zahl | L | 3-15 | W | 30-35 |
| MINOR COMPONENTS | | | | |
| Bowbells | L | 0-6 | W | 5-10 |
| Parnell | SIL | 0-1 | VP | 5-10 |
| Wabek | L | 6-30 | E | 1-5 |

L, loam; SIL, silt loam
VP, very poor; W, well;E, excessive

### Description

### Major Limitations for Agricultural Use

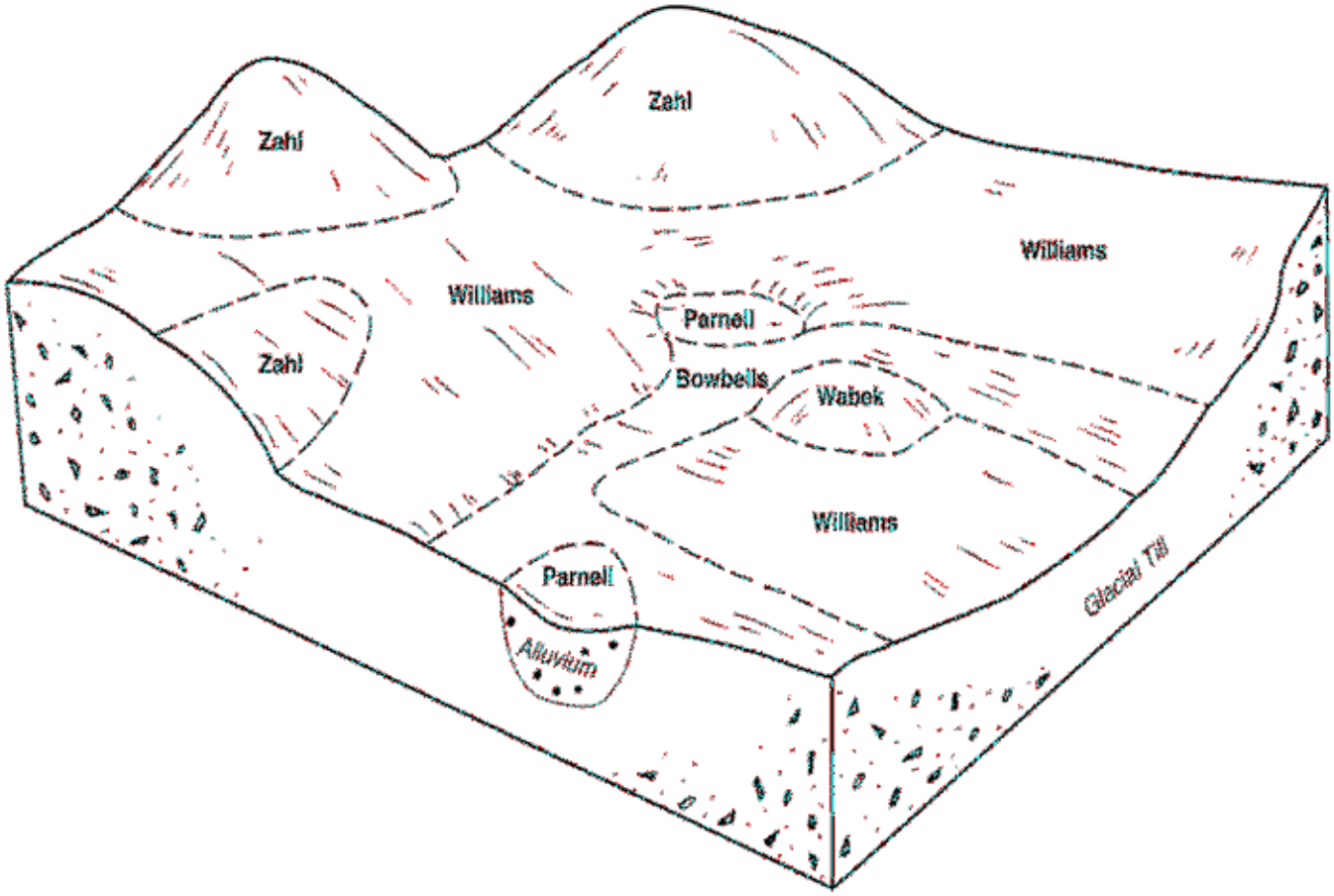


**Figure 3. Typical pattern of soils and underlying material in the Williams-Zahl association.**

## 78—Williams-Arnegard-Amor Association, level to rolling

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Williams | L | 0-9 | W | 40-45 |
| Arnegard | L | 0-6 | W | 15-20 |
| Amor | L | 3-15 | W | 10-15 |
| MINOR COMPONENTS | | | | |
| Grail | SICL | 1-6 | W | 5-10 |
| Cabba | L | 9-45 | W | 5-10 |
| Daglum | SIL | 0-9 | W | 5-10 |
| Lehr | L | 0-6 | W | 1-5 |

L, loam;SIL, silt loam;SICL, silty clay loam
W, well

### Description

### Major Limitations for Agricultural Use

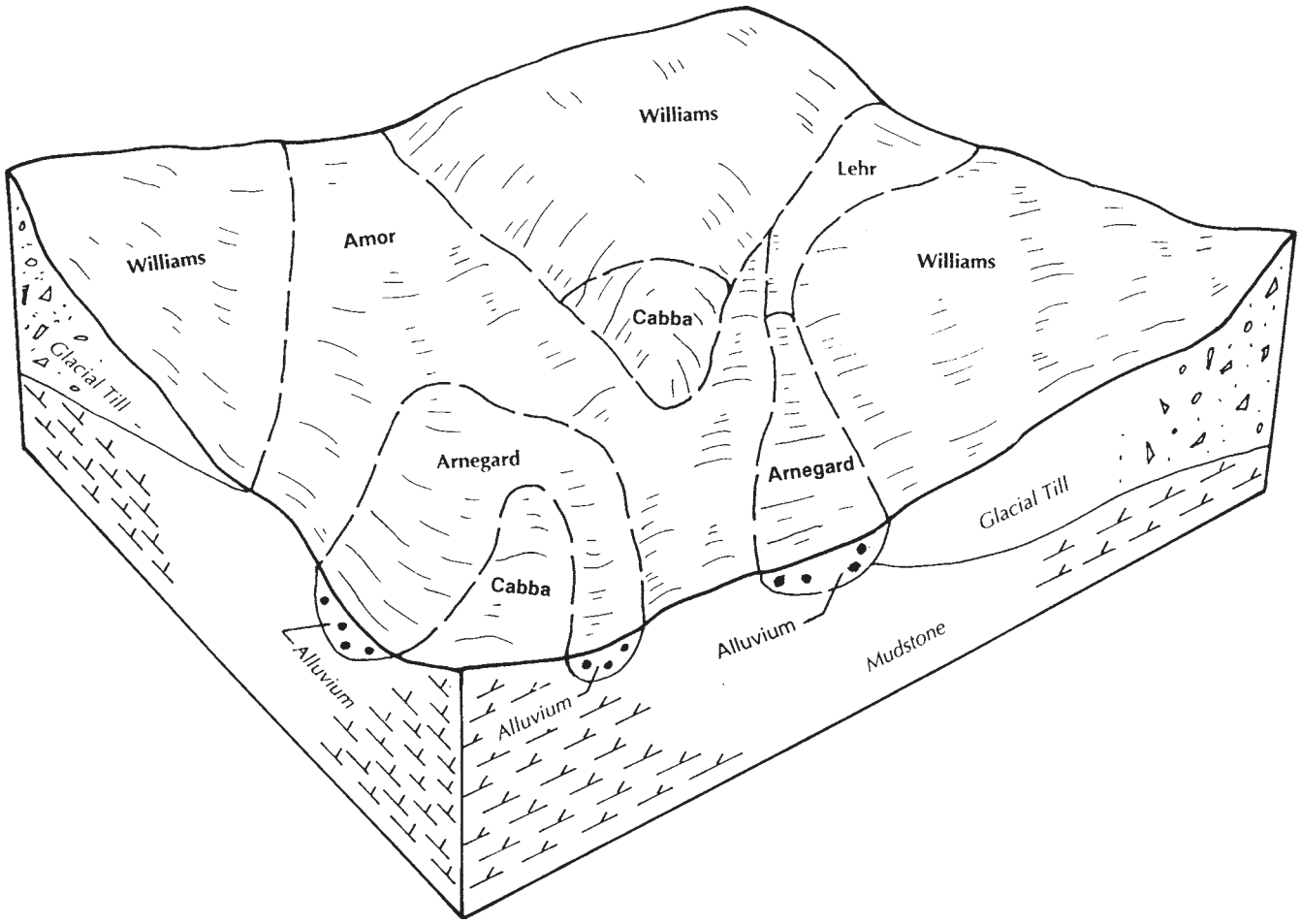


**Figure 4. Typical pattern of soils and underlying material in the Williams-Arnegard-Amor association.**

## 84—Williams-Flaxton Association, nearly level to gently rolling

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Williams | L | 3-9 | W | 40-45 |
| Flaxton | FSL | 1-9 | W | 35-40 |
| MINOR COMPONENTS | | | | |
| Lehr | L | 0-6 | SE | 5-10 |
| Zahl | L | 6-15 | W | 5-10 |
| Regent | SICL | 3-9 | W | 1-5 |
| Harriet | SIL | 0-1 | P | 1-5 |

FSL, fine sandy loam;L, loam; SIL, silt loam;SICL, silty clay loam
P, poor;W, well,SE, somewhat excessive

### Description

### Major Limitations for Agricultural Use

## 87— Zahl-Williams-Parnell Association, level to steep

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Zahl | L | 6-35 | W | 40-45 |
| Williams | L | 3-25 | W | 35-40 |
| Parnell | SICL | 0-1 | VP | 15-20 |
| MINOR COMPONENTS | | | | |
| Southam | SICL | 0-1 | VP | 5-10 |
| Wabek | L | 6-25 | E | 1-5 |

L, loam; SICL, silty clay loam
VP, very poor;W, well;E, excessive

**Description**

**Major Limitations for Agricultural Use**

## 88—Overly-Nutley-Rusklyn Association, level to gently rolling

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Overly | SIC | 0-6 | W | 25-30 |
| Nutley | SICL | 0-3 | W | 25-30 |
| Rusklyn | SICL | 3-9 | W | 20-25 |
| MINOR COMPONENTS | | | | |
| Barnes | L | 1-6 | W | 5-10 |
| Southam | SICL | 0-1 | VP | 5-10 |
| Parnell | SICL | 0-1 | VP | 1-5 |
| Vallers, saline | L | 0-3 | P | 1-5 |

L, loam; SICL, silty clay loam;SIC, silty clay
VP, very poor;P, poor;W, well

### Description

### Major Limitations for Agricultural Use

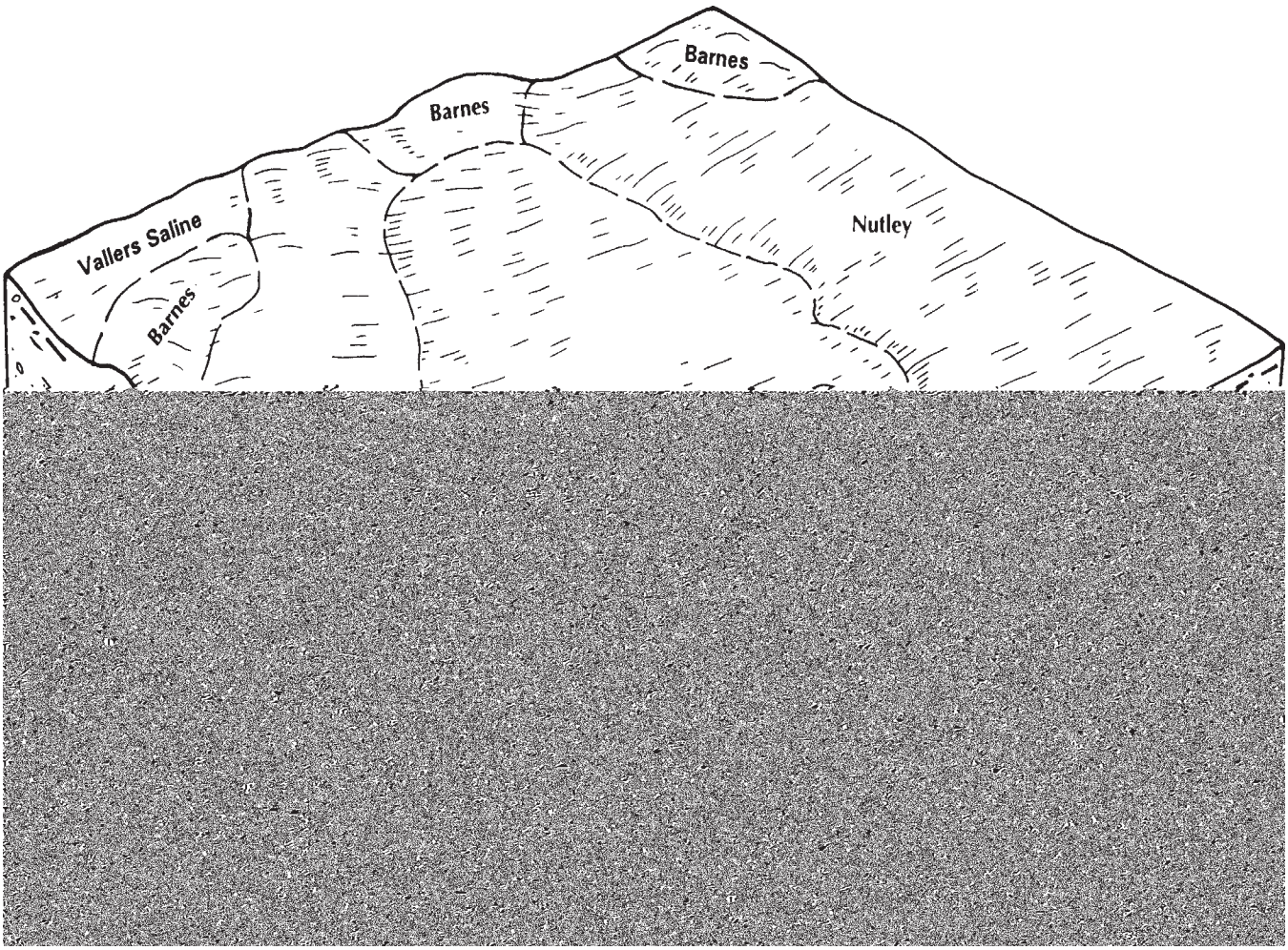


**Figure 5. Typical pattern of soils and underlying material in the Overly-Nutley-Rusklyn association.**

## 112 —Wabek-Appam-Lehr Association, level to hilly

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Wabek | SL | 3-25 | W | 50-55 |
| Appam | SL | 0-15 | W | 30-35 |
| Lehr | L | 1-6 | W | 15-20 |
| MINOR COMPONENTS | | | | |
| Williams | L | 3-25 | W | 1-5 |
| Parnell | SIL | 0-1 | VP | 1-5 |
| Marysland | SIL | 0-1 | P | 1-5 |
| Zahl | L | 3-25 | W | 1-5 |

SL, sandy loam;L, loam; SIL, silt loam
VP, very poor;P, poor;W, well

### Description

### Major Limitations for Agricultural Use

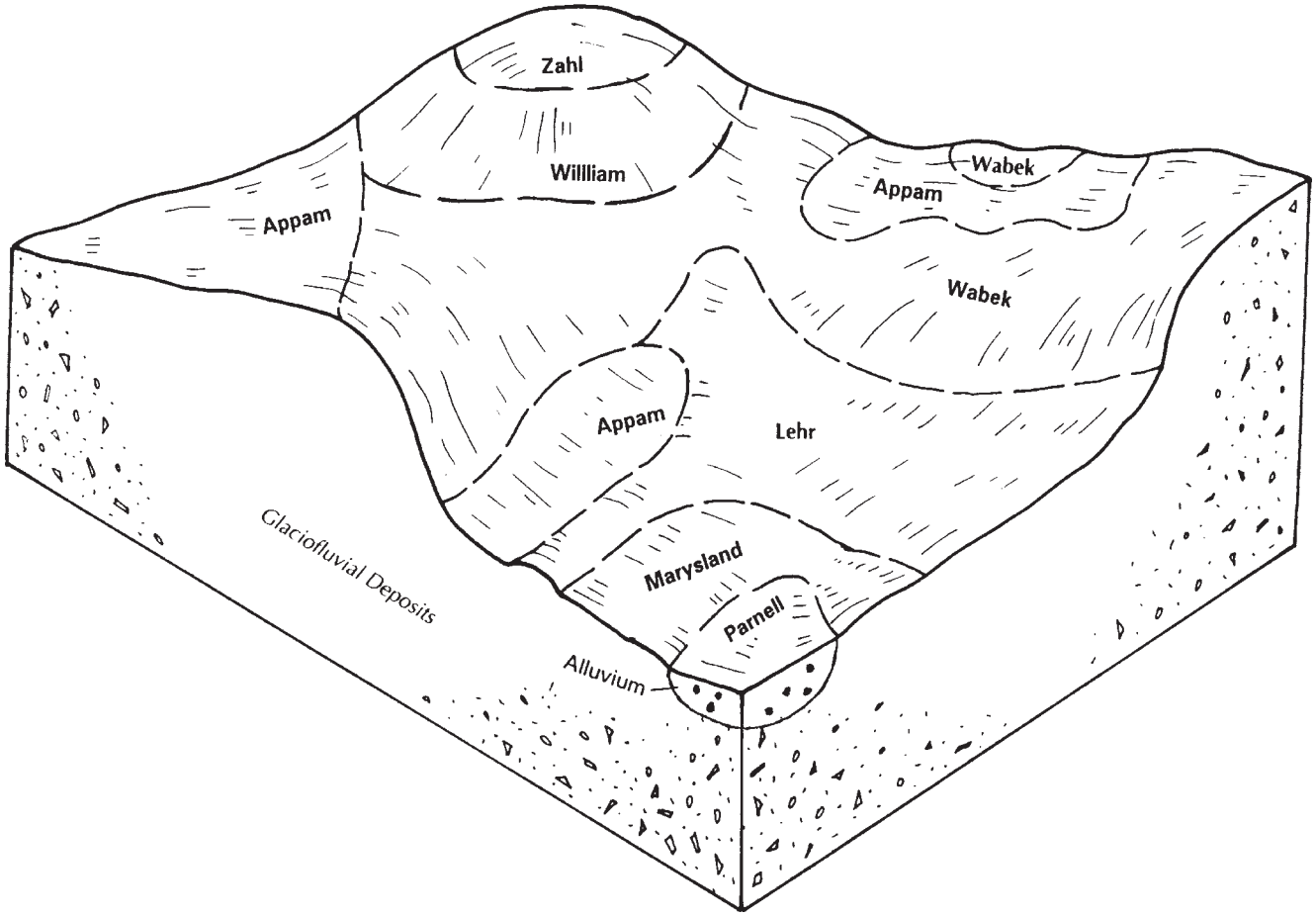


**Figure 6. Typical pattern of soils and underlying material in the Wabek-Appam-Lehr association.**

## 123—Vebar-Amor-Cohagen Association, undulating to very steep

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Vebar | FSL | 3-15 | W | 40-45 |
| Amor | L | 3-15 | W | 20-25 |
| Cohagen | FSL | 6-50 | W | 15-20 |
| MINOR COMPONENTS | | | | |
| Werner | L | 3-50 | W | 10-15 |
| Arnegard | L | 0-6 | W | 5-10 |
| Daglum | SIL | 0-3 | W | 1-5 |

FSL, fine sandy loam;L, loam;SIL, silt loam
W, well

**Description**

**Major Limitations for Agricultural Use**

## 169—Zahl-Williams Association, undulating to very steep

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Zahl | L | 3-45 | W | 50-55 |
| Williams | L | 3-15 | W | 35-40 |
| MINOR COMPONENTS | | | | |
| Parnell | SICL | 0-1 | VP | 5-10 |
| Niobell | L | 0-6 | W | 1-5 |
| Wabek | L | 6-25 | E | 1-5 |

L, loam;SICL, silty clay loam
VP, very poor;W, well;E, excessive

**Description**

**Major Limitations for Agricultural Use**

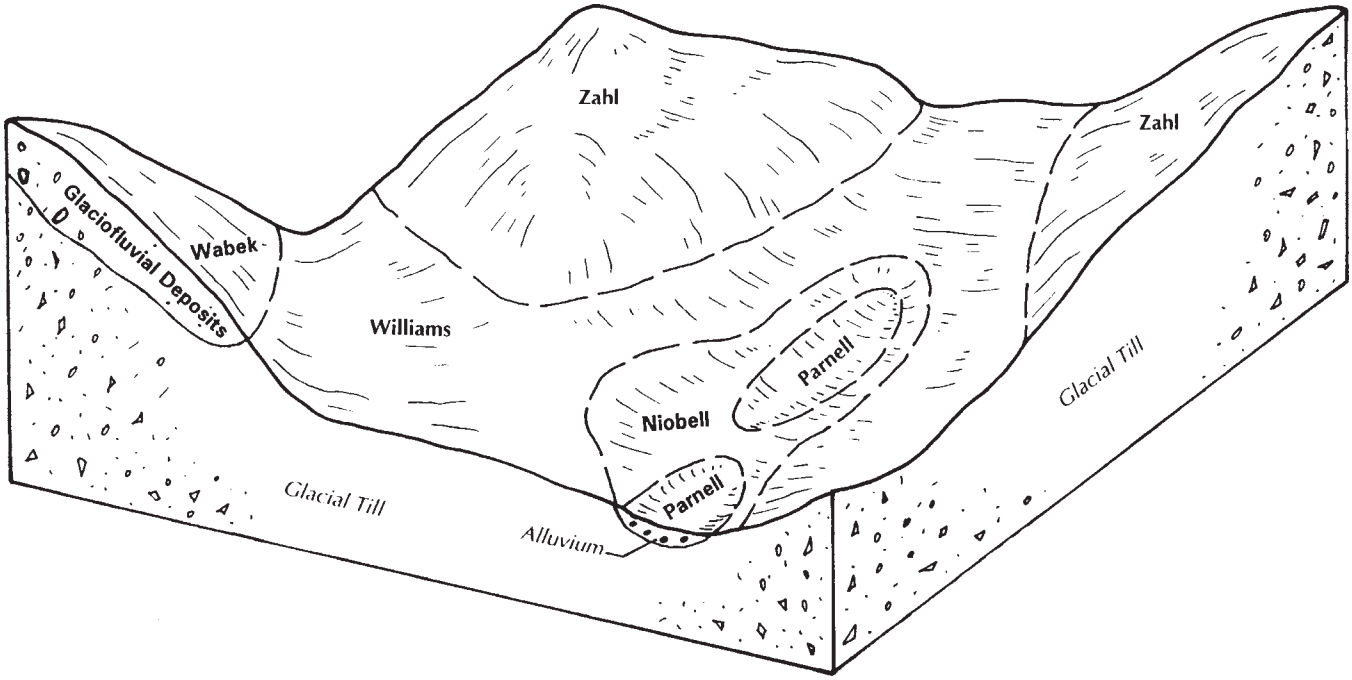


**Figure 7. Typical pattern of soils and underlying materials in the Zahl-Williams association.**

## 191—Southam-Harriet-Marysland Association, level

| | SURFACE TEXTURE* | SLOPE PERCENT | DRAINAGE** | PERCENT COMPOSITION |
|---|---|---|---|---|
| MAJOR COMPONENTS | | | | |
| Southam | SICL | 0-1 | VP | 30-35 |
| Harriet | L | 0-1 | P | 20-25 |
| Marysland | L | 0-1 | P | 10-15 |
| MINOR COMPONENTS | | | | |
| Karlsruhe | COSL | 0-1 | SP | 5-10 |
| Colvin | SIL | 0-1 | P | 5-10 |
| Divide | L | 0-3 | SP | 1-5 |
| Wabek | SL | 0-25 | E | 1-5 |

COSL, coarse sandy loam;SL, sandy loam;L, loam;SIL, silt loam;SICL, silty clay loam
VP, very poor;SP, somewhat poor;P, poor;E, excessive

### Description

### Major Limitations for Agricultural Use

# Detailed Soil Map Units

Map units on the detailed soil maps represent soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the soil maps and interpretive tables, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. The soils or miscellaneous areas are called map unit components. The map unit descriptions in this section describe the setting of the map unit or where on the landscape named map unit components can be found. The composition, or the proportion, of various soils or miscellaneous areas of a map unit determine how a map unit is named.

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

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called similar soils. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting or dissimilar soils. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. Included soils or miscellaneous areas are mentioned in the map unit descriptions. Soil interpretations in this manuscript are for named map unit components only.

A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

The map unit descriptions on the following pages give a range in composition for the named map unit components and similar soils. They also give the average component composition of named, similar, and dissimilar soils.

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

Soils of one series can differ in texture of the surface layer or of underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Williams loam, 6 to 9 percent slopes, is one of the phases of the Williams series.

A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in

such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Wabek-Lehr complex, 1 to 6 percent slopes, is an example.

An undifferentiated group is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Hamerly and Vallers loams, saline, 0 to 3 percent slopes, is an undifferentiated group in this survey area.

This survey includes miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Pits, gravel and sand, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by special symbols on the soil maps.

The map unit descriptions on the following pages give information on each named component. Information such as surface layer texture, depth class, and drainage class are included. There is also information concerning the management of the map unit.

An identifying symbol precedes the map unit name in each map unit description. This symbol is used to identify delineations on the soil maps.

Table 4, “Acreage and Proportionate Extent of the Soils,” gives the acreage and proportionate extent of each map unit in the survey area. Additional information about each named component and map unit inclusion can be found in “Soil Series and Their Morphology.” Hydric soils information can be found in the section “Hydric Soils.” Table 24 “Hydric Soil List” indicates the map unit components with hydric conditions. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The “Glossary” defines many of the terms used in describing the soils or miscellaneous areas

## 30—Amor-Arnegard loams, 0 to 3 percent slopes

### Setting:

Amor soils occur on convex rises. Arnegard soils occur on alluvial flats and in concave swales. This map unit occurs on uplands.

### Map Unit Composition (percent)

**Named Components**

Amor and similar soils: 50 to 70 percent
Arnegard and similar soils: 10 to 20 percent

**Average Component Composition**

Amor: 58 percent
Reeder: 14 percent
Arnegard: 10 percent
Farnuf: 6 percent
Daglum: 3 percent
Stady: 3 percent
Vebar: 3 percent
Parshall: 2 percent
Cabba: 1 percent

### Named Component Description

**Amor**

Slope: 0 to 3 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bw—8 to 19 inches; loam
Bk—19 to 31 inches; loam
Cr—31 to 60 inches; bedrock

**Arnegard**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 13 inches; loam
Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and

Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Eng,ineering and Soil Properties.

## 40—Amor-Werner-Farnuf loams, 6 to 9 percent slopes

### Setting:

Amor soils occur on backslopes of knolls and ridges. Werner soils occur on shoulders of knolls and ridges. Farnuf soils are on flats and terraces. This map unit occurs on uplands.

### Map Unit Composition (percent)

**Named Components**

Amor and similar soils: 25 to 40 percent
Werner and similar soils: 10 to 30 percent
Farnuf and similar soils: 10 to 35 percent

**Average Component Composition**

Amor: 30 percent
Werner: 24 percent
Farnuf: 20 percent
Amor, gently sloping: 12 percent
Vebar: 4 percent
Arnegard: 3 percent
Tally: 3 percent
Cohagen: 2 percent
Regent: 2 percent

### Named Component Description

**Amor**

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bw—8 to 19 inches; loam
Bk—19 to 31 inches; loam
Cr—31 to 60 inches; bedrock

**Werner**

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loam
Bk—6 to 17 inches; loam
Cr—17 to 60 inches; bedrock

**Farnuf**

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 9 inches; loam
Bt—9 to 23 inches; clay loam
Bk—23 to 34 inches; loam
BC—34 to 60 inches; stratified fine sandy loam to silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland,

Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 41—Amor-Werner loams, 9 to 15 percent slopes

### Setting:

Amor soils occur on backslopes. Werner soils occur on shoulders. This map unit occurs on ridges on uplands.

### Map Unit Composition (percent)

**Named Components**

Amor and similar soils: 30 to 55 percent
Werner and similar soils: 25 to 40 percent

**Average Component Composition**

Amor: 44 percent
Werner: 30 percent
Amor, moderately sloping: 7 percent
Arnegard: 3 percent
Chama: 3 percent
Farnuf: 3 percent
Parshall: 3 percent
Werner, moderately sloping: 3 percent
Cohagen: 2 percent
Vebar: 2 percent

### Named Component Description

**Amor**

Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bw—8 to 19 inches; loam
Bk—19 to 31 inches; loam
Cr—31 to 60 inches; bedrock

**Werner**

Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loam
Bk—6 to 17 inches; loam
Cr—17 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 76—Arvilla sandy loam, 0 to 6 percent slopes

### Setting:

Arvilla soils occur on rises on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Arvilla and similar soils: 70 to 90 percent

**Average Component Composition**

Arvilla: 79 percent
Lohnes: 7 percent
Sioux: 6 percent
0sakis: 2 percent
Claire: 2 percent
Divide: 1 percent
Fordville: 1 percent
Renshaw: 1 percent
Wyrene: 1 percent

### Named Component Description

**Arvilla**

Slope: 0 to 6 percent

**Figure 8. An area of Arvilla sandy loam, 1 to 6 percent slopes. Many acres of this soil are irrigated in northern Logan County.**

Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 14 to 25 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 10 inches; sandy loam
Bw—10 to 16 inches; sandy loam
2Bk—16 to 31 inches; gravelly coarse sand
2C—31 to 60 inches; gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland (fig. 8)

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 118—Barnes-Buse loams, 3 to 6 percent slopes

### Setting:

Barnes soils occur on knolls. Buse soils occur on ridges. This map unit occurs on moraines and till plains.

### Map Unit Composition (percent)

**Named Components**

Barnes and similar soils: 35 to 60 percent
Buse and similar soils: 25 to 45 percent

**Average Component Composition**

Barnes: 45 percent
Buse: 35 percent
Svea: 10 percent
Hamerly: 3 percent
Nutley: 3 percent
Tonka: 2 percent
Cavour: 1 percent
Parnell: 1 percent

### Named Component Description

**Barnes**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; loam
Bw—7 to 19 inches; loam
Bk—19 to 37 inches; loam
C—37 to 60 inches; loam

**Buse**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bk—8 to 40 inches; loam
C—40 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 156—Barnes-Svea loams, 3 to 6 percent slopes

### Setting:

Barnes soils are on backslopes of rises. Svea soils are on footslopes and in swales. This map unit occurs on till plains.

### Map Unit Composition (percent)

**Named Components**

Barnes and similar soils: 35 to 60 percent
Svea and similar soils: 20 to 40 percent

**Average Component Composition**

Barnes: 47 percent
Svea: 28 percent
Buse: 8 percent
Cresbard: 5 percent
Hamerly: 4 percent
Parnell: 3 percent
Tonka: 3 percent
Cavour: 1 percent
Vallers: 1 percent

### Named Component Description

**Barnes**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; loam
Bw—7 to 19 inches; loam
Bk—19 to 37 inches; loam
C—37 to 60 inches; loam

**Svea**

Slope: 3 to 6 percent

Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 10 inches; loam
Bw—10 to 21 inches; loam
Bk—21 to 36 inches; clay loam
C—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 313—Buse-Barnes loams, 6 to 9 percent slopes

### Setting:

Buse soils occur on shoulders of knolls and ridges. Barnes soils occur on backslopes of knolls. This map unit occurs on moraines and till plains.

### Map Unit Composition (percent)

**Named Components**

Buse and similar soils: 40 to 65 percent
Barnes and similar soils: 25 to 50 percent

**Average Component Composition**

Buse: 50 percent
Barnes: 27 percent
Svea: 11 percent
Langhei: 5 percent
Parnell: 3 percent
Tonka: 2 percent
Hamerly: 1 percent
Sioux: 1 percent

### Named Component Description

**Buse**

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bk—8 to 40 inches; loam
C—40 to 60 inches; loam

**Barnes**

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; loam
Bw—7 to 19 inches; loam
Bk—19 to 37 inches; loam
C—37 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 314—Buse-Barnes loams, 9 to 15 percent slopes

### Setting:

Buse soils occur on shoulders of knolls and ridges. Barnes soils occur on backslopes of knolls. This map unit occurs on moraines and till plains.

### Map Unit Composition (percent)

**Named Components**

Buse and similar soils: 30 to 55 percent
Barnes and similar soils: 20 to 40 percent

**Average Component Composition**

Buse: 43 percent
Barnes: 28 percent
Svea: 13 percent
Langhei: 10 percent
Parnell: 2 percent
Hamerly: 1 percent
Southam: 1 percent
Tonka: 1 percent
Vallers: 1 percent

### Named Component Description

**Buse**

Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 8 inches; loam
Bk—8 to 40 inches; loam
C—40 to 60 inches; loam

**Barnes**

Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; loam
Bw—7 to 19 inches; loam
B—19 to 37 inches; loam
C—37 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 319—Buse-Barnes loams, 15 to 35 percent slopes

### Setting:

Buse soils occur on shoulders. Barnes soils occur on backslopes. This map unit occur on knolls and ridges on moraines.

### Map Unit Composition (percent)

**Named Components**

Buse and similar soils: 25 to 45 percent
Barnes and similar soils: 35 to 60 percent

**Average Component Composition**

Buse: 40 percent
Barnes: 35 percent
Langhei: 8 percent
Svea: 8 percent
Sioux: 5 percent
Darnen: 2 percent
Vallers: 2 percent

### Named Component Description

**Buse**

Slope: 15 to 35 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 8 inches; loam
B—8 to 40 inches; loam
C—40 to 60 inches; loam

**Barnes**

Slope: 15 to 25 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None

Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; loam
Bw—7 to 19 inches; loam
B—19 to 37 inches; loam
C—37 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 450—Colvin silt loam

### Setting:

Colvin soils occur on flats on lake plains and in drainageways on till plains.

### Map Unit Composition (percent)

**Named Components**

Colvin and similar soils: 80 to 95 percent

**Average Component Composition**

Colvin: 87 percent
Marysland: 4 percent
Parnell: 4 percent
Regan: 2 percent
Bearden: 1 percent
Divide: 1 percent
Southam: 1 percent

### Named Component Description

**Colvin**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Poorly drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 10 inches; silt loam
Bkg—10 to 30 inches; silty clay loam
Cg—30 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 511—Divide loam, 0 to 3 percent slopes

### Setting:

Divide soils occur on flats on terraces and outwash plains.

### Map Unit Composition (percent)

**Named Components**

Divide and similar soils: 60 to 80 percent

**Average Component Composition**

Divide: 68 percent
Karlsruhe: 12 percent
Marysland: 6 percent
Hamerly: 5 percent
Bowdle: 4 percent
Tonka: 3 percent
Vallers: 1 percent
Wabek: 1 percent

### Named Component Description

**Divide**

Slope: 0 to 3 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 20 to 40 inches
Drainage Class: Somewhat poorly drained
Flooding: None

Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Ak—8 to 12 inches; loam
Bk—12 to 22 inches; loam
2C1—22 to 26 inches; gravelly loamy coarse sand
2C2—26 to 60 inches; very gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Hamerly: 1 percent
Parnell: 1 percent

### Named Component Description

**Flaxton**

Slope: 1 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 15 inches; fine sandy loam
Bw—15 to 22 inches; fine sandy loam
2Bt1—22 to 25 inches; clay loam
2Bt2—25 to 30 inches; clay loam
2Bw—30 to 35 inches; clay loam
2Bk—35 to 42 inches; clay loam
2BCk—42 to 60 inches; clay loam

**Williams**

Slope: 1 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 714—Flaxton-Williams complex, 6 to 9 percent slopes

### Setting:

Flaxton soils are in swales. Williams soils are on summits and shoulders. This map unit occurs on rises and knolls on till plains.

### Map Unit Composition (percent)

**Named Components**

Flaxton and similar soils: 25 to 55 percent
Williams and similar soils: 15 to 35 percent

**Average Component Composition**

Flaxton: 43 percent
Williams: 23 percent
Parshall: 15 percent
Zahl: 9 percent
Appam: 5 percent
Tally: 2 percent
Parnell: 1 percent
Telfer: 1 percent
Wabek: 1 percent

### Named Component Description

**Flaxton**

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 15 inches; fine sandy loam
Bw—15 to 22 inches; fine sandy loam
2Bt1—22 to 25 inches; clay loam
2Bt2—25 to 30 inches; clay loam
2Bw—30 to 35 inches; clay loam
2Bk—35 to 42 inches; clay loam
2BCk—42 to 60 inches; clay loam

**Williams**

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None

Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 727—Fordville loam, 0 to 3 percent slopes

### Setting:

Fordville soils occur on flats on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Fordville and similar soils: 35 to 60 percent

**Average Component Composition**

Fordville: 48 percent
Renshaw: 18 percent
Spottswood: 12 percent
Divide: 7 percent
Svea: 6 percent
Sioux: 3 percent
Arvilla: 2 percent
Swenoda: 2 percent
Barnes: 1 percent
Hamerly: 1 percent

### Named Component Description

**Fordville**

Slope: 0 to 3 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bw1—6 to 12 inches; loam
Bw2—12 to 24 inches; loam
2C—24 to 60 inches; very gravelly sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 863—Hamerly loam, 0 to 3 percent slopes

### Setting:

Hamerly soils occur on flats on till plains.

### Map Unit Composition (percent)

**Named Components**

Hamerly and similar soils: 60 to 80 percent

**Average Component Composition**

Hamerly: 69 percent
Vallers, saline: 8 percent
Svea: 6 percent
Colvin: 4 percent
Overly: 4 percent
Divide: 3 percent
Tonka: 3 percent
Parnell: 2 percent
Hamerly, saline: 1 percent

### Named Component Description

**Hamerly**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat poorly drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bk—8 to 35 inches; loam
C—35 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 883—Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes

### Setting:

Hamerly soils are on flats. Tonka soils are in shallow depressions. Parnell soils are in deep depressions. This map unit occurs on till plains.

### Map Unit Composition (percent)

**Named Components**

Hamerly and similar soils: 20 to 45 percent
Tonka and similar soils: 15 to 35 percent
Parnell and similar soils: 15 to 35 percent

**Average Component Composition**

Hamerly: 38 percent
Tonka: 27 percent
Parnell: 16 percent
Vallers: 7 percent
Svea: 4 percent
Cavour: 3 percent
Barnes: 2 percent
Wyard: 2 percent
Miranda: 1 percent

### Named Component Description

**Hamerly**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat poorly drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bk—8 to 35 inches; loam
C—35 to 60 inches; loam

**Tonka**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 13 inches; silt loam
E—13 to 19 inches; loam
Bt—19 to 34 inches; silty clay loam
2BC—34 to 50 inches; clay loam
2Cg—50 to 60 inches; clay loam

**Parnell**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A1—0 to 15 inches; silty clay loam
A2—15 to 22 inches; silt loam
Btg1—22 to 32 inches; silty clay loam

Btg2—32 to 55 inches; silty clay
BCg—55 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1011—Karlsruhe coarse sandy loam

### Setting:

Karlsruhe soils occur on flats on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Karlsruhe and similar soils: 50 to 70 percent

**Average Component Composition**

Karlsruhe: 60 percent
Wyrene: 31 percent
Marysland: 3 percent
Arveson: 2 percent
Divide: 2 percent
Arvilla: 1 percent
Stirum: 1 percent

### Named Component Description

**Karlsruhe**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat poorly drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; coarse sandy loam
Ak—5 to 11 inches; coarse sandy loam
ABk—11 to 15 inches; loamy coarse sand
Bk—15 to 30 inches; loamy coarse sand
C—30 to 60 inches; coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Irrigated cropland and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1181—Lohnes loamy coarse sand, 0 to 6 percent slopes

### Setting:

Lohnes soils occur on rises on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Lohnes and similar soils: 70 to 85 percent

**Average Component Composition**

Lohnes: 78 percent
Arvilla: 11 percent
Claire: 6 percent
Maddock: 3 percent
Falsen: 1 percent
Sioux: 1 percent

### Named Component Description

**Lohnes**

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 16 inches; loamy coarse sand
AC—16 to 30 inches; loamy coarse sand
C—30 to 60 inches; coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Irrigated cropland and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1202—Maddock loamy fine sand, 0 to 6 percent slopes

### Setting:

Maddock soils occur on knolls and rises on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Maddock and similar soils: 75 to 90 percent

**Average Component Composition**

Maddock: 82 percent
Lohnes: 11 percent
Arvilla: 3 percent
Embden: 3 percent
Rusklyn: 1 percent

### Named Component Description

**Maddock**

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 10 inches; loamy fine sand
Bw—10 to 14 inches; fine sand
C—14 to 60 inches; fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1249—Appam sandy loam, 0 to 6 percent slopes

### Setting:

Appam soils occur on rises on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Appam and similar soils: 70 to 90 percent

**Average Component Composition**

Appam: 74 percent
Wabek: 11 percent
Ruso: 6 percent
Bowdle: 3 percent
Rusklyn: 3 percent
Lohnes: 2 percent
Lehr: 1 percent

### Named Component Description

**Appam**

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A1—0 to 6 inches; sandy loam
Bw—6 to 15 inches; sandy loam
Bk—15 to 19 inches; sandy loam
2C—19 to 60 inches; gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and

Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland, irrigated cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1267—Marysland loam

### Setting:

Marysland soils occur on flats on outwash plains and in drainageways on till plains.

### Map Unit Composition (percent)

**Named Components**

Marysland and similar soils: 70 to 85 percent

**Average Component Composition**

Marysland: 75 percent
Divide: 7 percent
Harriet: 6 percent
Colvin: 4 percent
Parnell: 3 percent
Hamerly: 2 percent
Karlsruhe: 2 percent
Southam: 1 percent

### Named Component Description

**Marysland**

Slope: 0 to 1 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 20 to 40 inches
Drainage Class: Poorly drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 9 inches; loam
Ak—9 to 12 inches; loam
Bkg1—12 to 15 inches; loam
Bkg2—15 to 20 inches; loam
Bkg3—20 to 27 inches; loam
2Cg1—27 to 40 inches; stratified fine sand to gravelly coarse sand
2Cg2—40 to 60 inches; stratified fine sand to gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1372—Noonan-Williams loams, 1 to 6 percent slopes

### Setting:

Noonan soils occur in swales. Williams soils occur on rises. This map unit occurs on till plains.

### Map Unit Composition (percent)

**Named Components**

Noonan and similar soils: 45 to 65 percent
Williams and similar soils: 15 to 35 percent

**Average Component Composition**

Noonan: 54 percent
Williams: 19 percent
Niobell: 8 percent
Harriet: 7 percent
Bowbells: 4 percent
Zahl: 4 percent
Hamerly: 3 percent
Tonka: 1 percent

### Named Component Description

**Noonan**

Slope: 1 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 5 to 10 inches

Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Sodic within 30 inches
**Typical profile:**
Ap—0 to 6 inches; loam
Btn1—6 to 9 inches; clay loam
Btn2—9 to 12 inches; clay loam
Bky1—12 to 20 inches; clay loam
Bky2—20 to 28 inches; clay loam
BCy—28 to 60 inches; clay loam

**Williams**

Slope: 1 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1374—Nutley silty clay, 0 to 3 percent slopes

### Setting:

Nutley soils occur on flats on lake plains.

### Map Unit Composition (percent)

**Named Components**

Nutley and similar soils: 65 to 80 percent

**Average Component Composition**

Nutley: 69 percent
Sinai: 22 percent
Rusklyn: 4 percent
Buse: 2 percent
Bryant: 1 percent
Fargo: 1 percent
Overly: 1 percent

### Named Component Description

**Nutley**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; silty clay
Bss—7 to 20 inches; clay
C—20 to 60 inches; clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1375—Nutley silty clay, 3 to 6 percent slopes

### Setting:

Nutley soils occur on rises on lake plains.

### Map Unit Composition (percent)

**Named Components**

Nutley and similar soils: 55 to 75 percent

**Average Component Composition**

Nutley: 64 percent
Sinai: 15 percent
Rusklyn: 9 percent
Great Bend: 4 percent
Barnes: 3 percent
Bearden: 2 percent
Overly: 2 percent
Hegne: 1 percent

### Named Component Description

**Nutley**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; silty clay
Bss—7 to 20 inches; clay
C—20 to 60 inches; clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1427—Parnell silty clay loam

### Setting:

Parnell soils occur in depressions on till plains.

### Map Unit Composition (percent)

**Named Components**

Parnell and similar soils: 75 to 95 percent

**Average Component Composition**

Parnell: 88 percent
Vallers: 4 percent
Southam: 3 percent
Marysland: 2 percent
Tonka: 2 percent
Colvin: 1 percent

### Named Component Description

**Parnell**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A1—0 to 15 inches; silty clay loam
A2—15 to 22 inches; silt loam
Btg1—22 to 32 inches; silty clay loam
Btg2—32 to 55 inches; silty clay
BCg—55 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Wetland wildlife habitat and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1437—Parshall fine sandy loam, 0 to 3 percent slopes

### Setting:

Parshall soils occur on flats on terraces and uplands.

### Map Unit Composition (percent)

**Named Components**

Parshall and similar soils: 55 to 75 percent

**Average Component Composition**

Parshall: 67 percent
Tally: 11 percent
Arnegard: 4 percent
Bryant: 4 percent
Flaxton: 4 percent
Telfer: 4 percent
Bowdle: 3 percent
Appam: 2 percent
Niobell: 1 percent

### Named Component Description

**Parshall**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 12 inches; fine sandy loam
Bw—12 to 29 inches; fine sandy loam
Bk—29 to 48 inches; fine sandy loam
BCk—48 to 60 inches; loamy fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1466—Pits, gravel and sand

### Setting:

Gravel and sand pits occur on outwash plains and terraces.

### Map Unit Composition (percent)

**Named Components**

Pits, gravel and sand and similar soils:

**Average Component Composition**

Pits, gravel and sand: 90 percent
Parnell: 5 percent
Wabek: 5 percent

### Named Component Description

**Definition:** Areas from which soil and gravel have been removed. Some areas have been smoothed and overburden material replaced.
Slope: 0 to 60 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

### Management

**Major uses:** Wildlife habitat

For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1676—Wildrose silty clay

### Setting:

Wildrose soils occur on flats on lake plains and till plains.

### Map Unit Composition (percent)

**Named Components**

Wildrose and similar soils: 65 to 85 percent

**Average Component Composition**

Wildrose: 67 percent
Mondamin: 16 percent
Bearden: 4 percent
Rusklyn: 4 percent
Aberdeen: 3 percent
Bryant: 2 percent
Makoti: 1 percent
Parnell: 1 percent
Williams: 1 percent
Zahl: 1 percent

### Named Component Description

**Wildrose**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; silty clay
A—6 to 14 inches; clay
Bss1—14 to 21 inches; clay
Bss2—21 to 31 inches; clay
Bss3—31 to 38 inches; clay
By—38 to 44 inches; clay
BC—44 to 58 inches; clay
C—58 to 60 inches; silty clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1697—Sioux-Arvilla complex, 0 to 6 percent slopes

### Setting:

Sioux soils are on knolls and rises. Arvilla soils are on flats. This map unit occurs on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Sioux and similar soils: 50 to 75 percent
Arvilla and similar soils: 10 to 30 percent

**Average Component Composition**

Sioux: 63 percent
Arvilla: 18 percent
Fordville: 13 percent
Divide: 2 percent
Heimdal: 2 percent
Renshaw: 2 percent

### Named Component Description

**Sioux**

Slope: 0 to 6 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 6 to 14 inches
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; loam
AC—5 to 8 inches; gravelly loam
C—8 to 60 inches; very gravelly sand

**Arvilla**

Slope: 0 to 6 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 14 to 25 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 10 inches; sandy loam
Bw—10 to 16 inches; sandy loam
2Bk—16 to 31 inches; gravelly coarse sand
2C—31 to 60 inches; gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland,

Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1710—Southam silty clay loam

### Setting:

Southam soils occur in depressions on till plains and lake plains.

### Map Unit Composition (percent)

**Named Components**

Southam and similar soils: 80 to 95 percent

**Average Component Composition**

Southam: 91 percent
Vallers: 4 percent
Lallie: 2 percent
Arveson: 1 percent
Marysland: 1 percent
Minnewaukan: 1 percent

### Named Component Description

**Southam**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Saline within 30 inches
Sodium Affected: Not affected
**Typical profile:**
Ag1—0 to 16 inches; silty clay loam
Ag2—16 to 40 inches; silty clay
Cg—40 to 60 inches; silty clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Wetland wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1762—Svea-Barnes loams, 0 to 3 percent slopes

### Setting:

Svea soils are in swales. Barnes soils are on rises. This map unit occurs on till plains.

### Map Unit Composition (percent)

**Named Components**

Svea and similar soils: 20 to 50 percent
Barnes and similar soils: 35 to 60 percent

**Average Component Composition**

Svea: 48 percent
Barnes: 44 percent
Buse: 3 percent
Hamerly: 2 percent
Tonka: 2 percent
Cresbard: 1 percent

### Named Component Description

**Svea**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 10 inches; loam
Bw—10 to 21 inches; loam
Bk—21 to 36 inches; clay loam
C—36 to 60 inches; loam

**Barnes**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; loam
Bw—7 to 19 inches; loam
Bk—19 to 37 inches; loam
C—37 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1805—Telfer loamy fine sand, 0 to 6 percent slopes

### Setting:

Telfer soils occur on rises on lake plains and uplands.

### Map Unit Composition (percent)

**Named Components**

Telfer and similar soils: 50 to 65 percent

**Average Component Composition**

Telfer: 54 percent
Lihen: 25 percent
Krem: 9 percent
Parshall: 6 percent
Flaxton: 3 percent
Tally: 3 percent

### Named Component Description

**Telfer**

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loamy fine sand
AC—6 to 14 inches; fine sand
C—14 to 60 inches; fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1886—Hamerly and Vallers loams, saline, 0 to 3 percent slopes

### Setting:

Hamerly and Vallers soils occur on flats on till plains.

### Map Unit Composition (percent)

**Named Components**

Vallers, saline and similar soils: 0 to 90 percent
Hamerly, saline and similar soils: 0 to 90 percent

**Average Component Composition**

Vallers, saline: 26 percent
Hamerly, saline: 23 percent
Colvin, saline: 20 percent
Colvin, slightly saline: 8 percent
Hamerly, slightly saline: 8 percent
Vallers, slightly saline: 5 percent
Divide: 3 percent
Harriet: 3 percent
Parnell: 3 percent
Arveson, slightly saline: 1 percent

### Named Component Description

**Vallers, saline**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Poorly drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Not affected
**Typical profile:**
A—0 to 12 inches; loam

Bkg—12 to 32 inches; loam
Cg—32 to 60 inches; loam

**Hamerly, saline**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat poorly drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bk—8 to 35 inches; loam
C—35 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1898—Vebar fine sandy loam, 0 to 6 percent slopes

### Setting:

Vebar soils occur on rises on uplands.

### Map Unit Composition (percent)

**Named Components**

Vebar and similar soils: 30 to 45 percent

**Average Component Composition**

Vebar: 35 percent
Vebar, level and nearly level: 28 percent
Amor: 11 percent
Parshall: 8 percent
Cohagen: 7 percent
Tally: 5 percent
Arnegard: 4 percent
Ruso: 2 percent

### Named Component Description

**Vebar**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; fine sandy loam
Bw—5 to 26 inches; fine sandy loam
C—26 to 32 inches; fine sandy loam
Cr—32 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 1978—Water

### Setting:

Water occurs in depressions and steams. The soils associated with this map unit occur on till plains.

### Map Unit Composition (percent)

**Named Components**

Water: 90 percent

**Average Component Composition**

Water: 90 percent
Colvin, poorly drained: 5 percent
Southam: 5 percent

### Named Component Description

**Definition:** Areas, including ponds, lakes, streams and reservoirs, that are covered with water in most years

during the period that is warm enough for plants to grow or longer.

### Management

For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2006—Williams loam, 6 to 9 percent slopes

### Setting:

Williams soils occur on side slopes of knolls on uplands and till plains.

### Map Unit Composition (percent)

**Named Components**

Williams and similar soils: 55 to 70 percent

**Average Component Composition**

Williams: 65 percent
Bowbells: 18 percent
Zahl: 9 percent
Arnegard: 3 percent
Lehr: 3 percent
Vida: 1 percent
Wilton: 1 percent

### Named Component Description

**Williams**

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2014—Williams-Bowbells loams, 0 to 3 percent slopes

### Setting:

Williams soils occur on rises. Bowbells soils occur in swales. This map unit occurs on till plains.

### Map Unit Composition (percent)

**Named Components**

Williams and similar soils: 35 to 60 percent
Bowbells and similar soils: 25 to 50 percent

### Average Component Composition

Williams: 49 percent
Bowbells: 44 percent
Bowdle: 3 percent
Arnegard: 1 percent
Lehr: 1 percent
Niobell: 1 percent
Zahl: 1 percent

### Named Component Description

**Williams**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam

Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

**Bowbells**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loam
Bt1—6 to 14 inches; clay loam
Bt2—14 to 23 inches; clay loam
Bk—23 to 36 inches; loam
C—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2015—Williams-Bowbells loams, 3 to 6 percent slopes

### Setting:

Williams soils occur on rises. Bowbells soils occur in swales. This map unit occurs on till plains.

### Map Unit Composition (percent)

**Named Components**

Williams and similar soils: 60 to 80 percent
Bowbells and similar soils: 15 to 35 percent

**Average Component Composition**

Williams: 68 percent
Bowbells: 23 percent
Lehr: 3 percent
Bowdle: 2 percent
Zahl: 2 percent
Arnegard: 1 percent
Vida: 1 percent

### Named Component Description

**Williams**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

**Bowbells**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loam
Bt1—6 to 14 inches; clay loam
Bt2—14 to 23 inches; clay loam
Bk—23 to 36 inches; loam
C—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2031—Williams-Zahl loams, 3 to 6 percent slopes

### Setting:

Williams soils occur on summits and backslopes. Zahl soils occur on shoulders. This map unit occurs on ridges and knolls on moraines and till plains.

### Map Unit Composition (percent)

**Named Components**

Williams and similar soils: 45 to 70 percent
Zahl and similar soils: 20 to 45 percent

**Average Component Composition**

Williams: 56 percent
Zahl: 28 percent
Bowbells: 5 percent
Zahill: 5 percent
Arnegard: 3 percent
Hamerly: 1 percent
Parnell: 1 percent
Wabek: 1 percent

### Named Component Description

**Williams**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

**Zahl**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2037—Williams-Zahl-Parnell complex, 0 to 15 percent slopes

### Setting:

Williams soils are on backslopes and summits of knolls and ridges. Zahl soils occurs on shoulders of knolls and ridges. Parnell soils occur in depressions. This map unit occurs on moraines and till plains.

### Map Unit Composition (percent)

**Named Components**

Williams and similar soils: 25 to 45 percent
Zahl and similar soils: 15 to 40 percent
Parnell and similar soils: 15 to 35 percent

**Average Component Composition**

Williams: 33 percent
Zahl: 26 percent
Parnell: 23 percent
Bowbells: 7 percent
Hamerly: 5 percent
Southam: 2 percent
Tonka: 2 percent
Vallers: 2 percent

### Named Component Description

**Williams**

Slope: 3 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None

Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

**Zahl**

Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

**Parnell**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A1—0 to 15 inches; silty clay loam
A2—15 to 22 inches; silt loam
Btg1—22 to 32 inches; silty clay loam
Btg2—32 to 55 inches; silty clay
BCg—55 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, range, and wetland wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2073—Zahl-Max loams, 15 to 45 percent slopes

### Setting:

Zahl soils occur on shoulders. Max soils occur on backslopes. This map unit occurs on knolls and ridges on moraines and till plains.

### Map Unit Composition (percent)

**Named Components**

Zahl and similar soils: 40 to 65 percent
Max and similar soils: 15 to 40 percent

**Average Component Composition**

Zahl: 54 percent
Max: 24 percent
Bowbells: 7 percent
Zahill: 5 percent
Williams: 4 percent
Arnegard: 2 percent
Wabek: 2 percent
Bearpaw: 1 percent
Vida: 1 percent

### Named Component Description

**Zahl**

Slope: 15 to 45 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

**Max**

Slope: 15 to 45 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None

Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loam
Bw—6 to 16 inches; loam
Bk—16 to 37 inches; loam
C—37 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2081—Zahl-Williams loams, 9 to 15 percent slopes

### Setting:

Zahl soils occur on shoulders. Williams soils occur on backslopes and summits. This map unit occurs on knolls and ridges on moraines and till plains.

### Map Unit Composition (percent)

#### Named Components

Zahl and similar soils: 40 to 65 percent
Williams and similar soils: 25 to 40 percent

#### Average Component Composition

Zahl: 52 percent
Williams: 33 percent
Bowbells: 7 percent
Arnegard: 2 percent
Parnell: 2 percent
Hamerly: 1 percent
Tonka: 1 percent
Wabek: 1 percent
Zahill: 1 percent

### Named Component Description

#### Zahl

Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

#### Williams

Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2175—Zahl-Williams loams, 6 to 9 percent slopes

### Setting:

Zahl soils occur on shoulders. Williams soils occur on backslopes and summits. This map unit occurs on knolls and ridges on moraines and till plains.

### Map Unit Composition (percent)

**Named Components**

Zahl and similar soils: 40 to 65 percent
Williams and similar soils: 25 to 50 percent

**Average Component Composition**

Zahl: 49 percent
Williams: 35 percent
Bowbells: 11 percent
Wabek: 2 percent
Hamerly: 1 percent
Krem: 1 percent
Parnell: 1 percent

### Named Component Description

**Zahl**

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

**Williams**

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2188—Wabek-Lehr complex, 1 to 6 percent slopes

### Setting:

Wabek soil occur on ridges. Lehr soils occur on rises. This map unit occurs on outwash plains and collapsed outwash plains.

### Map Unit Composition (percent)

**Named Components**

Wabek and similar soils: 40 to 65 percent
Lehr and similar soils: 25 to 50 percent

**Average Component Composition**

Wabek: 54 percent
Lehr: 27 percent
Bowdle: 10 percent
Stady: 6 percent
Appam: 1 percent
Rusklyn: 1 percent
Zahl: 1 percent

### Named Component Description

**Wabek**

Slope: 1 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; sandy loam
Bk—5 to 9 inches; gravelly coarse sandy loam
C—9 to 60 inches; very gravelly coarse sand

**Lehr**

Slope: 1 to 6 percent

Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 14 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bw—6 to 11 inches; loam
Bk1—11 to 15 inches; loam
2Bk2—15 to 22 inches; gravelly loamy coarse sand
2C—22 to 60 inches; very gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2234—Amor-Werner loams, 3 to 6 percent slopes

### Setting:

Amor soils occur on backslopes. Werner soils occur on summits and shoulders. This map unit occurs on knolls and ridges on uplands.

### Map Unit Composition (percent)

**Named Components**

Amor and similar soils: 35 to 55 percent
Werner and similar soils: 10 to 20 percent

**Average Component Composition**

Amor: 45 percent
Amor, level and nearly level: 16 percent
Werner: 15 percent
Arnegard: 8 percent
Shambo: 7 percent
Vebar: 3 percent
Flasher: 2 percent
Grail: 2 percent
Belfield: 1 percent
Manning: 1 percent

### Named Component Description

**Amor**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bw—8 to 19 inches; loam
Bk—19 to 31 inches; loam
Cr—31 to 60 inches; bedrock

**Werner**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loam
Bk—6 to 17 inches; loam
Cr—17 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2235—Arnegard loam, 0 to 6 percent slopes

### Setting:

Arnegard soils occur on terraces and in swales on uplands.

### Map Unit Composition (percent)

**Named Components**

Arnegard and similar soils: 40 to 60 percent

**Average Component Composition**

Arnegard: 50 percent
Arnegard, gently sloping: 21 percent
Farnuf: 10 percent
Bowdle: 7 percent
Grail: 6 percent
Peta: 2 percent
Reeder: 2 percent
Hamerly: 1 percent
Parnell: 1 percent

### Named Component Description

**Arnegard**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 13 inches; loam
Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2240—Bowdle-Lehr loams, 0 to 3 percent slopes

### Setting:

Bowdle soils occur on flats. Lehr soils occur on rises. This map unit occurs on terraces and outwash plains.

### Map Unit Composition (percent)

**Named Components**

Bowdle and similar soils: 35 to 55 percent
Lehr and similar soils: 35 to 55 percent

**Average Component Composition**

Bowdle: 42 percent
Lehr: 42 percent
Wabek: 8 percent
Stady: 5 percent
Arnegard: 2 percent
Falkirk: 1 percent

### Named Component Description

**Bowdle**

Slope: 0 to 3 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bw1—8 to 16 inches; loam
Bw2—16 to 22 inches; loam
Bk—22 to 25 inches; gravelly loam
2C1—25 to 30 inches; very gravelly loamy sand
2C2—30 to 60 inches; very gravelly loamy sand

**Lehr**

Slope: 0 to 3 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 14 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected

Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bw—6 to 11 inches; loam
Bk1—11 to 15 inches; loam
2Bk2—15 to 22 inches; gravelly loamy coarse sand
2C—22 to 60 inches; very gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland, irrigated cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2241—Bryant loam, 0 to 6 percent slopes

### Setting:

Bryant soils occur on rises on lake plains.

### Map Unit Composition (percent)

**Named Components**

Bryant and similar soils: 80 to 95 percent

**Average Component Composition**

Bryant: 87 percent
Makoti: 5 percent
Bearpaw: 3 percent
Rusklyn: 3 percent
Bowdle: 1 percent
Telfer: 1 percent

### Named Component Description

**Bryant**

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 8 inches; loam
Bw—8 to 15 inches; clay loam
Bk1—15 to 19 inches; loam
Bk2—19 to 32 inches; loam
C—32 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2242—Cohagen-Vebar-Parshall fine sandy loams, 15 to 50 percent slopes

### Setting:

Cohagen soils occur on shoulders of ridges. Vebar soils occur on backslopes and summits of ridges. Parshall soils occur in swales. This map unit occurs on uplands.

### Map Unit Composition (percent)

**Named Components**

Cohagen and similar soils: 25 to 40 percent
Vebar and similar soils: 15 to 35 percent
Parshall and similar soils: 10 to 25 percent

**Average Component Composition**

Cohagen: 28 percent
Vebar: 22 percent
Flasher: 17 percent
Parshall: 16 percent
Beisigl: 3 percent
Rock Outcrop: 3 percent
Telfer: 3 percent
Arnegard: 2 percent
Harriet: 2 percent
Wabek: 2 percent
Werner: 2 percent

### Named Component Description

**Cohagen**

Slope: 15 to 50 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 3 inches; fine sandy loam
C—3 to 17 inches; fine sandy loam
Cr—17 to 60 inches; bedrock

**Vebar**

Slope: 15 to 35 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; fine sandy loam
Bw—5 to 26 inches; fine sandy loam
C—26 to 32 inches; fine sandy loam
Cr—32 to 60 inches; bedrock

**Parshall**

Slope: 15 to 25 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 12 inches; fine sandy loam
Bw—12 to 29 inches; fine sandy loam
Bk—29 to 48 inches; sandy loam
BCk—48 to 60 inches; fine sandy loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2243—Vebar-Flasher complex, 9 to 15 percent slopes

### Setting:

Vebar soils occur on backslopes and summits. Flasher soils occur on shoulders. This map unit occurs on ridges on uplands.

### Map Unit Composition (percent)

**Named Components**

Vebar and similar soils: 25 to 50 percent
Flasher and similar soils: 20 to 30 percent

**Average Component Composition**

Vebar: 34 percent
Cohagen: 25 percent
Flasher: 25 percent
Beisigl: 5 percent
Amor: 3 percent
Telfer: 3 percent
Cabba: 2 percent
Parshall: 2 percent
Regent: 1 percent

### Named Component Description

**Vebar**

Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; fine sandy loam
Bw—5 to 26 inches; fine sandy loam

C—26 to 32 inches; fine sandy loam
Cr—32 to 60 inches; bedrock

**Flasher**

Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2244—Daglum-Belfield loams, 0 to 2 percent slopes

### Setting:

Daglum soils occur in swales. Belfield soils occur on rises. This map unit occurs on terraces and uplands.

### Map Unit Composition (percent)

**Named Components**

Daglum and similar soils: 50 to 75 percent
Belfield and similar soils: 15 to 35 percent

**Average Component Composition**

Daglum: 66 percent
Belfield: 21 percent
Rhoades: 8 percent
Grail: 2 percent
Harriet: 2 percent
Stirum: 1 percent

### Named Component Description

**Daglum**

Slope: 0 to 2 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
**Typical profile:**
Ap—0 to 7 inches; loam
E—7 to 8 inches; silt loam
Btn—8 to 18 inches; clay
Bky—18 to 32 inches; clay loam
C—32 to 60 inches; clay

**Belfield**

Slope: 0 to 2 percent
Depth to Restrictive Feature: Natric; top depth ranges from 7 to 21 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
**Typical profile:**
A—0 to 9 inches; loam
E/B—9 to 12 inches; silty clay loam
Btn1—12 to 17 inches; silty clay
Btn2—17 to 24 inches; silty clay loam
Bk—24 to 43 inches; silty clay loam
C—43 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2246—Grail silty clay loam, 0 to 6 percent slopes

### Setting:

Grail soils occur on flats and in swales on uplands.

### Map Unit Composition (percent)

**Named Components**

Grail and similar soils: 40 to 60 percent

**Average Component Composition**

Grail: 49 percent
Grail, gently sloping: 25 percent
Savage: 10 percent
Felor: 7 percent
Belfield: 3 percent
Reeder: 3 percent
Bowdle: 1 percent
Lawther: 1 percent
Rhoades: 1 percent

### Named Component Description

**Grail**

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 10 inches; silty clay loam
Bt—10 to 24 inches; silty clay
Bk—24 to 52 inches; silty clay loam
C—52 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2248—Lehr-Bowdle loams, 3 to 6 percent slopes

### Setting:

Lehr soils occur on rises. Bowdle soils occur in swales. This map unit occurs on terraces and outwash plains.

### Map Unit Composition (percent)

**Named Components**

Lehr and similar soils: 50 to 75 percent
Bowdle and similar soils: 15 to 40 percent

**Average Component Composition**

Lehr: 57 percent
Bowdle: 28 percent
Wabek: 6 percent
Arnegard: 3 percent
Stady: 3 percent
Bowbells: 1 percent
Falkirk: 1 percent
Parshall: 1 percent

### Named Component Description

**Lehr**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 14 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; loam
Bw—6 to 11 inches; loam
Bk1—11 to 15 inches; loam
2Bk2—15 to 22 inches; gravelly loamy coarse sand
2C—22 to 60 inches; very gravelly coarse sand

**Bowdle**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None

Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bw1—8 to 16 inches; loam
Bw2—16 to 22 inches; loam
Bk—22 to 25 inches; gravelly loam
2C1—25 to 30 inches; very gravelly loamy sand
2C2—30 to 60 inches; very gravelly loamy sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland, irrigated cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2249—Makoti silty clay loam, 0 to 3 percent slopes

### Setting:

Makoti soils occur on flats on lake plains.

### Map Unit Composition (percent)

#### Named Components

Makoti and similar soils: 70 to 90 percent

#### Average Component Composition

Makoti: 77 percent
Bryant: 12 percent
Rusklyn: 7 percent
Flaxton: 1 percent
Noonan: 1 percent
Tally: 1 percent
Wildrose: 1 percent

### Named Component Description

#### Makoti

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; silty clay loam
Bw1—6 to 14 inches; silty clay loam
Bw2—14 to 19 inches; silty clay loam
Bk1—19 to 26 inches; silty clay loam
Bk2—26 to 34 inches; silty clay loam
C1—34 to 46 inches; stratified very fine sandy loam to silty clay loam
C2—46 to 60 inches; stratified very fine sandy loam to silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2250—Makoti-Rusklyn silty clay loams, 3 to 6 percent slopes

### Setting:

Makoti soils occur in swales. Rusklyn soils occur on rises. This map unit occurs on lake plains.

### Map Unit Composition (percent)

#### Named Components

Makoti and similar soils: 45 to 70 percent
Rusklyn and similar soils: 25 to 50 percent

#### Average Component Composition

Makoti: 50 percent
Rusklyn: 38 percent
Bryant: 12 percent

### Named Component Description

#### Makoti

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained

Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 6 inches; silty clay loam
Bw1—6 to 14 inches; silty clay loam
Bw2—14 to 19 inches; silty clay loam
Bk1—19 to 26 inches; silty clay loam
Bk2—26 to 34 inches; silty clay loam
C1—34 to 46 inches; stratified very fine sandy loam to silty clay loam
C2—46 to 60 inches; stratified very fine sandy loam to silty clay loam

**Rusklyn**

Slope: 1 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 9 inches; silty clay loam
Bk1—9 to 19 inches; silty clay loam
Bk2—19 to 28 inches; silty clay loam
C1—28 to 53 inches; silty clay loam
2C2—53 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2252—Max-Zahl-Arnegard loams, 9 to 35 percent slopes, very stony

### Setting:

Max soils occur on backslopes and summits of knolls and ridges. (fig. 9) Zahl soils occur on shoulders of knolls and ridges. Arnegard soils occur on footslopes of knolls and ridges and in swales. This map unit occurs on moraines and till plains.

### Map Unit Composition (percent)

**Named Components**

Zahl and similar soils: 20 to 40 percent
Max and similar soils: 20 to 45 percent
Arnegard and similar soils: 5 to 25 percent

**Average Component Composition**

Zahl: 37 percent
Max: 28 percent
Williams: 12 percent
Arnegard: 9 percent
Bowbells: 8 percent
Vida: 4 percent
Wabek: 2 percent

### Named Component Description

**Zahl**

Slope: 9 to 35 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

**Max**

Slope: 9 to 35 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; loam
Bw—6 to 16 inches; loam
Bk—16 to 37 inches; loam
C—37 to 60 inches; loam

**Arnegard**

Slope: 9 to 25 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained

**Figure 9. An area of Max-Zahl-Arnegard loams, 9 to 35 percent slopes, very stony. These areas are well suited to range.**

Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 13 inches; loam
Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Range

For cropland limitations and hazards see Table 6.

For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2253—Mondamin silty clay, 1 to 6 percent slopes

### Setting:

Mondamin soils occur on rises on lake plains and till plains.

### Map Unit Composition (percent)

**Named Components**

Mondamin and similar soils: 50 to 70 percent

**Average Component Composition**

Mondamin: 60 percent

Wildrose: 21 percent
Rusklyn: 6 percent
Bryant: 4 percent
Makoti: 3 percent
Zahl: 3 percent
Hamerly: 2 percent
Williams: 1 percent

### Map Unit Composition (percent)

**Named Components**

Overly and similar soils: 20 to 50 percent
Rusklyn and similar soils: 30 to 55 percent

**Average Component Composition**

Overly: 35 percent
Rusklyn: 32 percent
Great Bend: 20 percent
Svea: 4 percent
Barnes: 2 percent
Sinai: 2 percent
Swenoda: 2 percent
Bearden: 1 percent
Renshaw: 1 percent
Tonka: 1 percent

### Named Component Description

**Overly**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 10 inches; silty clay loam
Bw—10 to 17 inches; silty clay loam
Bk—17 to 38 inches; silty clay loam
C—38 to 60 inches; stratified silt loam to silty clay

**Rusklyn**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 9 inches; silty clay loam
Bk1—9 to 19 inches; silty clay loam
Bk2—19 to 28 inches; silty clay loam
C1—28 to 53 inches; silty clay loam
2C2—53 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2257—Reeder-Arnegard loams, 3 to 6 percent slopes

### Setting:

Reeder soils occur on rises. Arnegard soils occur in swales. This map unit occurs on uplands.

### Map Unit Composition (percent)

**Named Components**

Reeder and similar soils: 35 to 55 percent
Arnegard and similar soils: 10 to 25 percent

**Average Component Composition**

Reeder: 42 percent
Arnegard: 16 percent
Farnuf: 14 percent
Grail: 8 percent
Regent: 6 percent
Shambo: 5 percent
Janesburg: 4 percent
Stady: 3 percent
Wabek: 1 percent
Werner: 1 percent

### Named Component Description

**Reeder**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 8 inches; loam
Bt—8 to 17 inches; clay loam

Bk—17 to 36 inches; loam
Cr—36 to 60 inches; bedrock

**Arnegard**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 13 inches; loam
Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2258—Regent-Savage silty clay loams, 0 to 6 percent slopes

### Setting:

Regent soils occur on rises. Savage soils occur on flats. This map unit occurs on uplands.

### Map Unit Composition (percent)

**Named Components**

Regent and similar soils: 10 to 20 percent
Savage and similar soils: 0 to 10 percent

**Average Component Composition**

Regent, level and nearly level: 33 percent
Regent, gently sloping: 15 percent
Grail: 11 percent
Farnuf: 9 percent
Reeder: 9 percent
Savage, level and nearly level: 8 percent
Savage, gently sloping: 5 percent
Belfield: 4 percent
Daglum: 2 percent
Lehr: 2 percent
Werner: 2 percent

### Named Component Description

**Regent**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 10 inches; silty clay loam
Bt—10 to 26 inches; silty clay
Bk—26 to 39 inches; silty clay loam
Cr—39 to 60 inches; bedrock

**Savage**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; silty clay loam
Bt—6 to 16 inches; silty clay
Bk1—16 to 39 inches; silty clay
Bk2—39 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2259—Rhoades-Daglum loams, 3 to 9 percent slopes

### Setting:

Rhoades soils occur in micro-lows on backslopes of knolls and in micro-lows in swales. Daglum soils occur on micro-highs on backslopes of rises. This map unit occurs on uplands.

### Map Unit Composition (percent)

**Named Components**

Rhoades and similar soils: 30 to 50 percent
Daglum and similar soils: 10 to 20 percent

**Average Component Composition**

Rhoades: 38 percent
Daglum: 20 percent
Grail: 10 percent
Rhoades, moderately sloping: 9 percent
Belfield: 8 percent
Daglum, moderately sloping: 6 percent
Dogtooth: 6 percent
Cohagen: 1 percent
Regent: 1 percent
Stirum: 1 percent

### Named Component Description

**Rhoades**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 1 to 5 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
**Typical profile:**
E—0 to 4 inches; loam
Btn—4 to 11 inches; clay loam
Bky—11 to 49 inches; clay loam
Cr—49 to 60 inches; bedrock

**Daglum**

Slope: 3 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
**Typical profile:**
A—0 to 5 inches; loam
E—5 to 8 inches; clay loam
Btn—8 to 18 inches; clay
Bz—18 to 26 inches; silty clay
C—26 to 45 inches; silty clay
Cr—45 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2260—Rusklyn silty clay loam, 1 to 6 percent slopes

### Setting:

Rusklyn soils occur on rises on lake plains.

### Map Unit Composition (percent)

**Named Components**

Rusklyn and similar soils: 70 to 90 percent

**Average Component Composition**

Rusklyn: 79 percent
Makoti: 6 percent
Bryant: 4 percent
Parnell: 3 percent
Williams: 3 percent
Overly: 2 percent
Wabek: 2 percent
Nutley: 1 percent

### Named Component Description

**Rusklyn**

Slope: 1 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained

Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 9 inches; silty clay loam
Bk1—9 to 19 inches; silty clay loam
Bk2—19 to 28 inches; silty clay loam
C1—28 to 53 inches; silty clay loam
2C2—53 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2261—Schaller loamy sand, 0 to 6 percent slopes

### Setting:

Schaller soils occur on rises on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Schaller and similar soils: 70 to 85 percent

**Average Component Composition**

Schaller: 78 percent
Arvilla: 10 percent
Claire: 6 percent
Maddock: 3 percent
Fordville: 1 percent
Karlsruhe: 1 percent
Sioux: 1 percent

### Named Component Description

**Schaller**

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 9 inches; loamy sand
Bk—9 to 15 inches; fine sandy loam
C—15 to 60 inches; gravelly loamy coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2262—Schaller loamy sand, 6 to 15 percent slopes

### Setting:

Schaller soils occur on ridges on eskers and collapsed outwash plains.

### Map Unit Composition (percent)

**Named Components**

Schaller and similar soils: 45 to 65 percent

**Average Component Composition**

Schaller: 56 percent
Maddock: 20 percent
Sioux: 11 percent
Claire: 5 percent
Rusklyn: 5 percent
Buse: 2 percent
Arvilla: 1 percent

### Named Component Description

**Schaller**

Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None

Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 9 inches; loamy sand
Bk—9 to 15 inches; fine sandy loam
C—15 to 60 inches; gravelly loamy coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2263—Sinai silty clay

### Setting:

Sinai soils occur on flats on lake plains.

### Map Unit Composition (percent)

**Named Components**

Sinai and similar soils: 70 to 80 percent

**Average Component Composition**

Sinai: 74 percent
Nutley: 20 percent
Great Bend: 3 percent
Rusklyn: 2 percent
Fargo: 1 percent

### Named Component Description

**Sinai**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 12 inches; silty clay
Bss—12 to 23 inches; silty clay
Bkss—23 to 42 inches; silty clay
C—42 to 60 inches; silty clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2264—Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes

### Setting:

Vebar soils occur on backslopes. Cohagen soils occur on summits and shoulders. This map unit occurs on knolls and ridges on uplands. (fig. 10)

### Map Unit Composition (percent)

**Named Components**

Vebar and similar soils: 30 to 45 percent
Cohagen and similar soils: 15 to 30 percent

**Average Component Composition**

Vebar: 36 percent
Cohagen: 19 percent
Vebar, moderately sloping: 15 percent
Parshall: 10 percent
Flasher: 7 percent
Lihen: 4 percent
Beisigl: 3 percent
Cabba: 3 percent
Shambo: 3 percent

### Named Component Description

**Vebar**

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches

**Figure 10. Windbreaks protect against soil blowing on Parshall soils in the foreground and Vebar-Cohagen soils in the background.**

Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; fine sandy loam
Bw—5 to 26 inches; fine sandy loam
C—26 to 32 inches; fine sandy loam
Cr—32 to 60 inches; bedrock

### Cohagen

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 3 inches; fine sandy loam
C—3 to 17 inches; fine sandy loam
Cr—17 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

## Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2265—Wabek-Appam sandy loams, 0 to 6 percent slopes

### Setting:

Wabek soils occur on ridges. Appam soils occur in swales. This map unit occurs on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Wabek and similar soils: 50 to 75 percent
Appam and similar soils: 10 to 35 percent

**Average Component Composition**

Wabek: 72 percent
Appam: 16 percent
Lehr: 5 percent
Bowdle: 3 percent
Schaller: 2 percent
Ruso: 1 percent
Stady: 1 percent

### Named Component Description

**Wabek**

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; sandy loam
Bk—5 to 9 inches; gravelly coarse sandy loam
C—9 to 60 inches; very gravelly coarse sand

**Appam**

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 6 inches; sandy loam
Bw—6 to 15 inches; sandy loam
Bk—15 to 19 inches; sandy loam
2C—19 to 60 inches; gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture, hayland, and range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2266—Wabek-Appam sandy loams, 6 to 25 percent slopes

### Setting:

Wabek soils occur on ridges on outwash plains and collapsed outwash plains. Appam soils occur in swales on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Wabek and similar soils: 60 to 85 percent
Appam and similar soils: 10 to 30 percent

**Average Component Composition**

Wabek: 67 percent
Appam: 21 percent
Parshall: 5 percent
Lehr: 4 percent
Bowdle: 3 percent

### Named Component Description

**Wabek**

Slope: 6 to 25 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2269—Cavour-Barnes loams, 1 to 6 percent slopes

### Setting:

Cavour soils are on footslopes and flats and in swales. Barnes soils are on backslopes of rises. This map unit occurs on till plains.

### Map Unit Composition (percent)

**Named Components**

Cavour and similar soils: 40 to 65 percent
Barnes and similar soils: 20 to 40 percent

**Average Component Composition**

Cavour: 51 percent
Barnes: 31 percent
Cresbard: 12 percent
Svea: 3 percent
Bearden: 1 percent
Hamerly: 1 percent
Parnell: 1 percent

### Named Component Description

**Cavour**

Slope: 1 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 14 inches
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
**Typical profile:**
A—0 to 6 inches; loam
E—6 to 8 inches; silt loam
Btn—8 to 24 inches; clay
C—24 to 60 inches; clay loam

**Barnes**

Slope: 1 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 7 inches; loam
Bw—7 to 19 inches; loam
Bk—19 to 37 inches; loam
C—37 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2270—Harriet and Stirum soils

### Setting:

Harriet and Stirum soils are on flats in drainageways and on flood plains.

### Map Unit Composition (percent)

**Named Components**

Harriet and similar soils: 0 to 80 percent
Stirum and similar soils: 0 to 80 percent

**Average Component Composition**

Harriet: 36 percent
Stirum: 36 percent
Heil: 10 percent

Manfred: 6 percent
Noonan: 5 percent
Marysland: 3 percent
Desart: 1 percent
Hamerly: 1 percent
Lehr: 1 percent
Minnewaukan: 1 percent

### Named Component Description

**Harriet**

Slope: 0 to 1 percent
Depth to Restrictive Feature: Natric; top depth ranges from 0 to 5 inches
Drainage Class: Poorly drained
Flooding: Occasional
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
**Typical profile:**
E—0 to 2 inches; silt loam
Btn—2 to 18 inches; clay loam
Bz1—18 to 28 inches; loam
2Bz2—28 to 38 inches; very fine sandy loam
3Ab—38 to 40 inches; clay loam
3C—40 to 60 inches; stratified very fine sandy loam to silty clay

**Stirum**

Slope: 0 to 1 percent
Depth to Restrictive Feature: Natric; top depth ranges from 3 to 13 inches
Drainage Class: Poorly drained
Flooding: Occasional
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
**Typical profile:**
Ap—0 to 7 inches; fine sandy loam
Btn—7 to 15 inches; fine sandy loam
Bk—15 to 26 inches; loam
Bg—26 to 34 inches; very fine sandy loam
Bkg—34 to 44 inches; silt loam
2Cg—44 to 60 inches; loamy fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Rangeland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2271—Lohnes loamy coarse sand, 6 to 15 percent slopes

### Setting:

Lohnes soils occur on backslopes of ridges on outwash plains.

### Map Unit Composition (percent)

**Named Components**

Lohnes and similar soils: 45 to 65 percent

**Average Component Composition**

Lohnes: 60 percent
Maddock: 13 percent
Sioux: 10 percent
Buse: 5 percent
Embden: 5 percent
Arvilla: 3 percent
Rusklyn: 3 percent
Vebar: 1 percent

### Named Component Description

**Lohnes**

Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 16 inches; loamy coarse sand
AC—16 to 30 inches; coarse sand
C—30 to 60 inches; coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Pasture and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2272—Sioux-Arvilla complex, 6 to 25 percent slopes

### Setting:

Sioux soils are on summits. Arvilla soils are on backslopes and footslopes. This map unit occurs on rises and ridges of outwash plains.

### Map Unit Composition (percent)

**Named Components**

Sioux and similar soils: 55 to 75 percent
Arvilla and similar soils: 10 to 30 percent

**Average Component Composition**

Sioux: 68 percent
Arvilla: 20 percent
Buse: 5 percent
Renshaw: 5 percent
Fordville: 2 percent

### Named Component Description

**Sioux**

Slope: 6 to 25 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 6 to 14 inches
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 5 inches; loam
AC—5 to 8 inches; gravelly loam
C—8 to 60 inches; very gravelly sand

**Arvilla**

Slope: 0 to 6 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 14 to 25 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 10 inches; sandy loam
Bw—10 to 16 inches; sandy loam
2Bk—16 to 31 inches; gravelly coarse sand
2C—31 to 60 inches; gravelly coarse sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Rangeland and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2273—Svea-Buse-Parnell complex, 0 to 15 percent slopes

### Setting:

Buse soils are on summits and shoulders. Svea soils are on footslopes and in swales. Parnell soils are in depressions. This map unit occurs on rises and ridges of moraines on till plains.

### Map Unit Composition (percent)

**Named Components**

Svea and similar soils: 20 to 45 percent
Buse and similar soils: 20 to 40 percent
Parnell and similar soils: 15 to 35 percent

**Average Component Composition**

Svea: 38 percent
Buse: 25 percent
Parnell: 23 percent
Barnes: 8 percent
Southam: 3 percent
Vallers: 2 percent
Hamerly: 1 percent

### Named Component Description

**Svea**

Slope: 3 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
Ap—0 to 10 inches; loam
Bw—10 to 21 inches; loam
Bk—21 to 36 inches; loam
C—36 to 60 inches; loam

**Buse**

Slope: 3 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 8 inches; loam
Bk—8 to 40 inches; loam
C—40 to 60 inches; loam

**Parnell**

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A1—0 to 15 inches; silty clay loam
A2—15 to 22 inches; silt loam
Btg1—22 to 32 inches; silty clay loam
Btg2—32 to 55 inches; silty clay
BCg—55 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Rangeland and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2274—Towner sandy loam, 3 to 6 percent slopes

### Setting:

Towner soils are on rises. Maddock soil are on footslopes and in swales. This map unit occurs on eolion mantled till plains.

### Map Unit Composition (percent)

**Named Components**

Towner and similar soils: 45 to 60 percent
Maddock and similar soils: 20 to 35 percent

**Average Component Composition**

Towner: 50 percent
Maddock: 27 percent
Arvilla: 5 percent
Cavour: 5 percent
Barnes: 4 percent
Buse: 4 percent
Fordville: 3 percent
Sioux: 2 percent

### Named Component Description

**Towner**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 20 inches; sandy loam
Bw—20 to 29 inches; loamy fine sand
2Bk—29 to 36 inches; loam
2C—36 to 60 inches; loam

**Maddock**

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted

Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 10 inches; loamy fine sand
Bw—10 to 14 inches; fine sand
C—14 to 60 inches; fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

### Management

**Major uses:** Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

## 2275—Towner-Maddock-Buse complex, 6 to 15 percent slopes

### Setting:

Towner soils are on shoulders and backslopes. Maddock soils are on footslopes and toeslopes. Buse soils are on summits. These soils occur on rises and ridges of eolion mantled till plains.

### Map Unit Composition (percent)

**Named Components**

Towner and similar soils: 35 to 60 percent
Maddock and similar soils: 15 to 35 percent
Buse and similar soils: 5 to 15 percent

**Average Component Composition**

Towner: 48 percent
Maddock: 23 percent
Svea: 9 percent
Buse: 8 percent
Arvilla: 5 percent
Nutley: 5 percent
Sioux: 2 percent

### Named Component Description

**Towner**

Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 20 inches; sandy loam
Bw—20 to 29 inches; loamy fine sand
2Bk—29 to 36 inches; loam
2C—36 to 60 inches; loam

**Maddock**

Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 10 inches; loamy fine sand
Bw—10 to 14 inches; fine sand
C—14 to 60 inches; fine sand

**Buse**

Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
**Typical profile:**
A—0 to 8 inches; loam
Bk—8 to 40 inches; loam
C—40 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

## Management

**Major uses:** Rangeland and wildlife habitat

For cropland limitations and hazards see Table 6.
For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

Table 4.-Acreage and Proportionate Extent of the Soils

| Map symbol | Soil name | Acres | Percent |
|---|---|---|---|
| 30 | Amor-Arnegard loams, 0 to 3 percent slopes | 1,145 | 0.2 |
| 40 | Amor-Werner-Farnuf loams, 6 to 9 percent slopes | 8,465 | 1.3 |
| 41 | Amor-Werner loams, 9 to 15 percent slopes | 8,275 | 1.3 |
| 76 | Arvilla sandy loam, 0 to 6 percent slopes | 10,790 | 1.7 |
| 118 | Barnes-Buse loams, 3 to 6 percent slopes | 25,985 | 4.0 |
| 156 | Barnes-Svea loams, 3 to 6 percent slopes | 6,765 | 1.0 |
| 313 | Buse-Barnes loams, 6 to 9 percent slopes | 38,645 | 6.0 |
| 314 | Buse-Barnes loams, 9 to 15 percent slopes | 35,380 | 5.4 |
| 319 | Buse-Barnes loams, 15 to 35 percent slopes | 10,495 | 1.6 |
| 450 | Colvin silt loam | 3,150 | 0.5 |
| 511 | Divide loam, 0 to 3 percent slopes | 2,695 | 0.4 |
| 674 | Farnuf loam, 0 to 2 percent slopes | 745 | 0.1 |
| 712 | Flaxton-Williams complex, 1 to 6 percent slopes | 3,585 | 0.6 |
| 714 | Flaxton-Williams complex, 6 to 9 percent slopes | 685 | 0.1 |
| 727 | Fordville loam, 0 to 3 percent slopes | 1,805 | 0.3 |
| 863 | Hamerly loam, 0 to 3 percent slopes | 2,470 | 0.4 |
| 883 | Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes | 1,905 | 0.3 |
| 1011 | Karlsruhe coarse sandy loam | 1,735 | 0.3 |
| 1181 | Lohnes loamy coarse sand, 0 to 6 percent slopes | 2,600 | 0.4 |
| 1202 | Maddock loamy fine sand, 0 to 6 percent slopes | 3,660 | 0.6 |
| 1249 | Appam sandy loam, 0 to 6 percent slopes | 4,030 | 0.6 |
| 1267 | Marysland loam | 4,045 | 0.6 |
| 1372 | Noonan-Williams loams, 1 to 6 percent slopes | 2,175 | 0.3 |
| 1374 | Nutley silty clay, 0 to 3 percent slopes | 1,000 | 0.2 |
| 1375 | Nutley silty clay, 3 to 6 percent slopes | 1,455 | 0.2 |
| 1427 | Parnell silty clay loam | 10,755 | 1.7 |
| 1437 | Parshall fine sandy loam, 0 to 3 percent slopes | 1,580 | 0.2 |
| 1466 | Pits, gravel and sand | 175 | * |
| 1676 | Wildrose silty clay | 590 | * |
| 1697 | Sioux-Arvilla complex, 0 to 6 percent slopes | 6,245 | 1.0 |
| 1710 | Southam silty clay loam | 21,090 | 3.2 |
| 1762 | Svea-Barnes loams, 0 to 3 percent slopes | 1,845 | 0.3 |
| 1805 | Telfer loamy fine sand, 0 to 6 percent slopes | 1,260 | 0.2 |
| 1886 | Hamerly and Vallers loams, saline, 0 to 3 percent slopes | 4,450 | 0.7 |
| 1898 | Vebar fine sandy loam, 1 to 6 percent slopes | 5,985 | 0.9 |
| 1978 | Water | 15,500 | 2.4 |
| 2006 | Williams loam, 6 to 9 percent slopes | 7,550 | 1.2 |
| 2014 | Williams-Bowbells loams, 0 to 3 percent slopes | 7,240 | 1.1 |
| 2015 | Williams-Bowbells loams, 3 to 6 percent slopes | 28,780 | 4.4 |
| 2031 | Williams-Zahl loams, 3 to 6 percent slopes | 39,985 | 6.2 |
| 2037 | Williams-Zahl-Parnell complex, 0 to 15 percent slopes | 4,935 | 0.8 |
| 2073 | Zahl-Max loams, 15 to 45 percent slopes | 16,885 | 2.6 |
| 2081 | Zahl-Williams loams, 9 to 15 percent slopes | 64,130 | 9.9 |
| 2175 | Zahl-Williams loams, 6 to 9 percent slopes | 61,380 | 9.5 |
| 2188 | Wabek-Lehr complex, 1 to 6 percent slopes | 16,890 | 2.6 |
| 2234 | Amor-Werner loams, 3 to 6 percent slopes | 5,970 | 0.9 |
| 2235 | Arnegard loam, 0 to 6 percent slopes | 5,915 | 0.9 |
| 2240 | Bowdle-Lehr loams, 0 to 3 percent slopes | 15,040 | 2.3 |
| 2241 | Bryant loam, 0 to 6 percent slopes | 1,515 | 0.2 |
| 2242 | Cohagen-Vebar-Parshall fine sandy loams, 15 to 50 percent slopes | 1,835 | 0.3 |
| 2243 | Cohagen-Vebar complex, 9 to 15 percent slopes | 7,675 | 1.2 |
| 2244 | Daglum-Belfield loams, 0 to 2 percent slopes | 1,345 | 0.2 |
| 2246 | Grail silty clay loam, 0 to 6 percent slopes | 1,070 | 0.2 |
| 2248 | Lehr-Bowdle loams, 3 to 6 percent slopes | 7,100 | 1.1 |
| 2249 | Makoti silty clay loam, 0 to 3 percent slopes | 695 | 0.1 |
| 2250 | Makoti-Rusklyn silty clay loams, 3 to 6 percent slopes | 1,080 | 0.2 |
| 2252 | Max-Zahl-Arnegard loams, 9 to 35 percent slopes, very stony | 7,445 | 1.1 |
| 2253 | Mondamin silty clay, 1 to 6 percent slopes | 760 | 0.1 |
| 2254 | Overly silty clay loam, 0 to 3 percent slopes | 795 | 0.1 |
| 2255 | Overly-Rusklyn silty clay loams, 3 to 6 percent slopes | 1,340 | 0.2 |
| 2257 | Reeder-Arnegard loams, 3 to 6 percent slopes | 5,985 | 0.9 |
| 2258 | Regent-Savage silty clay loams, 0 to 6 percent slopes | 2,425 | 0.4 |

Table 4.-Acreage and Proportionate Extent of the Soils--Continued

| Map symbol | Soil name | Acres | Percent |
|---|---|---|---|
| 2259 | Rhoades-Daglum loams, 3 to 9 percent slopes | 815 | 0.1 |
| 2260 | Rusklyn silty clay loam, 1 to 6 percent slopes | 2,175 | 0.3 |
| 2261 | Schaller loamy sand, 0 to 6 percent slopes | 680 | 0.1 |
| 2262 | Schaller loamy sand, 6 to 15 percent slopes | 1,165 | 0.2 |
| 2263 | Sinai silty clay | 1,580 | 0.2 |
| 2264 | Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes | 5,775 | 0.9 |
| 2265 | Wabek-Appam sandy loams, 0 to 6 percent slopes | 7,190 | 1.1 |
| 2266 | Wabek-Appam sandy loams, 6 to 25 percent slopes | 26,790 | 4.1 |
| 2267 | Werner-Amor-Arnegard loams, 15 to 50 percent slopes | 1,815 | 0.3 |
| 2269 | Cavour-Barnes loams, 1 to 6 percent slopes | 3,815 | 0.6 |
| 2270 | Harriet and Stirum soils | 9,015 | 1.4 |
| 2271 | Lohnes loamy coarse sand, 6 to 15 percent slopes | 2,295 | 0.4 |
| 2272 | Sioux-Arvilla complex, 6 to 25 percent slopes | 11,590 | 1.8 |
| 2273 | Svea-Buse-Parnell complex, 0 to 15 percent slopes | 1,905 | 0.3 |
| 2274 | Towner sandy loam, 3 to 6 percent slopes | 1,735 | 0.3 |
| 2275 | Towner-Maddock-Buse complex, 6 to 15 percent slopes | 2,035 | 0.3 |
| | Total | 649,300 | 100.0 |

* Less than 0.1 percent.

# Formation and Classification of the Soils

## Formation of the Soils

## Parent Material

**Climate**

**Topography**

**Living Organisms**

**Time**

## Classification of the Soils

*sol*

*Bor*

*oll*

*Hapl*

*boroll*

Table 5.-Classification of the Soils

| Soil name | Family or higher taxonomic class |
|---|---|
| Aberdeen | Fine, smectitic glossic Udic Natriborolls |
| Amor | Fine-loamy, mixed, superactive Typic Haploborolls |
| Appam | Sandy, mixed Typic Haploborolls |
| Arnegard | Fine-loamy, mixed, superactive Pachic Haploborolls |
| Arveson | Coarse-loamy, mixed, superactive, frigid Typic Calciaquolls |
| Arvilla | Sandy, mixed Udic Haploborolls |
| Barnes | Fine-loamy, mixed, superactive Udic Haploborolls |
| Bearden | Fine-silty, mixed, superactive, frigid Aeric Calciaquolls |
| Bearpaw | Fine, smectitic Vertic Argiborolls |
| Beisigl | Mixed, frigid Typic Ustipsamments |
| Belfield | Fine, smectitic Glossic Natriborolls |
| Bowbells | Fine-loamy, mixed, superactive Pachic Argiborolls |
| Bowdle | Fine-loamy over sandy or sandy-skeletal, mixed, superactive Pachic Haploborolls |
| Bryant | Fine-silty, mixed, superactive Typic Haploborolls |
| Buse | Fine-loamy, mixed, superactive Udic Calciborolls |
| Cabba | Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents |
| Cavour | Fine, smectitic Udic Natriborolls |
| Chama | Fine-silty, mixed, superactive Typic Calciborolls |
| Claire | Mixed, frigid Typic Udipsamments |
| Cohagen | Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents |
| Colvin | Fine-silty, mixed, superactive, frigid Typic Calciaquolls |
| Cresbard | Fine, smectitic Glossic Udic Natriborolls |
| Daglum | Fine, smectitic Vertic Natriborolls |
| Darnen | Fine-loamy, mixed, superactive Pachic Udic Haploborolls |
| Desart | Coarse-loamy, mixed, superactive Typic Natriborolls |
| Divide | Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aeric Calciaquolls |
| Dogtooth | Fine, smectitic Leptic Natriborolls |
| Easby | Fine-loamy, mixed, superactive, frigid Typic Calciaquolls |
| Embden | Coarse-loamy, mixed, superactive Pachic Udic Haploborolls |
| Falkirk | Fine-loamy, mixed, superactive Pachic Haploborolls |
| Falsen | Sandy, mixed Aquic Haploborolls |
| Fargo | Fine, smectitic, frigid Typic Epiaquerts |
| Farland | Fine-silty, mixed, superactive Typic Argiborolls |
| Farnuf | Fine-loamy, mixed, superactive Typic Argiborolls |
| Felor | Fine-loamy, mixed, superactive Typic Argiborolls |
| Flasher | Mixed, frigid, shallow Typic Ustipsamments |
| Flaxton | Fine-loamy, mixed, superactive Pachic Argiborolls |
| Fordville | Fine-loamy over sandy or sandy-skeletal, mixed, superactive Pachic Udic Haploborolls |
| Grail | Fine, smectitic Pachic Vertic Argiborolls |
| Great Bend | Fine-silty, mixed, superactive Udic Haploborolls |
| Hamerly | Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls |
| Harriet | Fine, smectitic, frigid Typic Natraquolls |
| Hegne | Fine, smectitic, frigid Typic Calciaquerts |
| Heil | Fine, smectitic, frigid Typic Natraquerts |
| Heimdal | Coarse-loamy, mixed, superacitve Udic Haploborolls |
| Janesburg | Fine, smectitic Typic Natriborolls |
| Karlsruhe | Sandy, mixed, frigid Aeric Calciaquolls |
| Krem | Loamy, mixed, superactive Arenic Argiborolls |
| Lallie | Fine, smectitic, calcareous, frigid Vertic Fluvaquents |
| Langhei | Fine-loamy, mixed, superactive, frigid Typic Eutrochrepts |
| Lawther | Fine, smectitic, frigid Udic Haplusterts |
| Lehr | Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Haploborolls |
| Lihen | Sandy, mixed Entic Haploborolls |
| Livona | Fine-loamy, mixed, superactive Typic Argiborolls |
| Lohnes | Sandy, mixed Udorthentic Haploborolls |

Table 5.-Classification of the Soils--Continued

| Soil name | Family or higher taxonomic class |
|---|---|
| Maddock | Sandy, mixed Udorthentic Haploborolls |
| Makoti | Fine-silty, mixed, superactive Pachic Haploborolls |
| Manfred | Fine-loamy, mixed, superactive, frigid Typic Natraquolls |
| Manning | Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Typic Haploborolls |
| Marysland | Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Calciaquolls |
| Max | Fine-loamy, mixed, superactive Typic Haploborolls |
| Minnewaukan | Mixed, frigid Typic Psammaquents |
| Miranda | Fine, smectitic Leptic Natriborolls |
| Mondamin | Fine, smectitic Vertic Argiborolls |
| Niobell | Fine, smectitic Glossic Natriborolls |
| Noonan | Fine, smectitic Typic Natriborolls |
| Nutley | Fine, smectitic, frigid Chromic Hapluderts |
| Overly | Fine-silty, mixed, superactive Pachic Udic Haploborolls |
| Osakis | Sandy, mixed, Aquic Haploborolls |
| Parnell | Fine, smectitic, frigid Vertic Argiaquolls |
| Parshall | Coarse-loamy, mixed, superactive Pachic Haploborolls |
| Peta | Fine-loamy, mixed, superactive Pachic Argiborolls |
| Rauville | Fine-silty, mixed, superactive, calcareous, frigid Cumulic Endoaquolls |
| Reeder | Fine-loamy, mixed, superactive Typic Argiborolls |
| Regan | Fine-silty, mixed, superactive, frigid Typic Calciaquolls |
| Regent | Fine, smectitic Vertic Argiborolls |
| Renshaw | Fine-loamy over sandy or sandy-skeletal, mixed, superactive Udic Haploborolls |
| Rhoades | Fine, smectitic Leptic Vertic Natriborolls |
| Rusklyn | Fine-silty, mixed, superactive Udic Calciborolls |
| Ruso | Coarse-loamy, mixed, superactive Pachic Haploborolls |
| Sakakawea | Coarse-silty, mixed, superactive Typic Calciborolls |
| Savage | Fine, smectitic Vertic Argiborolls |
| Schaller | Sandy, mixed Entic Haploborolls |
| Shambo | Fine-loamy, mixed, superactive Typic Haploborolls |
| Sinai | Fine, smectitic, frigid Typic Hapluderts |
| Sioux | Sandy-skeletal, mixed Udorthentic Haploborolls |
| Southam | Fine, smectitic, calcareous, frigid Cumulic Vertic Endoaquolls |
| Spottswood | Fine-loamy over sandy or sandy-skeletal, mixed, superactive Pachic Udic Haploborolls |
| Stady | Fine-loamy over sandy or sandy-skeletal, mixed,superactive Typic Haploborolls |
| Stirum | Coarse-loamy, mixed, superactive, frigid Typic Natraquolls |
| Svea | Fine-loamy, mixed, superactive Pachic Udic Haploborolls |
| Swenoda | Coarse-loamy, mixed, superactive Pachic Udic Haploborolls |
| Tally | Coarse-loamy, mixed, superactive Typic Haploborolls |
| Telfer | Sandy, mixed Entic Haploborolls |
| Tonka | Fine, smectitic, frigid Argiaquic Argialbolls |
| Towner | Sandy over loamy, mixed, superactive Udorthentic Haploborolls |
| Vallers | Fine-loamy, mixed, superactive, frigid Typic Calciaquolls |
| Vebar | Coarse-loamy, mixed, superactive Typic Haploborolls |
| Vida | Fine-loamy, mixed, superactive Typic Argiborolls |
| Wabek | Sandy-skeletal, mixed Entic Haploborolls |
| Werner | Loamy, mixed, superactive, shallow Entic Haploborolls |
| Wildrose | Fine, smectitic, frigid Udic Haplusterts |
| Williams | Fine-loamy, mixed, superactive Typic Argiborolls |
| Wilton | Fine-silty, mixed, superactive Pachic Haploborolls |
| Wyard | Fine-loamy, mixed, superactive, frigid Typic Endoaquolls |
| Wyndmere | Coarse-loamy, mixed, superactive, frigid, Aeric Calciaquolls |
| Wyrene | Sandy, mixed, frigid Aeric Calciaquolls |
| Zahill | Fine-loamy, mixed, superactive, frigid Calcic Ustochrepts |
| Zahl | Fine-loamy, mixed, superactive Typic Calciborolls |

# Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each 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 (Soil Survey Staff, 1993). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (USDA-SCS, 1975) and Keys to Soil Taxonomy (Soil Survey Staff, 1996a). Unless otherwise stated, colors in the descriptions are for moist soil and effervescence refers to disseminated lime throughout the horizon. Following the pedon description is the range of important characteristics of the soil series.

## Aberdeen Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 2 percent
**Notes:** These soils are sodic.

**Taxonomic class:** Fine, smectitic Glossic Udic Natriborolls

**Typical pedon:**
Aberdeen silty clay loam, 580 feet west and 93 feet south of the northeast corner of sec. 9, T. 122 N., R. 63 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; slightly acid; abrupt smooth boundary.

BE—8 to 11 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; gray (10YR 6/1) dry silt coatings on faces of peds; weak medium subangular blocky structure parting to weak thin platy; slightly hard, friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

Btn1—11 to 18 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate fine blocky; hard, firm, sticky and plastic; shiny films on faces of peds; neutral; clear wavy boundary.

Btn2—18 to 26 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate medium and fine blocky; hard, firm, sticky and plastic; shiny films on faces of peds; neutral; clear wavy boundary.

Bkz1—26 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam, light gray (2.5Y 7/2) dry; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; common fine nests of gypsum and other salts; common very fine accumulations of lime; strong effervescence; slightly alkaline; clear wavy boundary.

Bkz2—31 to 38 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; common fine nests of gypsum and other salts; common very fine accumulations of lime; strong effervescence; slightly alkaline; gradual wavy boundary.

C1—38 to 51 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations and few fine distinct gray (10YR 5/1) redoximorphic depletions; massive; hard, friable, slightly sticky and slightly plastic; few fine threads and nests of gypsum and other salts; slight effervescence; slightly alkaline; gradual wavy boundary.

C2—51 to 60 inches; light olive brown (2.5Y 5/4) silt loam, laminated with thin layers of silty clay and very fine sandy loam, pale yellow (2.5Y 7/4) dry; common fine prominent yellowish brown (10YR

5/6) and strong brown (7.5YR 5/6) redoximorphic concentrations and gray (10YR 5/1) redoximorphic depletions; massive; laminations 1 to 3 mm thick; slightly hard, friable, slightly sticky and slightly plastic; slight effervescence; slightly alkaline.

**Range in Characteristics**

**Depth to lime:** 16 to 40 inches
**Notes:** Some pedons have an E or B/E horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry
Texture: silty clay loam or silt loam

**BE horizon:**
Value: 3 or 4, 4 or 5 dry
Chroma: 1 or 2

**Btn horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4, 3 to 5 dry
Chroma: 1 to 3
Texture: silty clay, silty clay loam, or clay

**Bkz horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 5, 5 to 7 dry
Chroma: 1 to 4
Texture: silty clay loam, silty clay, or silt loam

**C horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 6, 5 to 8 dry
Texture: silt loam or silty clay loam

## Amor Series

**Depth class:** Moderately deep
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Uplands
**Parent material:** Soft mudstone and sandstone
**Slope:** 1 to 25 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Haploborolls

**Typical pedon:**
Amor loam, 2,300 feet east and 180 feet north of the southwest corner of sec. 2, T. 131 N., R. 103 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to weak medium and fine granular; slightly hard, friable, slightly sticky and nonplastic; many roots and pores; neutral; abrupt smooth boundary.

Bw1—8 to 13 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; few stains of dark grayish brown (10YR 4/2) dry on faces of peds; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common roots; many fine pores; neutral; gradual wavy boundary.

Bw2—13 to 19 inches; dark grayish brown (2.5Y 4/2) loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine pores; slight effervescence; slightly alkaline; gradual wavy boundary.

Bk—19 to 31 inches; grayish brown (2.5Y 5/2) loam, light gray (2.5Y 7/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine roots; common fine pores; few masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

Cr—31 to 60 inches; light olive gray and light olive brown (5Y 6/2 and 2.5Y 5/3) soft sandstone and siltstone; pale yellow and light gray (2.5Y 7/3 and 5Y 7/2) dry; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 8 to 16 inches
**Depth to lime:** 14 to 40 inches
**Depth to soft bedrock:** 20 to 40 inches
**Notes:** Some pedons have a BCk horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry

**Bw horizon:**
Value: 3 to 5, 4 to 6 dry
Chroma: 2 to 4

**Bk horizon:**
Value: 4 to 6, 5 to 7 dry

**Cr horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 5, 3 to 7 dry
Notes: It is soft mudstone, siltstone, or sandstone.

## Appam Series

**Depth class:** Very deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Moderately rapid in the upper part and very rapid in the lower part
**Landform:** Outwash plains and collapsed outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 15 percent

**Taxonomic class:** Sandy, mixed Typic Haploborolls

**Typical pedon:**
Appam sandy loam, 2,600 feet north and 700 feet east of the southwest corner of sec. 36, T. 160 N., R. 93 W.

A—0 to 6 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common fine and very fine roots; about 3 percent gravel; neutral; clear boundary.

Bw—6 to 15 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 4/3) dry; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, slightly sticky and nonplastic; common fine and very fine roots; very dark brown (10YR 2/2) dry organic stains on faces of peds; about 5 percent gravel; neutral; clear wavy boundary.

Bk—15 to 19 inches; brown (10YR 5/3) sandy loam, very pale brown (10YR 7/3) dry; weak medium and coarse prismatic structure parting to weak medium and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; about 12 percent gravel; many coarse irregularly shaped masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

2C—19 to 60 inches; yellowish brown (10YR 5/4) gravelly coarse sand, light yellowish brown (10YR 6/4) dry; single grain; loose, nonsticky and nonplastic; about 30 percent gravel: strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 15 inches
**Depth to sand and gravel:** 14 to 25 inches

**A horizon:**
Value: 2 or 3, 3 to 5 dry

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 6 dry
Chroma: 2 to 4

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 8 dry
Chroma: 2 or 3

**2C horizon:**
Hue: 10YR or 2.5Y
Notes: Contains 5 to 35 percent gravel.

## Arnegard Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 0 to 25 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Pachic Haploborolls

**Typical pedon:**
Arnegard loam, 1,575 feet north and 1,700 feet west of the southeast corner of sec. 35, T. 132 N., R. 93 W.

Ap—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and many very fine roots; neutral; clear smooth boundary.

A—6 to 13 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak medium prismatic structure parting to weak fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; neutral; gradual wavy boundary.

Bw1—13 to 27 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; many very fine roots; neutral; clear wavy boundary.

Bw2—27 to 36 inches; very dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; weak medium prismatic structure parting to weak

medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; slightly alkaline; clear wavy boundary.

Bk—36 to 60 inches; dark grayish brown (2.5Y 4/2) loam, light brownish gray (2.5Y 6/2) dry; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few fine irregular masses of lime; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to more than 30 inches
**Notes:** Some pedons have a BCk or C horizon.

**A horizon:**
Value: 2 or 3, 3 or 4 dry

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4, 3 to 5 dry

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 5 to 7 dry
Chroma: 2 to 4

## Arveson Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Moderate or moderately rapid
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 1 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Coarse-loamy, mixed, superactive, frigid Typic Calciaquolls

**Typical pedon:**
Arveson clay loam, 660 feet west and 165 feet north of the southeast corner of sec. 25, T. 142 N., R. 46 W.

A—0 to 8 inches (10YR 2/1), broken face, clay loam, dark gray (10YR 4/1), broken face, dry; weak fine granular structure; very friable, slightly sticky; strong effervescence throughout (HCl, unspecified); slightly alkaline; gradual smooth boundary.

Bk—8 to 14 inches; very dark gray (10YR 3/1), broken face, clay loam, gray (10YR 5/1), broken face, dry; weak very fine granular structure; very friable, slightly sticky; violent effervescence throughout (HCl, unspecified); moderately alkaline; gradual wavy boundary.

Bkg1—14 to 25 inches; light gray (5Y 7/1), broken face, loam; weak very fine granular structure; very friable, slightly sticky; violent effervescence throughout (HCl, unspecified); common tongues of very dark gray (10YR 3/1) Bk material; moderately alkaline; clear wavy boundary.

Bkg2—25 to 34 inches; gray (5Y 6/1), broken face, sandy loam; weak very fine granular structure; very friable, slightly sticky; many fine gray (5Y 5/1) and many medium gray (5Y 5/1) masses of lime: violent effervescence throughout (HCl, unspecified); moderately alkaline; clear smooth boundary.

2Cg1—34 to 46 inches; gray (5Y 6/1) loamy sand; weak very fine granular structure; very friable, slightly sticky; few fine distinct pale olive (5Y 6/3) masses of iron accumulation pedogenic; strong effervescence throughout (HCl, unspecified); moderately alkaline; clear smooth boundary.

2Cg2—46 to 60 inches; light olive gray (5Y 6/2) fine sand; single grain; loose; few fine prominent olive yellow (2.5Y 6/8) and few fine distinct (5Y 6/4) masses of iron accumulation pedogenic; slight effervescence throughout (HCl, unspecified); moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 24 inches
**Depth to loamy fine sand or coarser material:** Greater than 20 inches

**A horizon:**
Texture: sandy loam, fine sandy loam, or clay loam

**Bk horizon:**
Texture: sandy loam, fine sandy loam, loam, or clay loam

**2Cg horizon:**
Texture: loamy sand, fine sand, fine sandy loam, or sandy loam

## Arvilla Series

**Depth class:** Very deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Moderately rapid in the upper part and

rapid or very rapid in the lower part
**Landform:** Outwash plains and till plains
**Parent material:** Glacial outwash
**Slope:** 0 to 6 percent

**Taxonomic class:** Sandy, mixed Udic Haploborolls

**Typical pedon:**
Arvilla sandy loam, 1,850 feet south and 1,320 feet east of the northwest corner of sec 6, T. 161 N., R. 72 W.

Ap—0 to 5 inches; black (10YR 2/1), broken face, sandy loam, very dark gray (10YR 3/1), broken face, dry; weak medium and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots throughout; 5 percent mixed gravel; neutral; clear smooth boundary.

A—5 to 10 inches; black (10YR 2/1), broken face, sandy loam, very dark gray (10YR 3/1), broken face, dry; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots throughout; 5 percent mixed gravel; neutral; gradual wavy boundary.

Bw—10 to 16 inches; brown (10YR 4/3), broken face, sandy loam, brown (10YR 5/3) dry; weak medium prismatic structure parting to moderate medium subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine roots throughout; 5 percent mixed gravel; neutral; abrupt smooth boundary.

2Bk—16 to 31 inches; brown (10YR 4/3) gravelly coarse sand, pale brown (10YR 6/3) dry; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; masses of lime located on undersides of pebbles; strong effervescence throughout (HCl, unspecified); 30 percent mixed gravel; slightly alkaline; gradual wavy boundary.

2C—31 to 60 inches; brown (10YR 4/3) gravelly coarse sand, pale brown (10YR 6/3) dry; single grain; loose, nonsticky and nonplastic; slight effervescence throughout (HCl, unspecified); 30 percent mixed gravel; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 20 inches
**Depth to lime:** 13 to 25 inches
**Depth to sand and gravel:** 14 to 25 inches
**Notes:** Some pedons have a loamy sand or sandy loam Bk horizon.

**Bw horizon:**
Notes: 0 to 10 percent gravel

**2Bk and 2C horizons:**
Notes: They have more than 5 percent gravel and average 20 to 35 percent gravel.

## Barnes Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Till plains and moraines
**Parent material:** Glacial till
**Slope:** 1 to 25 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Udic Haploborolls

**Typical pedon:**
Barnes loam, 2,100 feet west and 1,450 feet north of the southeast corner of sec. 27, T. 158 N., R. 69 W.

Ap—0 to 7 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak coarse subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine pores; slightly alkaline; abrupt smooth boundary.

Bw1—7 to 11 inches; dark brown (10YR 3/3) loam, brown (10YR 4/3) dry; moderate medium prismatic structure parting to moderate medium angular blocky; slightly hard, firm, slightly sticky and slightly plastic; common medium pores; patches of clay on vertical faces of peds; slightly alkaline; clear wavy boundary.

Bw2—11 to 19 inches; olive brown (2.5Y 4/4) loam, light yellowish brown (2.5Y 6/4) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common medium pores; slightly alkaline; clear wavy boundary

Bk—19 to 37 inches; olive brown (2.5Y 4/4) loam, pale yellow (2.5Y 7/4) dry; moderate coarse prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky and slightly plastic; few medium pores; few masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

C—37 to 60 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; few medium

prominent yellowish brown (10YR 5/6) redoximorphic concentrations; massive; hard, firm, slightly sticky and slightly plastic; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Notes:** Some pedons have a BCk horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry

**Bw horizon:**
Value: 2 to 5, 3 to 6 dry
Chroma: 2 to 4

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4

**C horizon:**
Notes: Some pedons do not have a C horizon.

## Bearden Series

**Depth class:** Very deep
**Drainage class:** Somewhat poorly drained
**Permeability:** Moderately slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 3 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-silty, mixed, superactive, frigid Aeric Calciaquolls

**Typical pedon:**
Bearden silty clay loam, 640 feet east and 160 feet south of the northwest corner of sec. 29, T. 160 N., R. 52 W.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate very fine subangular blocky structure parting to moderate fine granular; very hard, friable, slightly sticky and slightly plastic; common fine roots; many fine pores; few threads of lime; strong effervescence (8 percent calcium carbonate); slightly alkaline; abrupt smooth boundary.

ABk—7 to 18 inches; dark gray (10YR 4/1) and very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) and dark gray (10YR 4/1) dry, gray (10YR 6/1) dry in the lower part; weak coarse and medium subangular blocky structure; very hard, friable, sticky and plastic; common fine roots; many fine pores; few fine masses of lime; disseminated lime throughout with the amount increasing with depth; violent effervescence (15 to 20 percent calcium carbonate); moderately alkaline; clear irregular boundary.

Bk1—18 to 28 inches; light olive brown (2.5Y 5/4) silty clay loam, light yellowish brown (2.5Y 6/4) dry; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many fine pores; violent effervescence (25 percent calcium carbonate); moderately alkaline; clear wavy boundary.

Bk2—28 to 36 inches; olive brown (2.5Y 4/4) silty clay loam, light yellowish brown (2.5Y 6/4) dry; few fine faint gray (5Y 5/1) and few fine and medium prominent very dark brown (10YR 2/2) redoximorphic depletions; weak coarse subangular blocky structure parting to moderate fine and very fine subangular blocky; hard, friable, sticky and plastic; few fine pores; few masses of lime; violent effervescence (15 percent calcium carbonate); moderately alkaline; clear wavy boundary.

C1—36 to 46 inches; light olive brown (2.5Y 5/4) laminated silty clay loam, light yellowish brown (2.5Y 6/4) dry; common medium and fine distinct gray (5Y 5/1) redoximorphic depletions and common medium prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; few black nonmanganese spots; massive; very hard, friable, sticky and plastic; masses of gypsum crystals; few masses of lime; strong effervescence (15 percent calcium carbonate); moderately alkaline; gradual wavy boundary.

C2—46 to 60 inches; light olive brown (2.5Y 5/4) laminated silty clay loam, light yellowish brown (2.5Y 6/4) dry; common distinct gray (5Y 5/1) redoximorphic depletions and many fine and medium prominent dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/6) redoximorphic concentrations; massive; very hard, firm, sticky and plastic; few masses of lime; strong effervescence (15 percent calcium carbonate); slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 20 inches
**Depth to the calcic horizon:** 8 to 16 inches
**Notes:** Some pedons have a BCk horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5, 5 to 7 dry
Chroma: 1 to 4

**C horizon:**
Texture: silty clay loam or silty clay
Notes: Some pedons do not have a C horizon.

## Bearpaw Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Till plains and moraines
**Parent material:** Glacial till
**Slope:** 0 to 9 percent

**Taxonomic class:** Fine, smectitic Vertic Argiborolls

**Typical pedon:**
Bearpaw loam, 1,320 feet west and 1,200 feet south of the northeast corner of sec. 8, T. 28 N., R. 22 E.

A—0 to 3 inches; dark brown (10YR 3/3) loam, dark brown (10YR 4/3) dry; moderate fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; neutral (pH 7.0); clear smooth boundary.

Bt1—3 to 5 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, friable, sticky and slightly plastic; many fine roots; common fine pores; few faint clay films on faces of peds; slightly alkaline (pH 7.6); clear smooth boundary.

Bt2—5 to 10 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; strong medium and fine prismatic structure parting to moderate medium and fine angular blocky; very hard, friable, sticky and plastic; common fine and very fine roots; common very fine pores; continuous faint clay films on faces of peds; 5 percent pebbles; slightly alkaline (pH 7.6); clear wavy boundary.

Bt3—10 to 16 inches, dark grayish brown (10YR 4/2) clay loam, grayish brown (10YR 5/2) dry; 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; common very fine pores; continuous faint dark grayish brown (10YR 4/2) clay films on faces of peds; 5 percent pebbles; slightly alkaline (pH 7.6); clear wavy boundary.

Btk—16 to 23 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, friable, sticky and plastic; common fine and very fine roots; common very fine pores; few faint clay films on faces of peds; 5 percent pebbles; strong effervescence; common fine and medium masses of lime; moderately alkaline (pH 8.0); clear wavy boundary.

Bk—23 to 39 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; 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; strong effervescence; many fine and medium masses of lime; moderately alkaline (pH 8.4); gradual wavy boundary.

BCk—39 to 60 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure; very hard, firm, sticky and plastic; few very fine roots in upper part, 5 percent pebbles; strong effervescence; few fine and medium masses of lime; moderately alkaline (pH 8.2).

**Range in Characteristics**

**Mollic epipedon thickness:** 8 to 16 inches
**Notes:** Some pedons have a C horizon.

**A horizon:**
Value: 2 or 3, 3 or 4 dry
Chroma: 2 or 3

**Bt horizon:**
Chroma: 2 or 3

**Bk horizon:**
Value: 4 or 5
Chroma: 2 or 3

## Beisigl Series

**Depth class:** Moderately deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Rapid
**Landform:** Uplands
**Parent material:** Residuum
**Slope:** 3 to 25 percent

**Taxonomic class:** Mixed, frigid Typic Ustipsamments

**Typical pedon:**
Beisigl loamy fine sand, 1,460 feet south and 100 feet west of the northeast corner of sec. 15, T. 129 N., R. 92 W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine pores; 1 percent sandstone channers; slight effervescence; slightly alkaline; clear smooth boundary.

Bk1—5 to 12 inches; light olive brown (2.5Y 5/4) loamy fine sand, light yellowish brown (2.5Y 6/4) dry; weak medium prismatic structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine pores; 1 percent sandstone channers; disseminated lime; strong effervescence; moderately alkaline; clear smooth boundary.

Bk2—12 to 27 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, pale yellow (2.5Y 7/4) dry; weak coarse and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine pores; 1 percent coarse sandstone channers; disseminated lime; strong effervescence; moderately alkaline; gradual smooth boundary.

Cr—27 to 60 inches; light yellowish brown (2.5Y 6/4) soft calcareous sandstone, pale yellow (2.5Y 7/4) dry; hard and brittle when dry; fractures greater than 4 inches apart.

**Range in Characteristics**

**Depth to soft bedrock:** 20 to 40 inches

**A horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 6 dry
Chroma: 2 or 3
Texture: loamy fine sand, fine sandy loam, or loamy sand

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loamy fine sand, fine sand, or loamy sand

**Cr horizon**
Value: 5 or 6, 6 or 7 dry
Chroma: 2 to 6
Notes: The sandstone is slightly hard or hard, brittle when dry, and easily crushed when moist.

## Belfield Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 0 to 3 percent
**Notes:** These soils are sodic. Some pedons have a Bky or BCky horizon.

**Taxonomic class:** Fine, smectitic Glossic Natriborolls

**Typical pedon:**
Belfield silty clay loam, 2,320 feet east and 235 feet north of the southwest corner of sec. 36, T. 137 N., R. 98 W.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium prismatic structure parting to moderate very fine subangular blocky; very hard, friable; many roots; many very fine pores; common uncoated sand grains on faces of peds; slightly acid; clear wavy boundary.

E/B—9 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; moderate medium prismatic structure parting to weak medium platy which parts to strong very fine subangular blocky; very hard, friable; many roots; many very fine pores; thin light gray (10YR 7/1) dry uncoated sand grains on top of plates and discontinuous on bottom of plates; slightly acid; clear smooth boundary.

Btn1—12 to 17 inches; very dark grayish brown (2.5Y 3/2) silty clay, grayish brown (2.5Y 5/2) dry; strong medium prismatic structure parting to strong medium and fine angular blocky; extremely hard, friable; common roots; many very fine pores; faint continuous clay films on faces of peds; common uncoated sand grains in the upper part and few in the lower part; neutral; clear wavy boundary.

Btn2—17 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light olive brown (2.5Y 5/4) dry; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; very hard, friable; few roots; many fine pores; faint clay films of olive brown (2.5Y 4/3); slightly alkaline; clear wavy boundary.

**C horizon:**
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

## Bowdle Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate in the upper part and rapid in the lower part
**Landform:** Outwash plains and terraces
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 6 percent

**Taxonomic class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Pachic Haploborolls

**Typical pedon:**

Bk2—19 to 32 inches; olive brown (2.5Y 4/4) loam, light brownish gray (2.5Y 6/2) dry; massive; soft, friable; few rock fragments; common coarse accumulations of lime; violent effervescence (24 percent calcium carbonate); moderately alkaline; clear smooth boundary.

C—32 to 60 inches; dark brown (10YR 4/3) loam, yellowish brown (10YR 5/4) dry; many medium prominent reddish yellow (7.5YR 7/8) dry redoximorphic concentrations and light gray (10YR 7/1) dry redoximorphic depletions; massive; soft, friable; few rock fragments; strong effervescence (14 percent calcium carbonate); moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches

**Ap horizon:**
Value: 2 or 3, 4 or 5 dry

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 6 dry
Chroma: 2 to 4
Texture: loam, silt loam, or clay loam

**Bk horizon:**
Value: 3 to 5, 4 to 6 dry
Chroma: 2 to 4
Texture: loam or silt loam

**C horizon:**
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam, silt loam, or silty clay loam

## Buse Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Till plains and moraines
**Parent material:** Glacial till
**Slope:** 3 to 35 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-loamy, mixed, superactive Udic Calciborolls

**Typical pedon:**
Buse loam, 2,400 feet east and 155 feet south of the northwest corner of sec. 34, T. 132 N., R. 43 W.

Ap—0 to 8 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; common fine and medium roots throughout; common fine irregular masses of lime; about 2 percent gravel; slight effervescence; slightly alkaline; abrupt smooth boundary.

Bk1—8 to 22 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; common medium irregular masses of lime; about 2 percent gravel; violent effervescence; moderately alkaline; clear smooth boundary.

Bk2—22 to 40 inches; light olive brown (2.5Y 5/4) loam; few fine distinct light brownish gray (2.5Y 6/2) relict redoximorphic depletions and prominent strong brown (7.5YR 5/6) relict redoximorphic concentrations; weak fine subangular blocky structure; friable; common coarse irregular threads of lime; about 2 percent gravel; strong effervescence; moderately alkaline; clear smooth boundary.

C—40 to 60 inches; light olive brown (2.5Y 5/4) loam; common medium distinct grayish brown (2.5Y 5/2) relict redoximorphic depletions and few prominent light olive brown (2.5Y 5/6) relict redoximorphic concentrations; massive; friable; about 2 percent gravel; slight effervescence; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 10 inches

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry

**Bk horizon:**
Value: 4 to 6, 6 or 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

**C horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

## Cabba Series

**Depth class:** Shallow
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Uplands
**Parent material:** Residuum
**Slope:** 3 to 50 percent
**Notes:** These soils are calcareous

**Taxonomic class:** Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents

**Typical pedon:**
Cabba loam, 2,100 feet north and 1,000 feet east of the southwest corner of sec. 15, T. 21 N., R. 9 E.

A—0 to 3 inches; dark grayish brown (2.5Y 4/2) loam, grayish brown (2.5Y 5/2) dry; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; slight effervescence; slightly alkaline; clear smooth boundary.

Bk1—3 to 8 inches; dark grayish brown (2.5Y 4/2) loam, light brownish gray (2.5Y 6/2) dry; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine pores; common fine masses of lime; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—8 to 15 inches; brown (10YR 5/3) clay loam, pale brown (10YR 6/3) dry; strong thin platy structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine pores; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Cr—15 to 60 inches; brown (10YR 5/3) semiconsolidated sedimentary beds consisting of interbedded sandstone and shale, pale brown (10YR 6/3) dry; few very fine and fine roots in vertical cracks in upper part; strongly effervescent; moderately alkaline.

**Range in Characteristics**

**Depth to soft bedrock:** 10 to 20 inches

**A horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 3 to 6 dry
Chroma: 1 to 4

**Bk horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 7, 5 to 8 dry
Chroma: 1 to 6
Texture: loam, silt loam, clay loam, or silty clay loam

**Cr horizon:**
Notes: It is interbedded layers of siltstone, sandstone or shale that crush to loam, silt loam, very fine sandy loam, clay loam, or silty clay loam

## Cavour Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Very slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 0 to 6 percent
**Notes:** These soils are sodic.

**Taxonomic class:** Fine, smectitic Udic Natriborolls

**Typical pedon:**
Cavour loam, 162 feet east and 51 feet north of the southwest corner of sec. 19, T. 122 N., R. 49 W.

A—0 to 6 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; moderate fine and medium granular structure; slightly hard, friable; neutral; abrupt smooth boundary.

E—6 to 8 inches; dark gray (10YR 4/1) and very dark gray (10YR 3/1) silt loam, gray (10YR 5/1 and 10YR 6/1) dry; weak thin platy structure; slightly hard, very friable; neutral; abrupt wavy boundary.

Btn1—8 to 13 inches; black (10YR 2/1) clay, dark gray (10YR 4/1) dry; moderate coarse columnar structure parting to strong medium and fine blocky; extremely hard, very firm, sticky and plastic; thin light gray (10YR 6/1) caps about 1/4 inch thick on tops of columns; neutral; gradual irregular boundary.

Btn2—13 to 19 inches; black (10YR 2/1) clay, dark gray (10YR 4/1) dry; weak medium and fine prismatic structure parting to strong medium and fine blocky; extremely hard, firm, sticky and plastic; moderately alkaline; clear wavy boundary.

Btnyz—19 to 24 inches; very dark grayish brown (2.5Y 3/2) clay, dark gray (5Y 4/1) dry; moderate fine and medium blocky structure; very hard, firm, sticky and plastic; common fine and medium accumulations of gypsum and other salts; moderately alkaline; gradual wavy boundary.

Byz—24 to 32 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium accumulations of gypsum and other salts; slight effervescence; moderately alkaline; gradual wavy boundary.

C1—32 to 43 inches; olive brown (2.5Y 4/4) clay loam, light brownish gray (2.5Y 6/2) dry; common fine distinct gray (2.5Y 5/1) dry redoximorphic depletions and prominent yellowish brown (10YR 5/6) dry redoximorphic concentrations; massive; hard, firm, sticky and plastic; few to common fine and medium accumulations of gypsum and other salts; strong effervescence; moderately alkaline; gradual wavy boundary.

C2—43 to 60 inches; olive brown (2.5Y 4/4) clay loam, light brownish gray (2.5Y 6/2) dry; common fine prominent yellowish red (5YR 5/8) dry and strong brown (7.5YR 5/6) dry redoximorphic concentrations and common medium distinct gray (5Y 5/1) dry redoximorphic depletions; massive; hard, firm, sticky and plastic; few to common fine and medium accumulations of gypsum and other salts; strong effervescence; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 35 inches
**Depth to lime:** 14 to 35 inches
**Depth to gypsum or other salts:** 16 to 45 inches

**A horizon:**
Hue: 10YR or neutral
Value: 2 or 3, 3 to 5 dry
Chroma: 0 or 1
Texture: loam, silt loam, or clay loam

**E horizon:**
Value: 2 to 5, 3 to 7 dry
Chroma: 1 or 2
Texture: silt loam, loam, or fine sandy loam
Notes: The E horizon is mixed with the A horizon in some cultivated pedons.

**Btn horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4, 3 to 5 dry
Chroma: 1 to 3
Texture: clay loam, clay, silty clay, or silty clay loam
Notes: It has an exchangeable sodium percentage of 10 to 20.

**Byz horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5, 5 or 6 dry
Chroma: 1 to 3
Texture: loam, clay loam, silty clay loam, silty clay, or clay

**C horizon:**
Hue: 2.5Y or 5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 1 to 4
Texture: loam or clay loam

## Chama Series

**Depth class:** Moderately deep
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Uplands
**Parent material:** Soft siltstone, mudstone, and shale
**Slope:** 0 to 45 percent

**Taxonomic class:** Fine-silty, mixed, superactive Typic Calciborolls

**Typical pedon:**
Chama silt loam, 1,120 feet east and 1,180 feet north of the southwest corner of sec. 15, T. 136 N., R. 99 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; neutral; abrupt smooth boundary.

Bw—4 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and nonplastic; slight effervescence; slightly alkaline; clear smooth boundary.

Bk1—8 to 13 inches; light olive brown (2.5Y 5/4) silt loam, light gray (2.5Y 7/2) dry; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, slightly sticky and nonplastic; many fine masses of lime; violent effervescence; slightly alkaline; clear smooth boundary.

Bk2—13 to 22 inches; olive brown (2.5Y 4/4) silt loam, light yellowish brown (2.5Y 6/4) dry; weak medium subangular blocky and weak thick platy structure; slightly hard, friable, slightly sticky and nonplastic; many medium masses of lime; violent effervescence; slightly alkaline; clear smooth boundary.

BCk—22 to 34 inches; light olive brown (2.5Y 5/4) silt loam, light yellowish brown (2.5Y 6/4) dry; massive; slightly hard, friable, slightly sticky and nonplastic; many large lime concretions; slight

effervescence; slightly alkaline; gradual wavy boundary.

Cr—34 to 60 inches; light olive brown (2.5Y 5/4) soft siltstone, pale yellow (2.5Y 7/4) dry; slight effervescence; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 10 inches
**Depth to soft bedrock:** 20 to 40 inches
**Notes:** Some pedons have a C horizon above the Cr horizon.

**A horizon:**
Hue: 10YR or 2.5Y
Value: 2 or 3, 3 to 5 dry
Texture: silt loam, silty clay loam, clay loam, or loam

**Bw horizon:**
Hue: 2.5Y or 10YR
Value: 3 to 6, 4 to 7 dry
Chroma: 2 or 3
Texture: silt loam or silty clay loam

**Bk horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6, 4 to 7 dry
Texture: silt loam or silty clay loam

## Claire Series

**Depth class:** Very deep
**Drainage class:** Excessively drained
**Permeability:** Rapid
**Landform:** Outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 25 percent

**Taxonomic class:** Mixed, frigid Typic Udipsamments

**Typical pedon:**
Claire loamy coarse sand, 2,540 feet east and 670 feet north of the southwest corner of sec. 2, T. 150 N., R. 63 W.

Ap—0 to 8 inches; black (10YR 2/1) loamy coarse sand, dark gray (10YR 4/1) dry; very weak fine subangular blocky structure parting to single grain; loose; common roots; neutral; abrupt smooth boundary.

AC—8 to 14 inches; very dark grayish brown (10YR 3/2) coarse sand, dark grayish brown (10YR 4/2) dry; weak very coarse prismatic structure parting to single grain; loose; few roots; neutral; clear wavy boundary.

C1—14 to 19 inches; very dark grayish brown (10YR 3/2) coarse sand, dark grayish brown (10YR 4/2) dry; single grain; few roots; slightly alkaline; clear wavy boundary.

C2—19 to 48 inches; dark grayish brown (10YR 4/2) coarse sand, grayish brown (10YR 5/2) dry; single grain; slightly alkaline; abrupt smooth boundary.

C3—48 to 60 inches; dark grayish brown (2.5Y 4/2) fine sand, light gray (10YR 7/1) dry; common medium dark reddish gray (5YR 4/2) redoximorphic concentrations; single grain; slight effervescence; moderately alkaline.

**Range in Characteristics**

**10 to 40 inch particle-size control section:** Coarse sand, sand, or loamy coarse sand
**Notes:** Some pedons have Ab horizons.

**Ap horizon:**
Value: 2 to 4, 4 to 6 dry
Chroma: 1 or 2
Texture: loamy coarse sand or loamy sand

**AC horizon:**
Value: 3 or 4, 4 to 6 dry
Texture: loamy coarse sand, loamy sand, or coarse sand

**C horizon:**
Value: 3 to 5
Chroma: 1 to 6

## Cohagen Series

**Depth class:** Shallow
**Drainage class:** Well drained
**Permeability:** Moderately rapid
**Landform:** Uplands
**Parent material:** Soft sandstone
**Slope:** 6 to 50 percent
**Notes:** These soils are calcareous.

**Taxonomic class:** Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents

**Typical pedon:**
Cohagen fine sandy loam, 2,360 feet east and 250 feet north of the southwest corner of sec. 29, T. 143 N., R. 85. W.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to weak medium granular; slightly hard, very friable;

many roots; slight effervescence; slightly alkaline; clear wavy boundary.

C1—3 to 8 inches; dark grayish brown (2.5Y 4/2) fine sandy loam, light brownish gray (2.5Y 6/2) dry; weak medium and fine subangular blocky structure; slightly hard, very friable; common roots; slight effervescence; slightly alkaline; gradual boundary.

C2—8 to 17 inches; olive brown (2.5Y 4/4) fine sandy loam, light yellowish brown (2.5Y 6/4) and light olive brown (2.5Y 5/5) dry; weak medium subangular blocky structure; hard, friable; common grading to few roots; 25 percent soft sandstone fragments; slight effervescence; moderately alkaline; clear wavy boundary.

Cr—17 to 40 inches; light olive brown (2.5Y 5/4) soft calcareous sandstone, pale yellow (2.5Y 7/4) and light yellowish brown (2.5Y 6/4) dry; massive; slightly hard and brittle; soft and easily crushed; few roots in cracks in upper part; few seams of lime.

**Range in Characteristics**

**Notes:** Depth to bedrock is 10 to 20 inches.

**Ap horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 6 dry
Chroma: 2 or 3

**C horizon:**
Hue: 2.5Y or 10YR
Value: 4 or 5, 5 to 7 dry

## Colvin Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Moderately slow
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 0 to 1 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-silty, mixed, superactive, frigid Typic Calciaquolls

**Typical pedon:**
Colvin silty clay loam, 75 feet north and 65 feet east of the southwest corner of sec. 18, T. 136 N., R. 60 W.

A—0 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak coarse prismatic structure parting to moderate medium granular; hard, friable, sticky and plastic; many roots; many fine pores; strong effervescence; slightly alkaline; clear wavy boundary.

Bkg1—10 to 20 inches; gray and olive gray (5Y 6/1 and 5/2) silty clay loam, gray and white (N 6/0 and 8/0) dry; very weak medium subangular blocky structure parting to weak fine granular; hard, friable, slightly sticky and plastic; common roots; common fine pores; few masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

Bkg2—20 to 30 inches; light olive gray and olive gray (5Y 6/2 and 5/2) silty clay loam, light gray and gray (5Y 7/1 and 6/1) dry; common medium distinct light olive brown (2.5Y 5/6) redoximorphic concentrations; very weak fine subangular blocky structure; hard, friable, slightly sticky and plastic; few roots; common pores; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg—30 to 60 inches; olive gray (5Y 5/2) silty clay loam, light gray (5Y 7/2) dry; many large prominent yellowish brown (10YR 5/8) and few medium prominent yellowish red (5YR 5/6) redoximorphic concentrations; massive; hard, friable, sticky and plastic; strong effervescence in upper part, gradually decreases to slight effervescence at 50 inches; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 24 inches
**Depth to the calcic horizon:** 4 to 16 inches
**Notes:** Some pedons have an ABk, Bkz, or 2C horizon.

**A horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Chroma: 0 or 1

**Bk horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 3 to 7, 5 to 8 dry
Chroma: 0 to 2

## Cresbard Series

**Depth class:** Very deep
**Drainage class:** Moderately well
**Permeability:** Slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 0 to 6 percent
**Notes:** These soils are sodic.

**Taxonomic class:** Fine, smectitic Glossic Udic Natriborolls

**Typical pedon:**
Cresbard loam, 1,300 feet south and 120 feet west of the northeast corner of sec. 35, T. 115 N., R. 59 W.

Ap—0 to 9 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; common very fine vesicular and few tubular pores; moderately acid; abrupt smooth boundary.

E—9 to 10 inches; very dark grayish brown (10YR 3/2) loam, light gray (10YR 6/1) dry; weak fine and medium platy structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine vesicular and tubular pores; slightly acid; clear smooth boundary.

E/B—10 to 14 inches; 60 percent very dark grayish brown (10YR 3/2) (E) and 40 percent black (10YR 2/1) (B) clay loam, light gray (10YR 6/1) (E) and dark gray (10YR 4/1) (B) dry; moderate medium prismatic structure parting to moderate very fine and fine blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine tubular and common vesicular pores; slightly acid; clear smooth boundary.

Btn1—14 to 28 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to strong medium blocky; very hard, firm, very sticky and very plastic; common very fine and fine roots; common very fine tubular pores; neutral; gradual wavy boundary.

Btn2—28 to 34 inches; dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) dry; moderate medium prismatic structure parting to strong medium blocky; extremely hard, firm, moderately sticky and moderately plastic; common very fine and fine roots throughout; common very fine tubular pores; common prominent dark gray (10YR 4/1) dry continuous clay films on vertical and horizontal faces of peds; about 1 percent gravel; neutral; clear wavy boundary.

Bk—34 to 55 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; many coarse faint gray (10YR 5/1) dry redoximorphic depletions and few fine prominent yellowish brown (10YR 5/6) dry redoximorphic concentrations; moderate medium prismatic structure parting to weak very fine and fine subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; common medium irregular masses of lime; about 3 percent gravel; strong effervescence; slightly alkaline; gradual irregular boundary.

C—55 to 60 inches; grayish brown (2.5Y 5/2) clay loam, light brownish gray (2.5Y 6/2) dry; many medium distinct light gray (10YR 6/1) dry redoximorphic depletions and many fine prominent yellowish brown (10YR 5/6) dry redoximorphic concentrations; massive; hard, friable, slightly sticky and slightly plastic; many very fine vesicular and tubular pores; few fine rounded masses of lime; strong effervescence; about 2 percent gravel; slightly alkaline.

**Range in Characteristics**

**Depth to lime:** 15 to 40 inches

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry
Texture: silt loam or loam

**E horizon:**
Value: 2 to 4, 5 or 6 dry
Texture: loam or silt loam

**E/B horizon:**
Hue: 10YR or 2.5Y
Value: E part - 2 to 4, 5 or 6 dry; B part - 2 to 4, 3 to 6 dry
Chroma: B part - 1 to 3
Texture: clay loam or silty clay loam

**Btn horizon:**
Value: 3 to 6 dry
Chroma: 1 to 3
Texture: silty clay, clay loam, or clay
Notes: It contains 35 to 50 percent clay and more than 15 percent fine sand or coarser sand.

**Bk horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: clay loam, loam, or silt loam

**C horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: clay loam, loam, or silt loam
Notes: It has nests of gypsum or other salts in some pedons.

## Daglum Series

**Depth class:** Deep and very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 0 to 9 percent
**Notes:** These soils are sodic.

**Taxonomic class:** Fine, smectitic Vertic Natriborolls

**Typical pedon:**
Daglum silt loam, 1,950 feet east and 1,355 feet north of the southwest corner of sec. 26, T. 132 N., R. 98 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; slightly acid; abrupt smooth boundary.

E—7 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium and coarse subangular blocky structure parting to moderate fine subangular blocky and weak medium platy; slightly hard, friable, slightly sticky and slightly plastic; many very fine pores; light gray (10YR 7/2) dry coatings; slightly acid; clear smooth boundary.

Btn1—8 to 14 inches; very dark grayish brown (10YR 3/2) clay, dark grayish brown (10YR 4/2) dry; strong fine and medium columnar structure parting to strong fine and medium angular blocky; extremely hard, very firm, very sticky and plastic; common very fine roots along faces of peds; many very fine pores; light gray (10YR 7/2) dry silt coatings on tops of columns; many faint clay films on faces of peds; very dark brown (10YR 2/2) coatings on faces of peds; slightly alkaline; gradual smooth boundary.

Btn2—14 to 18 inches; very dark grayish brown (10YR 3/2) clay, dark grayish brown (10YR 4/2) dry; strong medium and coarse prismatic structure parting to strong fine and medium angular blocky; extremely hard, very firm, very sticky and very plastic; common very fine roots along faces of peds; many very fine pores; many faint clay films on faces of peds; very dark brown (10YR 2/2) coatings on faces of peds; moderately alkaline; clear smooth boundary.

Bky1—18 to 26 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; strong fine and medium angular and subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; many very fine pores; few faint clay films on faces of peds; very dark grayish brown (10YR 3/2) coatings on faces of peds; few fine gypsum crystals; common fine and medium irregularly shaped masses of lime; strong effervescence; strongly alkaline; clear smooth boundary.

Bky2—26 to 32 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common very fine roots; common very fine pores; common fine and medium gypsum crystals; common fine and medium irregularly shaped masses of lime; violent effervescence; strongly alkaline; clear smooth boundary.

BCk—32 to 47 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine pores; common fine threads of lime; violent effervescence; moderately alkaline; clear wavy boundary.

C—47 to 60 inches; light olive brown (2.5Y 5/4) clay, light yellowish brown (2.5Y 6/4) dry; common fine distinct brownish yellow (10YR 6/8) dry redoximorphic concentrations; weak medium and coarse subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; common very fine pores; few fine gypsum crystals; common fine irregularly shaped masses of lime; strong effervescence; moderately alkaline.

### Range in Characteristics

**Depth to gypsum or other salts:** 16 to 36 inches
**Depth to soft bedrock:** 40 to 60 inches in map unit 2259 and more than 60 inches in map unit 2244
**Notes:** Pedons in map unit 2259 have a Cr horizon below a depth of 40 inches.

**A horizon:**
Value: 2 or 3, 4 or 5 dry

**E horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5, 4 to 7 dry
Notes: Some cultivated pedons do not have an E horizon.

**Btn horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5, 4 to 6 dry
Texture: clay loam, silty clay loam, clay, or silty clay

## Darnen Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Moderate
**Landform:** Valleys
**Parent material:** Glacial till
**Slope:** 3 to 6 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Pachic Udic Haploborolls

**Typical pedon:**
Darnen loam, 2,550 ft. west and 150 ft. north of the southeast corner of sec. 29, T. 122 N., R. 42 W.

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; friable; neutral; abrupt smooth boundary.

A—8 to 24 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; friable; many fine pores; neutral; clear smooth boundary.

AB—24 to 29 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; many fine pores; neutral; clear smooth boundary.

Bw1—29 to 34 inches; dark grayish brown (10YR 4/2) loam; weak fine subangular blocky structure; friable; neutral; gradual smooth boundary.

Bw2—34 to 60 inches; dark grayish brown (2.5Y 4/2) loam; weak fine subangular blocky structure; friable; strong effervescence throughout (HCl, unspecified); slightly alkaline; gradual smooth boundary.

### Range in Characteristics

**Mollic epipedon thickness:** 24 to 48 inches
**Depth to lime:** 20 to 60 inches
**Notes:** Some pedons have up to 5 percent rock fragments below 30 inches. Some pedons have a Bk horizon and/or a C horizon.

**A horizon:**
Texture: loam, silt loam, sandy loam, or clay loam

**Bw horizon:**
Texture: loam or clay loam

## Desart Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 0 to 9 percent
**Notes:** These soils are sodic.

**Taxonomic class:** Coarse-loamy, mixed, superactive Typic Natriborolls

**Typical pedon:**
Desart fine sandy loam, 1,300 feet west and 300 feet south of the northeast corner of sec. 28, T. 131 N., R. 81 W.

A1—0 to 11 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; slightly acid; clear smooth boundary.

A2—11 to 20 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; neutral; clear smooth boundary.

E—20 to 24 inches; dark grayish brown (2.5Y 4/2) loamy fine sand, light brownish gray (2.5Y 6/2) dry; weak medium subangular blocky structure parting to weak coarse platy; soft, very friable, nonsticky and nonplastic; common very fine roots; slightly alkaline; abrupt wavy boundary.

Btn—24 to 31 inches; olive brown (2.5Y 4/3) fine sandy loam, light yellowish brown (2.5Y 6/3) dry; strong coarse columnar structure parting to weak coarse platy; very hard, firm, slightly sticky and slightly plastic; few very fine roots; common faint dark grayish brown (2.5Y 4/2) moist clay films on faces of peds; strongly alkaline; clear wavy boundary.

C—31 to 60 inches; dark grayish brown (2.5Y 4/2) loamy fine sand, light brownish gray (2.5Y 6/2) dry; weak medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; strongly alkaline.

**Range in Characteristics**

**Depth to the Btn horizon:** 20 to 30 inches
**Notes:** Some pedons have E/B or B/E horizons. Some pedons have a Bk or Bky horizon. Some pedons have a Cr horizon at a depth of 40 to 60 inches.

**A horizon:**
Chroma: 2 or 3

**E horizon:**
Hue: 10YR or 2.5Y
Value: 5 to 7, 3 to 5 moist
Chroma: 1 or 2
Texture: very fine sandy loam, loamy fine sand, fine sandy loam, sandy loam, loamy sand, or fine sand

**Btn horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6, 3 to 5 moist
Chroma: 2 or 3
Texture: fine sandy loam, very fine sandy loam, sandy loam, or loam
Notes: Lime and salts are in the lower Btn horizon in some pedons.

**C horizon:**
Hue: 2.5Y or 5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 or 3
Texture: loam, sandy loam, or loamy fine sand

## Divide Series

**Depth class:** Very deep
**Drainage class:** Somewhat poorly drained
**Permeability:** Moderate in the upper part and very rapid in the lower part
**Landform:** Outwash plains and terraces
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 3 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aeric Calciaquolls

**Typical pedon:**
Divide loam, 1,050 feet west and 315 feet south of the northeast corner of sec. 4, T. 149 N., R. 60 W.

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; about 5 percent gravel; strong effervescence; moderately alkaline; abrupt smooth boundary.

Ak—8 to 12 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; about 5 percent gravel; few fine masses of lime; violent effervescence; moderately alkaline; abrupt wavy boundary.

Bk—12 to 22 inches; light brownish gray (2.5Y 6/2) loam, light gray (2.5Y 7/2) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; about 5 percent gravel; common medium masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.

2C1—22 to 26 inches; light olive brown (2.5Y 5/4) gravelly loamy coarse sand, light yellowish brown (2.5Y 6/4) dry; single grain; loose, nonsticky and nonplastic; few fine roots; about 20 percent gravel; strong effervescence; moderately alkaline; clear smooth boundary.

2C2—26 to 60 inches; olive brown (2.5Y 4/4) very gravelly coarse sand, light olive brown (2.5Y 5/4) dry; single grain; loose, nonsticky and nonplastic; about 35 percent gravel; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 20 inches
**Depth to the calcic horizon:** 7 to 16 inches
**Depth to sand and gravel:** 20 to 40 inches
**Notes:** Some pedons have an ABk horizon.

**A horizon:**
Hue: 10YR or 2.5Y
Value: 2 or 3, 3 to 5 dry

**Bk horizon:**
Hue: 10YR, 2.5Y, or 5Y

Value: 5 to 8 dry
Chroma: 1 to 4

**2C horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 7 dry
Notes: It has 5 to 40 percent gravel.

## Dogtooth Series

**Depth class:** Moderately deep
**Drainage class:** Well drained
**Permeability:** Very slow
**Landform:** Uplands
**Parent material:** Residuum
**Slope:** 9 to 15 percent
**Notes:** These soils are saline-sodic.

**Taxonomic class:** Fine, smectitic Leptic Natriborolls

**Typical pedon:**
Dogtooth silt loam, 2,100 feet east and 1,350 feet south of the northwest corner of sec. 4, T. 140 N., R. 89 W.

E—0 to 2 inches; dark grayish brown (2.5Y 4/2) silt loam, light brownish gray (2.5Y 6/2) dry; weak thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine pores; neutral; abrupt smooth boundary.

Btn—2 to 8 inches; very dark grayish brown (2.5Y 3/2) silty clay, grayish brown (2.5Y 5/2) dry; strong medium columnar structure parting to moderate fine angular blocky; very hard, very firm, very sticky and very plastic; common fine roots between peds; few medium and common fine pores; column tops coated with light brownish gray (2.5Y 6/2) dry E material; many distinct dark grayish brown (2.5Y 4/2) dry clay films on faces of peds; slight effervescence in lower part; moderately alkaline; clear smooth boundary.

Btkn—8 to 13 inches; light olive brown (2.5Y 5/4) silty clay, light yellowish brown (2.5Y 6/4) dry; moderate medium prismatic structure parting to strong fine angular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common fine pores; many faint clay films on faces of peds; few fine irregular masses of lime; strong effervescence; moderately alkaline; clear smooth boundary.

Bky—13 to 21 inches; light olive brown (2.5Y 5/4) silty clay, light yellowish brown (2.5Y 6/4) dry; moderate medium prismatic structure parting to moderate fine angular blocky; very hard, very firm, very sticky and very plastic; few fine roots; few fine pores; common fine irregular masses of lime; few fine gypsum crystals; strong effervescence; strongly alkaline; abrupt wavy boundary.

Cr—21 to 60 inches; dark gray (5Y 4/1) soft shale bedrock, light gray (5Y 6/1) dry; slight effervescence.

**Range in Characteristics**

**Depth to gypsum or other salts:** 5 to 14 inches
**Depth to soft bedrock:** 20 to 40 inches

**E horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 7 dry
Chroma: 2 or 3
Texture: loam, silt loam, fine sandy loam, or silty clay loam

**Btn horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 6 dry
Chroma: 1 to 3
Texture: silty clay, clay, silty clay loam, or clay loam

**Btkn horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 5, 5 or 6 dry
Chroma: 1 to 4
Texture: clay, silty clay, silty clay loam, or clay loam

**Bky horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 1 to 4
Texture: silty clay, silty clay loam, clay loam, or loam

**Cr horizon:**
Notes: It is soft shale, siltstone, or mudstone bedrock.

## Embden Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Moderately rapid
**Landform:** Outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 1 to 6 percent

**Taxonomic class:** Coarse-loamy, mixed, superactive Pachic Udic Haploborolls

**Typical pedon:**
Embden fine sandy loam, 2,640 feet east and 60 feet north of the southwest corner, sec. 21, T. 137 N., R. 53 W.

Ap—0 to 8 inches; black (10YR 2/1) fine sandy loam, very dark gray (10YR 3/1) dry; weak fine granular structure; slightly hard, very friable, slightly sticky and nonplastic; many fine roots and pores; neutral; abrupt smooth boundary.

A—8 to 14 inches; black (10YR 2/1) fine sandy loam,A—8542ly hard,subang8 -1aryo2 T ry; weak partingt smTc -0.07 pores; structure; slightly hard, very friable, slightly sticky
an3 nonplastw 1duUdiwavy roots and porT1 1 Tf-0.0186694
Ap—0314inches;black(10YR2T/TT01Tffinesandishbrown)Tc-4.23950002(Ap—055nonplastmodclte3oediumsubang8-1ary
h

Ap—0 to 7 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many roots; neutral; abrupt smooth boundary.

Bw1—7 to 14 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; dark brown (10YR 2/2) coats on faces of peds; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; slightly alkaline; clear wavy boundary.

Bw2—14 to 23 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; very dark brown (10YR 2/2) coats on faces of peds; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many very fine pores; patches of clay films on vertical faces of peds; slightly alkaline; gradual wavy boundary.

BC—23 to 28 inches; dark grayish brown (2.5Y 4/2) loam, grayish brown (2.5Y 5/2) dry; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine pores; slight effervescence in spots; slightly alkaline; clear wavy boundary.

2C1—28 to 34 inches; dark grayish brown (2.5Y 4/2) gravelly loam, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; approximately 30 percent gravel; strong effervescence; slightly alkaline; clear wavy boundary.

3C2—34 to 42 inches; grayish brown (2.5Y 5/2) clay loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure; hard, friable, sticky and slightly plastic; few fine roots; few fine pores; about 3 percent pebbles; common masses of lime; strong effervescence; moderately alkaline; diffuse boundary.

3C3—42 to 60 inches; light olive brown (2.5Y 5/3) clay loam, light yellowish brown (2.5Y 6/3) dry; massive; hard, firm, sticky and slightly plastic; few fine pores; about 3 percent pebbles; few masses of lime; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 inches to more than 30 inches
**Depth to glacial till:** 16 to 40 inches

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry
Texture: loam or silt loam

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4
Chroma: 2 or 3

**2C horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 or 6 dry
Chroma: 2 or 3

**3C horizon:**
Hue: 2.5Y or 5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam
Notes: It has 2 to 10 percent rock fragments.

## Falsen Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Rapid
**Landform:** Outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 3 percent

**Taxonomic class:** Sandy, mixed Aquic Haploborolls

**Typical pedon:**
Falsen coarse sand, 240 feet south and 45 feet west of the northeast corner of sec. 17, T. 154 N., R. 77 W.

A—0 to 12 inches; black (10YR 2/1) coarse sand, very dark gray (10YR 3/1) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; neutral; clear smooth boundary.

Bw—12 to 25 inches; very dark grayish brown (10YR 3/2) coarse sand, dark grayish brown (10R 4/2) dry; weak medium subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; few very fine roots; neutral; clear smooth boundary.

BC—25 to 36 inches; very dark grayish brown (10YR 3/2) coarse sand, dark grayish brown (10YR 4/2) dry; few fine faint dark brown (10YR 4/3) and common fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; single grain; loose, nonsticky and nonplastic; few very fine roots; slightly alkaline; gradual smooth boundary.

C1—36 to 44 inches; grayish brown (2.5Y 5/2) coarse sand, light gray (2.5Y 7/2) dry; many medium and coarse prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; single grain; loose, nonsticky and nonplastic; few very fine roots; slightly alkaline; gradual smooth boundary.

C2—44 to 60 inches; light olive brown (2.5Y 5/4) coarse sand, light yellowish brown (2.5Y 6/4) dry; many medium and coarse prominent yellowish brown (10YR 5/8 ) redoximorphic concentrations; single grain; loose, nonsticky and nonplastic; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 20 to 40 inches
**Depth to redoximorphic features:** 18 to 30 inches
**Depth to the C horizon:** 25 to 40 inches.
**Notes:** The soil has less than 5 percent rock fragments throughout.

**A horizon:**
Value: 2 or 3, 3 to 5 dry

**Bw horizon:**
Value: 3 or 4, 4 or 5 dry
Chroma: 2 or 3
Texture: coarse sand, loamy sand, loamy coarse sand, or sand

**C horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 6, 5 to 8 dry
Texture: coarse sand, loamy coarse sand, loamy sand, or sand

## Fargo Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 1 percent

**Taxonomic class:** Fine, smectitic, frigid Typic Epiaquerts

**Typical pedon:**
Fargo silty clay, 1,170 feet south and 410 feet east of the northwest corner of sec. 29, T. 144 N., R. 49 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure parting to strong fine granular; very hard, blocks friable, granules firm, very sticky and very plastic; many fine roots; many fine pores; neutral (pH 7.2); abrupt smooth boundary.

Bw1—8 to 13 inches; black (10YR 2/1) and very dark gray (10YR 3/1) crushed and rubbed silty clay, very dark gray (10YR 3/1) and dark gray (10YR 4/1) crushed and rubbed dry; moderate medium subangular blocky structure parting to strong very fine angular blocky; extremely hard, firm, very sticky and very plastic; many fine roots; many fine pores; faces of peds have shiny waxy sheen when moist; cracks filled with A material throughout; neutral (pH 7.0); abrupt wavy boundary.

Bw2—13 to 21 inches; very dark grayish brown (2.5Y 3/2) and very dark gray (2.5Y 3/1) silty clay, dark grayish brown (2.5Y 4/2) and gray (2.5Y 5/1) dry; dark grayish brown (2.5Y 5/2) and grayish brown (2.5Y 4/2) dry crushed and rubbed; moderate coarse prismatic structure parting to strong fine and very fine angular blocky; extremely hard, firm, very sticky and very plastic; common fine roots; common pores; slickensides on vertical faces of peds; faces of blocks have waxy sheen; slight effervescence in lower part, noneffervescent on tongues; cracks filled with A material throughout; slightly alkaline (pH 7.6); abrupt irregular boundary.

Bkg—21 to 32 inches; olive gray (5Y 5/2) silty clay, light gray (5Y 7/2) dry; weak medium subangular blocky structure parting to moderate fine angular blocky and granular; hard, friable, sticky and plastic; few roots; common fine pores; cracks filled with A material extend into this horizon; common fine masses of lime; strong effervescence; moderately alkaline (pH 8.0); clear wavy boundary.

Cg1—32 to 48 inches; grayish brown (2.5Y 5/2) silty clay, light gray (2.5Y 7/2) dry; common medium distinct brown (10YR 4/3) redoximorphic concentrations and gray (5Y 5/1) redoximorphic depletions; weak medium subangular blocky structure parting to moderate very fine angular blocky and granular; very hard, firm, very sticky and very plastic; few fine roots; common pores;

strong effervescence; moderately alkaline (pH 8.0); gradual wavy boundary.

Cg2—48 to 60 inches; olive (5Y 4/3) and pale olive (5Y 6/3) silty clay, pale olive (5Y 6/3) and pale olive (5Y 8/3) dry; many medium prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; laminated, fractures to moderate very fine blocky structure; very hard, firm, very sticky and very plastic; few medium masses of lime; slight effervescence; moderately alkaline (pH 8.0).

**Range in Characteristics**

**Mollic epipedon thickness:** 8 to 40 inches
**Depth to lime:** 11 to 42 inches
**10 to 40 inch particle-size control section:** Averages 40 to 60 percent clay and less than 15 percent fine sand and coarser sand

**Ap horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 2 or 3, 3 or 4 dry
Chroma: 0 or 1
Texture: clay, silty clay, or silty clay loam

**Bw horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4
Texture: clay, silty clay, or silty clay loam

**Bkg horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6, 5 to 8 dry
Chroma: 1 or 2
Texture: clay, silty clay, or silty clay loam
Notes: It contains 10 to 25 percent calcium carbonate equivalent

**Cg horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 6, 5 to 8 dry
Chroma: 1 to 3
Texture: clay, silty clay, or silty clay loam

## Farland Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Uplands
**Parent material:** Alluvium
**Slope:** 0 to 20 percent

**Taxonomic class:** Fine-silty, mixed, superactive Typic Argiborolls

**Typical pedon:**
Farland silt loam, 1,490 feet north and 1,200 feet west of southeast corner of sec. 1, T. 139 N., R. 91 W.

A—0 to 4 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium and fine prismatic and fine subangular blocky structure parting to moderate fine granular; slightly hard, friable; many roots; many fine pores; neutral; gradual wavy boundary.

Bt1—4 to 11 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium and fine prismatic structure parting to strong medium and fine angular blocky; hard, friable; many roots; common fine pores; faint clay films on faces of peds; neutral; clear wavy boundary.

Bt2—11 to 18 inches; dark grayish brown (2.5Y 4/2) silty clay loam, grayish brown (2.5Y 5/2) dry; moderate medium and fine prismatic structure parting to strong medium and fine subangular blocky; hard, friable; common roots; common fine pores; faint patchy clay films; neutral; gradual wavy boundary.

Bk1—18 to 25 inches; grayish brown (2.5Y 5/2) silt loam, light yellowish brown (2.5Y 6/4) dry; weak coarse prismatic and moderate coarse subangular blocky structure; hard, friable; few roots; common fine pores; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—25 to 34 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; weak coarse prismatic and moderate coarse and medium subangular blocky structure; friable; few roots; few fine pores; violent effervescence; common coarse masses of lime; moderately alkaline; gradual boundary.

C—34 to 60 inches; olive brown (2.5Y 4/4) stratified silt loam, loam, and silty clay loam, light brownish gray (2.5Y 6/2) dry; weak coarse to fine subangular blocky structure parting to weak thin platy; friable; few roots; few fine pores; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to lime:** 8 to 30 inches
**Notes:** Some pedons have a Btk or BCk horizon.

**A horizon:**
Value: 2 or 3, 4 or 5 dry
Chroma: 2 or 3
Texture: loam, silt loam, or clay loam

**Bt horizon:**
Value: 4 to 6 dry
Chroma: 2 to 4
Texture: silty clay loam or clay loam

**Bk horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 5, 5 to 7 dry
Chroma: 2 to 4
Texture: loam, silt loam, or silty clay loam

**C horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 6 dry
Chroma: 2 to 4

## Farnuf Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 0 to 3 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Argiborolls

**Typical pedon:**
Farnuf loam, 1,600 feet west and 1,240 feet south of the northeast corner of sec. 36, T. 18 N., R. 6 E.

A—0 to 7 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate very thin platy structure in the upper part and moderate medium prismatic structure in the lower part with plates and prisms that separate to moderate very fine granules; hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; many very fine and fine pores; neutral (pH 7.4); clear smooth boundary.

Bt—7 to 15 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; strong medium prismatic structure parting to strong fine and medium subangular blocky; very hard, friable, sticky and plastic; many fine and very fine roots; many fine and very fine and few medium pores; continuous faint dark grayish brown (10YR 4/2) dry clay films on faces of peds; slightly alkaline (pH 7.6); clear wavy boundary.

Bk1—15 to 24 inches; brown (10YR 5/3) loam, pale brown (10YR 6/3) dry; moderate medium prismatic structure that separates to weak medium and fine blocky; hard, friable, sticky and plastic; many fine and very fine roots; many fine and very fine and few medium pores; few masses of lime; strong effervescence; moderately alkaline (pH 8.3); diffuse wavy boundary.

Bk2—24 to 36 inches; grayish brown (10YR 5/2) loam, light gray (10YR 7/2) dry; weak coarse blocky structure; hard, friable, sticky and slightly plastic; common fine and very fine roots; common fine and very fine pores; 5 percent pebbles; common masses of lime; continuous faint coatings of lime on pebbles; strong effervescence; moderately alkaline (pH 8.4); diffuse wavy boundary.

BC—36 to 60 inches; brown (10YR 5/3) loam consisting of layers of stratified sandy clay loam and fine sandy loam, very pale brown (10YR 7/3) dry; massive; hard, very friable, sticky and slightly plastic; few fine and very fine roots; common fine and very fine pores; disseminated lime; strong effervescence; strongly alkaline (pH 8.5).

### Range in Characteristics

**Mollic epipedon thickness:** 7 to 15 inches
**Notes:** Some pedons have a C horizon.

**Ap horizon:**
Value: 2 or 3, 4 or 5 dry

**Bt horizon:**
Chroma: 2 to 4
Texture: loam, clay loam, or silty clay loam

**Bk horizon:**
Value: 4 to 6, 5 to 7 dry

**BC horizon:**
Value: 4 to 6, 5 to 7 dry
Texture: loam or clay loam

## Felor Series

**Depth class:** Very deep
**Drainage class:** Well drained

**Permeability:** Moderate in the upper part and slow in the lower part
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 1 to 3 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Argiborolls

**Typical pedon:**
Felor loam, 282 feet east and 72 feet south of the northwest corner of sec. 23, T. 18 N., R. 15 E.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak very coarse subangular blocky and weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; few pebbles; many fine and medium roots; slightly acid; abrupt wavy boundary.

A—5 to 11 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak coarse prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; slightly acid; clear wavy boundary.

Bt—11 to 28 inches; dark brown (7.5YR 4/4) sandy clay loam, brown (7.5YR 5/4) dry; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, slightly sticky and plastic; few fine roots; few pebbles; shiny film on faces of peds; slightly acid; gradual wavy boundary.

2Bw—28 to 34 inches; pale olive (5Y 6/3) silty clay, pale yellow (5Y 7/3) dry; strong fine and medium prismatic structure parting to moderate fine and medium blocky; hard, firm, sticky and plastic; shiny film on faces of peds; few fine roots; slightly alkaline; abrupt wavy boundary.

2Bk—34 to 39 inches; brown (7.5YR 5/4) and pale olive (5Y 6/3) silty clay, light brown (7.5YR 6/4) and pale yellow (5Y 7/3) dry; moderate fine and medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; common fine and medium accumulations of lime; strong effervescence; moderately alkaline; abrupt wavy boundary.

2C—39 to 60 inches; reddish brown (5Y 5/3) and light brownish gray (2.5Y 6/2) silty clay, white (2.5Y 8/2) and light reddish brown (5YR 6/3) dry; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; massive; laminated; hard, firm, sticky and plastic; few fine accumulations of lime; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to clayey material:** 20 to 35 inches

**A horizon:**
Value: 2 or 3, 4 or 5 dry

**Bt horizon:**
Hue: 7.5YR, 10YR, or 2.5Y
Value: 3 to 6, 4 to 7 dry
Chroma: 2 to 4
Texture: clay loam or sandy clay loam

**2Bk horizon:**
Value: 4 to 6, 5 to 8 dry
Chroma: 2 to 4
Notes: Some pedons have a Bk horizon.

**2C horizon:**
Value: 4 to 6, 5 to 8 dry

## Flasher Series

**Depth class:** Shallow
**Drainage class:** Somewhat excessively drained
**Permeability:** Rapid
**Landform:** Uplands
**Parent material:** Residuum
**Slope:** 3 to 50 percent

**Taxonomic class:** Mixed, frigid, shallow Typic Ustipsamments

**Typical pedon:**
Flasher loamy fine sand, 1,110 feet north and 195 feet west of southeast corner of sec. 3, T. 134 N., R. 86 W.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many roots; quartz grains stained; slight effervescence; slightly alkaline; gradual wavy boundary.

AC—6 to 10 inches; olive brown (2.5Y 4/4) loamy fine sand, light olive brown (2.5Y 5/4) dry; weak fine subangular blocky structure; loose, nonsticky and nonplastic; common roots; few small hard sandstone fragments; slight effervescence; slightly alkaline; gradual smooth boundary.

Cr—10 to 60 inches; olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/4) soft sandstone that crushes to sand, light yellowish brown (2.5Y 6/4) dry; slight effervescence; moderately alkaline.

**Range in Characteristics**

**10 to 40 inch particle-size control section:** loamy fine sand, fine sand, loamy sand, or sand
**Depth to soft bedrock:** 7 to 20 inches

**A horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4, 4 to 6 dry
Chroma: 2 or 3
Texture: loamy fine sand, loamy sand, fine sand, sandy loam, or fine sandy loam

**AC horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6, 4 to 8 dry
Chroma: 2 to 4
Texture: loamy fine sand, fine sand, or loamy sand

**Cr horizon:**
Notes: It is soft sandstone bedrock that crushes to fine sand, sand, or loamy fine sand.

## Flaxton Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately rapid in the upper part and moderately slow in the lower part
**Landform:** Till plains
**Parent material:** Eolian and glacial till
**Slope:** 1 to 6 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Pachic Argiborolls

**Typical pedon:**
Flaxton fine sandy loam, 190 feet south of the northeast corner of sec. 24, T. 137 N., R. 79 W.

A—0 to 15 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; dark grayish brown (10YR 4/2) dry in upper 2 inches; weak coarse and medium prismatic structure parting to weak fine subangular blocky and granular; friable; many roots; neutral; gradual smooth boundary.

Bw—15 to 22 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; friable; common roots; thin very dark brown (10YR 2/2) stains on faces of prisms; neutral; clear wavy boundary.

2Bt1—22 to 25 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; moderate coarse prismatic structure; firm, sticky; few fine and medium roots; many thin very dark grayish brown (2.5Y 3/2) clay films on faces of peds; few stones and pebbles; slightly alkaline; clear wavy boundary.

2Bt2—25 to 30 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; moderate coarse and medium prismatic structure; firm; few roots; many thin very dark grayish brown (2.5Y 3/2) clay films on faces of prisms; few tongues of fine sandy loam extend through the Bt horizons; strong effervescence; interior of prisms have a few masses of lime; slightly alkaline; clear wavy boundary.

2Bw—30 to 35 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; moderate coarse and medium prismatic structure; firm; strong effervescence; few masses of lime; moderately alkaline; gradual wavy boundary.

2Bk—35 to 42 inches; olive brown (2.5Y 4/4) clay loam, light brownish gray (2.5Y 6/2) dry; moderate medium prismatic structure; firm; strong effervescence; many large masses of lime; moderately alkaline; gradual wavy boundary.

2BCk—42 to 60 inches; olive (5Y 4/3) clay loam, pale olive (5Y 6/3) dry; massive; firm; violent effervescence; many masses of lime; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to more than 30 inches
**Depth to glacial till:** 12 to 30 inches
**Notes:** Some pedons do not have a Bw or 2BCk horizon.

**A horizon:**
Value: 2 or 3, 3 or 4 dry

**2Bt horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 6 dry

Chroma: 2 to 4
Texture: clay loam or loam

**2Bk horizon:**
Value: 4 or 5, 5 or 6 dry

**2BCk horizon:**
Value: 4 or 5, 5 or 6 dry
Chroma: 2 to 4

## Fordville Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate in the upper part and very rapid in the lower part
**Landform:** Outwash plains
**Parent material:** Alluvium over glaciofluvial deposits
**Slope:** 0 to 9 percent

**Taxonomic class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Pachic Udic Haploborolls

**Typical pedon:**
Fordville loam, 600 feet west and 114 feet north of the southeast corner of sec. 21, T. 118 N., R. 52 W.

Ap—0 to 6 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; slightly hard, very friable; neutral; abrupt smooth boundary.

Bw1—6 to 12 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; moderate coarse prismatic structure parting to weak medium and coarse subangular blocky; slightly hard, very friable; neutral; clear wavy boundary.

Bw2—12 to 17 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; slightly hard, very friable; neutral; clear wavy boundary.

Bw3—17 to 24 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) rubbed, grayish brown (10YR 5/2) dry; moderate medium prismatic structure; slightly hard, very friable; neutral; clear wavy boundary.

2C1—24 to 27 inches; dark grayish brown (10YR 4/2) gravelly loamy sand, grayish brown (10YR 5/2) dry; single grain; thick crusts of lime on undersides of pebbles; about 15 percent gravel; strong effervescence; slightly alkaline; gradual wavy boundary.

2C2—27 to 60 inches; dark grayish brown (2.5Y 4/2) gravelly sand, grayish brown (2.5Y 5/2) dry; single grain; thick crusts of lime on undersides of pebbles in upper part; about 25 percent gravel; strong effervescence; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to 30 inches
**Depth to sand and gravel:** 20 to 40 inches
**Notes:** Some pedons have a BC or Bk horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry
Chroma: 1 or 2 dry
Texture: loam or silt loam

**Bw horizon:**
Value: 2 to 4, 3 to 5 dry
Chroma: 1 to 4
Texture: loam, silt loam, or clay loam

**2C horizon:**
Value: 3 to 6, 4 to 7 dry
Chroma: 2 to 4
Texture: loamy sand or sand
Notes: It contains up to 50 percent gravel.

## Grail Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Uplands
**Parent material:** Alluvium
**Slope:** 1 to 6 percent

**Taxonomic class:** Fine, smectitic Pachic Vertic Argiborolls

**Typical pedon:**
Grail silt loam, 900 feet west and 900 feet south of the center of sec. 18, T. 139 N., R. 91 W.

Ap—0 to 5 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak coarse and medium subangular blocky structure; soft, friable; many roots; many pores; neutral; abrupt smooth boundary.

A—5 to 10 inches; very dark brown (10YR 2/2) silt loam, dark gray (10YR 4/1) dry; weak medium prismatic structure parting to moderate coarse and medium subangular blocky; slightly hard, friable; many roots; many pores; neutral; gradual wavy boundary.

Bt1—10 to 13 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; weak medium prismatic structure parting to moderate coarse and medium subangular blocky and moderate fine granular; firm; common roots; few pores; faint clay films on faces of prisms and blocks; neutral; gradual smooth boundary.

Bt2—13 to 24 inches; very dark grayish brown (10YR 3/2) silty clay, grayish brown (10YR 5/2) dry; moderate coarse prismatic structure parting to strong medium and fine angular blocky; very hard, firm; few roots; few pores; clay films on faces of peds; neutral; clear wavy boundary.

Bk—24 to 52 inches; grayish brown (2.5Y 5/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; very weak medium prismatic structure parting to moderate coarse and medium subangular blocky; hard, firm; few pores; strong effervescence; few small masses of lime; moderately alkaline; clear wavy boundary.

C—52 to 60 inches; dark grayish brown (2.5Y 4/2) silty clay loam, grayish brown (2.5Y 5/2) dry; weak medium subangular blocky structure; hard, firm; strong effervescence; few small masses of lime; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to more than 40 inches
**Notes:** Some pedons have an AB, Btk, or BCk horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry

**Bt horizon:**
Value: 2 to 4, 3 to 5 dry
Chroma: 1 to 3

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5, 4 to 7 dry
Chroma: 3 or 4

## Great Bend Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 3 to 15 percent
**Taxonomic class:** Fine-silty, mixed, superactive Udic Haploborolls

**Typical pedon:**
Great Bend silt loam, 1,100 feet south and 130 feet east of the northwest corner of sec. 29, T. 122 N., R. 62 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, friable; common fine roots throughout; neutral; abrupt smooth boundary.

Bw—8 to 13 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few fine roots throughout; neutral; clear wavy boundary.

Bk1—13 to 17 inches; light olive brown (2.5Y 5/4) silt loam, pale yellow (2.5Y 7/4) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; few roots throughout; many fine pores; strong effervescence throughout (HCl, unspecified); slightly alkaline; clear wavy boundary.

Bk2—17 to 29 inches; light olive brown (2.5Y 5/4) silt loam, pale yellow (2.5Y 7/4) dry; weak coarse subangular blocky and medium subangular blocky structure; slightly hard, very friable; few roots throughout; many fine pores; few fine gypsum threads; violent effervescence throughout (HCl, unspecified); moderately alkaline; gradual wavy boundary.

C1—29 to 46 inches; light yellowish brown (2.5Y 6/4) and olive brown (2.5Y 4/4) silt loam, light gray (2.5Y 7/2) and light olive brown (2.5Y 5/4) dry; massive; slightly hard, friable; strong effervescence throughout (HCl, unspecified); moderately alkaline; gradual wavy boundary.

C2—46 to 60 inches; light yellowish brown (2.5Y 6/4) silt loam, pale yellow (2.5Y 8/2) dry; common fine distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) redoximorphic concentrations; massive; slightly hard, friable; few fine iron-manganese concretions and few fine gypsum threads; strong effervescence throughout (HCl, unspecified); moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to lime:** 10 to 32 inches

**Notes:** Stratified loamy sand or glacial till is below a depth of 40 inches in some pedons.

**Ap horizon:**
Texture: silt loam or silty clay loam

**Bw horizon:**
Texture: silt loam or silty clay loam

**Bk horizon:**
Texture: silt loam or silty clay loam

**C horizon:**
Texture: silt loam or silty clay loam
Notes: The calcium carbonate equivalent ranges from 10 to 26 percent. It is varved with thin strata of very fine sand to clay in the lower part of some pedons.

## Hamerly Series

**Depth class:** Very deep
**Drainage class:** Somewhat poorly drained
**Permeability:** Moderately slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 0 to 3 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls

**Typical pedon:**
Hamerly loam, 2,090 feet south and 95 feet west of the northeast corner of sec. 26, T. 132 N., R. 56 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak medium subangular blocky structure parting to moderate medium granular; friable, slightly sticky; strong effervescence; abrupt smooth boundary.

Bk1—8 to 18 inches; light brownish gray (2.5Y 6/2) loam; weak medium and fine subangular blocky structure; friable; violent effervescence; gradual wavy boundary.

Bk2—18 to 25 inches; light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/4) loam; weak medium subangular blocky structure; friable; few masses of lime; violent effervescence; gradual wavy boundary.

C—25 to 60 inches; light olive brown (2.5Y 5/4) and olive brown (2.5Y 4/4) loam; common medium distinct gray (2.5Y 5/1) redoximorphic depletions and yellowish brown (10YR 5/6) redoximorphic concentrations; weak medium blocky structure; firm; strong effervescence.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to the calcic horizon:** 5 to 16 inches
**Salinity:** These soils are saline in some map units.
**Notes:** Some pedons have salt crystals in the upper part of the profile. Some pedons have a BCk horizon.

**Ap horizon:**
Hue: 10YR or 2.5Y
Value: 2 or 3, 3 to 5 dry
Chroma: 1 or 2

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 6, 5 to 7 dry
Chroma: 1 to 4

**C horizon:**
Hue: 2.5Y or 5Y
Chroma: 1 to 4

## Harriet Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Slow
**Landform:** Flood plains
**Parent material:** Alluvium
**Slope:** 0 to 1 percent
**Notes:** These soils are saline-sodic.

**Taxonomic class:** Fine, smectitic, frigid Typic Natraquolls

**Typical pedon:**
Harriet loam, 1,650 feet east and 40 feet north of the southwest corner of sec. 34, T. 139 N., R. 79 W.

E—0 to 2 inches; very dark gray (N 3/0) loam, gray (N 5/0 and 6/0) dry; weak thick and medium platy structure; friable; many fine roots; common fine pores; few salt crystals visible when soil is dry; moderately alkaline; abrupt wavy boundary.

Btn—2 to 6 inches; black (N 2/0) clay loam, dark gray (N 4/0) dry; moderate medium columnar structure; extremely hard, firm; coatings of very dark gray (N 3/0) on faces of peds; gray (N 5/0 dry) on tops and sides of columns; slight effervescence on inside of columns; strongly alkaline; clear wavy boundary.

Btnz—6 to 18 inches; very dark grayish brown (2.5Y 3/2) clay loam, grayish brown (2.5Y 5/2) dry; moderate coarse prismatic and weak medium subangular blocky structure; very hard, firm; few roots; common medium pores; common fine white salt crystals; strong effervescence; strongly alkaline; gradual wavy boundary.

Bz1—18 to 28 inches; dark grayish brown (2.5Y 4/2) loam, grayish brown and light brownish gray (2.5Y 5/2 and 6/2) dry; weak coarse prismatic structure; very hard, firm; few fine roots; few medium and fine pores; fine salt crystals visible when dry; violent effervescence; strongly alkaline; abrupt smooth boundary.

2Bz2—28 to 38 inches; light olive brown (2.5Y 5/3) very fine sandy loam, light yellowish brown (2.5Y 6/3) dry; weak coarse prismatic and weak coarse and medium subangular blocky structure; very hard, friable; few fine pores; common very fine salt crystals that are visible when dry; strong effervescence; strongly alkaline; abrupt smooth boundary.

3Ab—38 to 40 inches; very dark gray (N 3/0) clay loam, dark gray (N 4/0) dry; few medium distinct olive brown (2.5Y 4/3) redoximorphic concentrations; weak coarse prismatic structure; very hard, firm; few fine roots; strong effervescence; strongly alkaline; abrupt smooth boundary.

3C—40 to 60 inches; olive brown (2.5Y 4/3) stratified loam and clay loam, light yellowish brown (2.5Y 6/3) dry; weak coarse and medium subangular blocky structure; very hard, friable; strong effervescence; strongly alkaline.

**Range in Characteristics**

**Notes:** Some pedons have an A, Bk, BCk, or C horizon.

**Btn horizon:**
Hue: 10YR, 2.5Y, or neutral
Value: 2 to 4
Chroma: 0 to 2
Texture: clay loam, silty clay loam, or silty clay

**Bz and 2Bz horizons:**
Hue: 2.5Y or 5Y
Value: 3 to 5

**3C horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 5
Notes: Some pedons do not have a 3C horizon.

## Hegne Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Very slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 2 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine, smectitic, frigid Typic Calciaquerts

**Typical pedon:**
Hegne silty clay, 600 feet south and 2,100 feet east of the northwest corner of sec. 22, T. 157 N., R. 49 W.

Ap—0 to 10 inches; black (5Y 2.5/1) silty clay, very dark gray (5Y 3/1) dry; common fine distinct olive gray (5Y 4/2) redoximorphic depletions; strong fine and medium subangular blocky structure; firm; few fine and medium roots; many fine rounded light gray (10YR 7/2) masses of lime; slight effervescence; slightly alkaline; clear wavy boundary.

Bkssg1—10 to 18 inches; about 60 percent olive gray (5Y 4/2) and 40 percent dark gray (5Y 4/1) silty clay, light gray (5Y 6/1) and gray (5Y 5/1) dry; moderate medium subangular blocky structure; firm; few fine roots; few distinct intersecting slickensides tilted less than 45 degrees from horizontal; cracks filled with A material 1/4 to 3 inches wide and 2 to 4 feet apart; many fine masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

Bkssg2—18 to 34 inches; olive gray (5Y 5/2) silty clay, light olive gray (5Y 6/2) dry; common fine faint dark gray (5Y 4/1) redoximorphic depletions; moderate fine and medium subangular blocky structure; firm; few very fine roots; few distinct intersecting slickensides tilted less than 60 degrees from horizontal; cracks filled with A material 1/4 to 2 inches wide and 2 to 4 feet apart; many fine masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

Bg—34 to 50 inches; olive gray (5Y 4/2) silty clay; friable; common medium distinct light olive brown (2.5Y 5/4) redoximorphic concentrations; weak fine and medium subangular blocky structure; few fine

masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

Cg1—50 to 68 inches; olive gray (5Y 5/2) silty clay; common medium distinct gray (5Y 5/1) redoximorphic depletions and medium prominent strong brown (7.5YR 4/6) and common fine reddish yellow (7.5YR 6/6) redoximorphic concentrations; weak fine and medium subangular blocky soil fragments parting to weak fine platy; firm; few medium lime coats on faces of peds; strong effervescence; moderately alkaline; clear wavy boundary.

Cg2—68 to 80 inches; olive (5Y 5/3) laminated silty clay; common medium distinct gray (5Y 5/1) redoximorphic depletions and common medium prominent strong brown (7.5YR 5/6) and (7.5YR 5/8) redoximorphic concentrations; laminates part to weak fine platy fragments which part to weak fine subangular blocky fragments; firm; few medium irregular light gray (2.5Y 72) lime coats on faces of peds; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Calcium carbonate equivalent:** 10 to 30 percent
**10 to 40 inch particle-size control section:** 40 to 60 percent noncarbonate clay and less than 5 percent sand

**Ap horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 2 or 3
Chroma: 0 or 1
Texture: silty clay, clay, or silty clay loam

**Bkssg horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6
Chroma: 1 or 2
Texture: clay or silty clay

**Bg horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 6
Chroma: 1 or 2
Texture: clay or silty clay

**Cg horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 6
Chroma: 1 to 3
Texture: clay or silty clay

## Heil Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Very slow
**Landform:** Depressions
**Parent material:** Alluvium
**Slope:** 0 to 1 percent
**Notes:** These soils are saline-sodic.

**Taxonomic class:** Fine, smectitic, frigid Typic Natraquerts

**Typical pedon:**
Heil silty clay, 650 feet west and 20 feet south of the northeast corner of sec. 14, T. 135 N., R. 100 W.

E—0 to 3 inches; dark gray (10YR 4/1) silty clay, light gray (10YR 6/1) dry; common fine distinct brown (10YR 5/3) and dark brown (10YR 4/3) redoximorphic concentrations; moderate fine subangular blocky and weak thin platy structure; firm; many roots and fine pores; neutral; abrupt wavy boundary.

Btn—3 to 7 inches; very dark gray (2.5Y 3/1) silty clay, gray (2.5Y 5/1) dry; strong coarse and medium columnar structure parting to strong coarse medium and fine angular blocky; extremely hard, very firm; roots in cracks; few pores; slightly alkaline; gradual smooth boundary.

Btng—7 to 24 inches; very dark gray (5Y 3/1) silty clay, gray (5Y 5/1) dry; strong very coarse prismatic structure parting to strong coarse and medium angular blocky; extremely hard, very firm; few roots; surface of peds has a glossy appearance when moist; few tongues of E (5Y 6/1) dry; moderately alkaline; gradual wavy boundary.

Bg—24 to 38 inches; dark gray (5Y 4/1) silty clay, light gray (5Y 6/1) dry; moderate coarse angular blocky structure; extremely hard, very firm; strong effervescence; moderately alkaline; gradual wavy boundary.

Byg1—38 to 44 inches; dark gray (5Y 4/1) silty clay, light gray (5Y 6/1) dry; weak coarse and fine angular blocky structure; very firm; few fine gypsum crystals; strong effervescence; moderately alkaline; diffuse wavy boundary.

Byg2—44 to 52 inches; olive (5Y 4/3) silty clay, pale olive (5Y 6/3) dry; weak coarse subangular blocky structure; very firm; common gypsum crystals;

strong effervescence; strongly alkaline; gradual wavy boundary.

Cg—52 to 60 inches; olive (5Y 5/4) silty clay, pale olive (5Y 6/3) dry; many strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) redoximorphic concentrations and gray (5Y 5/1) redoximorphic depletions; massive; few large white masses of lime; strong effervescence; strongly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 45 inches
**Depth to lime:** 12 to 40 inches
**Depth to the Btn horizon:** 1 to 4 inches
**Notes:** Some pedons have an A horizon up to 3 inches thick. Some pedons have a Btkn or Bk horizon.

**E horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 5, 4 to 8 dry
Chroma: 1 or 2
Texture: silt loam, silty clay loam, or silty clay

**Btn horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4, 4 to 6 dry
Chroma: 1 or 2
Texture: silty clay or clay

**Bg and Byg horizons:**
Hue: 2.5Y or 5Y
Value: 3 to 5, 4 to 7 dry
Texture: silty clay, clay, silty clay loam, or clay loam

**Cg horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 5, 5 to 7 dry
Chroma: 1 to 4
Texture: silty clay, clay, silty clay loam, or clay loam

## Heimdal Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Till plains
**Slope:** 3 to 6 percent

**Taxonomic class:** Coarse-loamy, mixed, superactive Udic Haploborolls

**Typical pedon:**
Heimdal loam, 1,340 feet west and 150 feet south of northeast corner of sec. 14, T. 148 N., R. 70 W.

Ap—0 to 5 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure parting to weak fine granular; very friable; many pores; neutral; abrupt boundary.

Bw1—5 to 14 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate coarse and medium prismatic structure parting to weak coarse subangular blocky; very friable; many fine pores; neutral; gradual boundary.

Bw2—14 to 19 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; moderate coarse and medium prismatic structure parting to weak coarse subangular blocky; very friable; many fine pores; slightly alkaline; clear wavy boundary.

Bk—19 to 34 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/3) dry; weak coarse prismatic structure parting to weak medium and fine subangular blocky; very friable; common threads and nodules of lime; violent effervescence; moderately alkaline; gradual boundary.

C—34 to 60 inches; light olive brown (2.5Y 5/4) loam, pale yellow (2.5Y 7/3) dry; few coarse distinct gray (5Y 6/1) redoximorphic depletions and a few fine prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; weak subangular blocky and platy structure; few white lime nodules; violent effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to lime:** 12 to 26 inches
**Notes:** The soil contains up to 10 percent rock fragments throughout.

**Ap horizon:**
Value: 3 or 4, 2 or 3 moist

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 2 to 5 moist
Chroma: 2 to 4
Texture: loam, sandy loam, or fine sandy loam

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: loam, fine sandy loam, or sandy loam

**C horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: It is loam, fine sandy loam, or sandy loam

## Janesburg Series

**Depth class:** Moderately deep
**Drainage class:** Well drained
**Permeability:** Very slow
**Landform:** Uplands
**Parent material:** Residuum
**Slope:** 0 to 6 percent
**Notes:** These soils are sodic.

**Taxonomic class:** Fine, smectitic Typic Natriborolls

**Typical pedon:**
Janesburg silty clay loam, 2,050 feet south and 50 feet east of the northwest corner of sec. 36, T. 137 N., R. 87 W.

A—0 to 8 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; many fine and very fine roots; common fine pores; slightly acid; clear wavy boundary.

E—8 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium subangular blocky structure parting to weak medium platy; slightly hard, friable, sticky and plastic; many fine and very fine roots; many fine pores; slightly acid; abrupt wavy boundary.

Btn1—10 to 16 inches; very dark grayish brown (10YR 3/2) silty clay, grayish brown (10YR 5/2) dry; strong medium columnar structure parting to strong fine angular blocky; very hard, very firm, very sticky and very plastic; common fine and very fine roots between peds; common fine pores; many faint dark grayish brown (10YR 4/2) dry clay films on faces of peds; column tops coated with light brownish gray (10YR 6/2) dry E material; slightly alkaline; clear wavy boundary.

Btn2—16 to 21 inches; dark grayish brown (2.5Y 4/2) silty clay, light brownish gray (10YR 6/2) dry; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common fine pores; few faint grayish brown (2.5Y 5/2) dry clay films on faces of peds; slightly alkaline; abrupt wavy boundary.

BCk—21 to 26 inches; olive brown (2.5Y 4/4) silt loam, light yellowish brown (2.5Y 6/4) dry; moderate medium prismatic structure parting to weak medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; few medium irregular masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Cr—26 to 60 inches; olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/6) soft siltstone bedrock, light yellowish brown (2.5Y 6/4) and olive yellow (2.5Y 6/6) dry; common irregular masses of lime between siltstone stratifications; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Depth to gypsum or other salts:** More than 16 inches
**Depth to soft bedrock:** 20 to 40 inches

**A horizon:**
Value: 2 or 3, 4 or 5 dry
Chroma: 2 or 3
Texture: silty clay loam, clay loam, silt loam, loam, or fine sandy loam

**E horizon:**
Value: 3 or 4, 5 or 6 dry
Chroma: 1 to 3
Texture: silt loam, loam, or fine sandy loam

**Btn horizon:**
Value: 3 to 5, 4 to 6 dry
Chroma: 2 to 4
Texture: silty clay, clay, silty clay loam, or clay loam

**BCk horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam, silt loam, clay loam, silty clay loam, or silty clay

**Cr horizon:**
Notes: It is soft shale, siltstone, or mudstone.

## Karlsruhe Series

**Depth class:** Very deep
**Drainage class:** Somewhat poorly drained
**Permeability:** Rapid
**Landform:** Outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 3 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Sandy, mixed, frigid Aeric Calciaquolls

**Typical pedon:**
Karlsruhe coarse sandy loam, 2,400 feet south and 250 feet east of the northwest corner of sec. 16, T. 154 N., R. 76 W.

A—0 to 5 inches; black (10YR 2/1) coarse sandy loam, very dark gray (10YR 3/1) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; disseminated lime throughout; slight effervescence; slightly alkaline; abrupt smooth boundary.

Ak—5 to 11 inches; very dark gray (10YR 3/1) coarse sandy loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; disseminated lime throughout; strong effervescence; slightly alkaline; clear smooth boundary.

ABk—11 to 15 inches; very dark gray (10YR 3/1) loamy coarse sand, gray (10YR 5/1) dry; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; disseminated lime throughout; violent effervescence; moderately alkaline; clear smooth boundary.

Bk—15 to 20 inches; very dark grayish brown (10YR 3/2) loamy coarse sand, gray (10YR 5/1) dry; common fine faint dark brown (10YR 3/3) redoximorphic concentrations; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; disseminated lime throughout; violent effervescence; moderately alkaline; gradual wavy boundary.

BCk—20 to 30 inches; dark brown (10YR 3/3) coarse sand, brown (10YR 5/3) dry; many medium faint dark grayish brown (10YR 4/2) redoximorphic depletions; single grain; soft, very friable, nonsticky and nonplastic; few very fine roots; disseminated lime throughout; strong effervescence; slightly alkaline; gradual wavy boundary.

C1—30 to 39 inches; very dark grayish brown (10YR 3/2) coarse sand, grayish brown (2.5Y 5/2) dry; many medium faint dark brown (10YR 3/3) redoximorphic concentrations; single grain; soft, very friable, nonsticky and nonplastic; few very fine roots; slight effervescence; slightly alkaline; gradual wavy boundary.

C2—39 to 60 inches; dark grayish brown (2.5Y 4/2) coarse sand, olive brown (2.5Y 4/4) dry; many medium distinct light olive brown (2.5Y 5/6) redoximorphic concentrations; single grain; loose, nonsticky and nonplastic; slight effervescence; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**10 to 40 inch particle-size control section:** Averages loamy coarse sand or coarse sand containing more than 30 percent medium and coarser sand
**Depth to loamy sand and coarser material:** Less than 20 inches

**A horizon:**
Hue: 10YR or 2.5Y
Value: 2 or 3, 3 to 5 dry
Chroma: 1 or 2
Texture: coarse sandy loam, sandy loam, loamy coarse sand, or loamy sand
Notes: It has up to 10 percent rock fragments.

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5, 5 to 7 dry
Chroma: 1 to 4
Texture: coarse sandy loam, loamy coarse sand, sandy loam, or loamy sand
Notes: It has up to 10 percent rock fragments.

**C horizon:**
Value: 3 to 6, 4 to 7 dry
Chroma: 2 to 8
Texture: loamy coarse sand, coarse sand, loamy sand, or sand
Notes: It has up to 35 percent rock fragments.

## Krem Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Rapid over moderate
**Landform:** Uplands
**Parent material:** Eolian over glacial till
**Slope:** 0 to 15 percent

**Taxonomic class:** Loamy, mixed, superactive Arenic Argiborolls

**Typical pedon:**
Krem loamy fine sand, 1,850 feet east and 135 feet

south of the northwest corner of sec. 17, T. 144 N., R. 85 W.

Ap—0 to 7 inches; very dark brown (10YR 2/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine and medium granular structure; very friable, nonsticky and nonplastic; common very fine, medium, and coarse roots; very few pebbles; neutral; clear smooth boundary.

A1—7 to 15 inches; very dark grayish brown (10YR 3/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and few fine roots; very few pebbles; neutral; clear wavy boundary.

A2—15 to 25 inches; very dark grayish brown (10YR 3/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and few medium roots; many very fine tubular pores; very few pebbles; krotovina 3 inches in diameter; neutral; abrupt wavy boundary.

BA—25 to 30 inches; dark brown (10YR 4/3) loamy sand, brown (10YR 5/3) dry; weak medium subangular blocky structure; loose, nonsticky and nonplastic; few very fine roots; common very fine and medium tubular pores; about 5 percent rock fragments; slightly alkaline; abrupt irregular boundary.

2Bt—30 to 38 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; common fine distinct strong brown (7.5YR 5/6) dry redoximorphic concentrations; strong coarse prismatic structure parting to strong angular blocky; sticky and plastic; few very fine and fine roots; many very fine tubular pores; many moderately thick clay films on faces of peds and surface of pores; sandy coatings up to 1/4 inch thick between prisms; about 3 percent rock fragments; some are coated with lime; slightly alkaline; clear irregular boundary.

2Btk—38 to 60 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; common fine distinct strong brown (7.5YR 5/6) dry redoximorphic concentrations; strong very coarse prismatic structure parting to moderate medium and coarse angular blocky; sticky and plastic; few very fine and fine roots along faces of prisms; many very fine tubular pores; many moderately thick dark grayish brown (2.5Y 4/2) clay films on faces of peds and surfaces of pores; sandy coatings up to 1/4 inch thick between prisms; about 3 percent rock fragments; many irregular shaped masses of lime; violent effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** More than 20 inches
**Depth to glacial till:** 20 to 40 inches
**Notes:** Some pedons have 2Bk, 2BC, or 2C horizons.

**A horizon:**
Value: 3 to 5 dry
Chroma: 2 or 3
Texture: loamy fine sand, fine sand, or loamy sand

**BA horizon:**
Value: 3 or 4, 5 or 6 dry
Chroma: 2 or 3
Texture: loamy sand or loamy fine sand

**2Bt horizon:**
Hue: 2.5Y or 10YR
Value: 3 or 4, 4 to 6 dry
Chroma: 2 or 3
Texture: clay loam, sandy clay loam, or loam
Notes: It has up to 10 percent rock fragments.

## Lallie Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 2 percent

**Taxonomic class:** Fine, smectitic, calcareous, frigid Vertic Fluvaquents

**Typical pedon:**
Lallie silty clay loam, 2,630 feet east and 1,300 feet south of the northwest corner of sec. 21, T. 151 N., R. 61 W.

A—0 to 2 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium and fine granular structure; slightly hard, friable, sticky and plastic; many roots; common fine flecks of salt; strong effervescence; slightly alkaline; abrupt smooth boundary.

Cg—2 to 24 inches; dark gray (5Y 4/1) silty clay loam, light gray and gray (5Y 6/1) dry; common medium prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; weak coarse

prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, sticky and plastic; common fine roots; few fine flecks of salt; violent effervescence; slightly alkaline; abrupt wavy boundary.

Ab—24 to 32 inches; black (N 2/0) silty clay, very dark gray (5Y 3/1) dry; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; hard, firm, very sticky and very plastic; few fine roots; common fine flecks of salt; few snail shell fragments; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg'—32 to 60 inches; olive gray (5Y 4/2) silty clay, light gray and gray (5Y 6/1) dry; common fine prominent yellowish brown (10YR 5/4) redoximorphic concentrations; massive; very hard, very firm, very sticky and very plastic; few flecks of salt; common snail fragments; strong effervescence; slightly alkaline.

**Range in Characteristics**

**10 to 40 inch particle-size control section:** 35 and 60 percent clay
**Notes:** Some pedons have an O horizon

**A horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4, 3 to 6 dry
Chroma: 1 or 2
Texture: silty clay loam, silty clay, loam, silt loam, clay loam, or clay

**Cg horizon:**
Hue: 2.5Y, 5Y, or neutral
Value: 3 to 6, 4 to 8 dry
Chroma: 0 to 2
Texture: silty clay loam, silty clay, or clay

## Langhei Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate or moderately slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 9 to 15 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-loamy, mixed, superactive, frigid Typic Eutrochrepts

**Typical Pedon:**
Langhei loam, 2,250 feet west and 100 feet south of the northeast corner of sec. 8, T. 124 N., R. 39 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2), broken face, and very dark grayish brown (10YR 3/2), broken face, loam, gray (10YR 6/1), rubbed, dry; weak fine subangular blocky structure; friable; slight effervescence throughout (HCl, unspecified); 5 percent mixed gravel; moderately alkaline; abrupt smooth boundary.

Bk—6 to 15 inches; grayish brown (2.5Y 5/2), broken face, loam, pale yellow (2.5Y 8/2), broken face, dry; moderate thick platy and weak fine subangular blocky structure; friable; few light gray (2.5Y 7/2) masses of lime pedogenic throughout; strong effervescence throughout (HCl, unspecified); 5 percent mixed gravel; moderately alkaline; abrupt smooth boundary.

C—15 to 60 inches; light olive brown (2.5Y 5/4) loam; massive; friable; few fine prominent grayish brown (10YR 5/2) masses of iron accumulation pedogenic throughout and few fine distinct yellowish brown (10YR 5/4) masses of iron accumulation pedogenic throughout; 5 percent mixed gravel; slight effervescence throughout (HCl, unspecified); moderately alkaline.

**Range in Characteristics**

**10 to 40 inch particle-size control section:** Averages between 18 and 25 percent clay
**Percent rock fragments:** 2 to 10 percent in the 10 to 40 inch particle-size control section

**Ap horizon:**
Chroma: 1 or 2 (cultivated); 1 (uncultivated)

**Bk and C horizons:**
Texture: loam or clay loam

## Lawther Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Uplands
**Parent material:** Alluvium
**Slope:** 0 to 4 percent
**Notes:** These soils are calcareous.

**Taxonomic class:** Fine, smectitic, frigid Udic Haplusterts

**Typical pedon:**
Lawther silty clay, 2,195 feet south and 1,440 feet east of the northwest corner of sec. 25, T. 131 N., R. 98 W.

Ap—0 to 4 inches; very dark grayish brown (2.5Y 3/2) silty clay, dark grayish brown (2.5Y 4/2) dry; weak medium and coarse subangular blocky structure parting to moderate medium granular; very hard, firm, sticky and very plastic; common very fine pores; slightly alkaline; abrupt smooth boundary.

A—4 to 10 inches; very dark grayish brown (2.5Y 3/2) silty clay, dark grayish brown (2.5Y 4/2) dry; moderate coarse subangular blocky structure; very hard, very firm, sticky and very plastic; common very fine roots; common very fine pores; slightly alkaline; clear wavy boundary.

Bss1—10 to 21 inches; dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, very sticky and very plastic; common very fine roots; common very fine pores; very dark grayish brown (2.5Y 3/2) coatings on faces of peds; 1 inch wide cracks filled with A horizon material; common slickensides; very slight effervescence; slightly alkaline; gradual wavy boundary.

Bss2—21 to 33 inches; dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) dry; weak coarse and medium subangular blocky structure parting to moderate fine subangular blocky; very hard, firm, very sticky and very plastic; few very fine roots; common very fine pores; 1/2 inch wide cracks filled with A horizon material; common slickensides; few medium irregularly shaped masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Bk—33 to 47 inches; dark grayish brown (2.5Y 4/2) silty clay, light brownish gray (2.5Y 6/2) dry; weak coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine pores; 1/2 inch wide cracks filled with A horizon material; common slickensides; common fine irregularly shaped masses of lime; strong effervescence; moderately alkaline; abrupt wavy boundary.

C—47 to 60 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure; very hard, firm, very sticky and very plastic; few very fine roots; many very fine pores; common fine irregularly shaped masses of lime; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to more than 20 inches
**Depth to lime:** 0 to 30 inches
**Notes:** When the soil is dry, cracks 1/2 to 2 inches wide and several feet long extend downward through the Bss horizon. Some pedons have a By horizon up to 15 inches thick.

**A horizon:**
Hue: 10YR or 2.5Y
Value: 2 or 3, 3 to 5 dry
Texture: silty clay, clay, or silty clay loam

**Bss horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4, 3 to 6 dry
Chroma: 1 to 3
Texture: clay, silty clay, or silty clay loam

**Bk horizon:**
Hue: 2.5Y or 5Y
Value: 2 to 5, 4 to 6 dry
Chroma: 1 or 2
Texture: silty clay, clay, or silty clay loam

**C horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 6, 4 to 7 dry
Chroma: 1 to 3
Texture: clay loam, silty clay, clay, or silty clay loam

## Lehr Series

**Depth class:** Very deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Moderately rapid in the upper part and very rapid in the lower part
**Landform:** Outwash plains, collapsed outwash plains, and terraces
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 6 percent

**Taxonomic class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Haploborolls

**Typical pedon:**
Lehr loam, 1,490 feet north and 625 feet west of the southeast corner of sec. 12, T. 156 N., R. 93 W.

Ap—0 to 6 inches; very dark brown (10YR 2/2) loam,

very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; about 2 percent gravel; slightly alkaline; abrupt smooth boundary.

Bw—6 to 11 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; about 5 percent gravel; slightly alkaline; gradual wavy boundary.

Bk1—11 to 15 inches; brown (10YR 5/3) loam, pale brown (10YR 6/3) dry; few distinct very dark grayish brown (10YR 3/2) coatings on faces of peds; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; about 10 percent gravel; common medium irregular masses and filaments of lime; thin crusts of lime on undersides of pebbles; violent effervescence; moderately alkaline; clear smooth boundary.

2Bk2—15 to 22 inches; yellowish brown (10YR 5/4) gravelly loamy coarse sand, light yellowish brown (10YR 6/4) and white (10YR 8/1) dry; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; about 30 percent gravel; many medium irregular masses and filaments of lime; thin crusts of lime on undersides of pebbles; violent effervescence; moderately alkaline; clear smooth boundary.

2C—22 to 60 inches; grayish brown (2.5Y 5/2) and light yellowish brown (2.5Y 6/4) very gravelly coarse sand, light brownish gray (2.5Y 6/2) and pale yellow (2.5Y 7/4) dry; single grain; loose, nonsticky and nonplastic; about 40 percent gravel; thin crusts of lime on undersides of pebbles; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 8 to 16 inches
**Depth to sand and gravel:** 14 to 20 inches
**Notes:** Some pedons have a 2BCk horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 or 5 dry
Chroma: 2 to 4

**2C horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 or 6 dry

## Lihen Series

**Depth class:** Very deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Rapid
**Landform:** Uplands
**Parent material:** Eolian
**Slope:** 0 to 25 percent

**Taxonomic class:** Sandy, mixed Entic Haploborolls

**Typical pedon:**
Lihen sandy loam, 2,680 feet south and 2,600 feet west of the northeast corner of sec. 14, T. 29 N., R. 53 E.

A1—0 to 4 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak fine platy structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine and medium tubular pores; 2 percent pebbles; slightly alkaline; clear smooth boundary.

A2—4 to 9 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; massive; slightly hard, very friable, nonsticky and nonplastic; many fine roots; common fine pores and few medium pores; 10 percent pebbles; slightly alkaline; clear smooth boundary.

A3—9 to 24 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; single grain; loose, very friable, nonsticky and nonplastic; common fine roots; few pores; 10 percent pebbles; few lime cutans on lower surfaces of pebbles; slight effervescence; moderately alkaline; clear smooth boundary.

Bk—24 to 32 inches; dark grayish brown (2.5Y 4/2) sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; few roots; 10 percent pebbles; common lime cutans on lower surfaces of pebbles; strong effervescence; moderately alkaline; clear smooth boundary.

C—32 to 60 inches; dark grayish brown (2.5Y 4/2) sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; few roots;

disseminated lime; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:**

feet north of southeast corner of sec. 24, T. 135 N., R. 54 W.

A—0 to 10 inches; black (10YR 2/1) loamy fine sand, very dark gray (10YR 3/1) dry; weak fine granular structure parting to single grain; loose; nonsticky and nonplastic; many very fine and few fine roots; neutral; clear wavy boundary.

effervescence; slightly alkaline; gradual wavy boundary.

C1—34 to 46 inches; grayish brown (2.5Y 5/2) stratified silt loam and very fine sandy loam, olive yellow (2.5Y 6/6) dry; many medium distinct gray (5Y 5/1) redoximorphic depletions; massive; slightly hard, friable, slightly sticky and nonplastic; few fine roots; common very fine and fine pores; fine rounded masses of lime; strong effervescence; slightly alkaline; gradual smooth boundary.

C2—46 to 60 inches; olive brown (2.5Y 4/4) stratified silty clay loam and very fine sandy loam, light brownish gray (2.5Y 6/2) dry; many medium distinct grayish brown (2.5Y 5/2) redoximorphic depletions; massive; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine pores; medium rounded masses of lime; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to 24 inches
**Notes:** Some pedons do not have a C horizon. Some pedons have a BCk horizon.

**Ap horizon:**
Hue: 2 or 3, 3 or 4 dry

**Bw horizon:**
Value: 2 to 4, 3 to 5 dry

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4

## Manfred Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 0 to 1 percent
**Notes:** These soils are saline-sodic.

**Taxonomic class:** Fine-loamy, mixed, superactive, frigid Typic Natraquolls

**Typical pedon:**
Manfred silty clay loam, 2,100 feet east and 50 feet north of the southwest corner of sec. 17, T. 156 N., R. 58 W.

A—0 to 10 inches; black (5Y 2/1) silty clay loam, very dark gray (N 3/0) dry; moderate fine and medium subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common roots throughout; slight effervescence throughout (HCl, unspecified); moderately alkaline; abrupt irregular boundary; a layer of muck 1 inch in thickness covers the surface.

Btg—10 to 13 inches; dark olive gray (5Y 3/2) silty clay loam, dark gray (5Y 4/1) dry; few fine distinct olive brown (2.5Y 4/4) redoximorphic concentrations; strong fine angular blocky structure; very hard, firm, very sticky and very plastic; clay films on faces of peds; strong effervescence throughout (HCl, unspecified); moderately alkaline; clear irregular boundary.

Bkg—13 to 23 inches; olive gray (5Y 5/2) sandy clay loam, light olive gray (5Y 6/2) dry; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; weak medium angular blocky structure parting to moderate fine granular; very hard, friable, moderately sticky and moderately plastic; violent effervescence throughout (HCl, unspecified); moderately alkaline; few iron and manganese concretions; about 5 percent by volume fine gravel; clear wavy boundary.

BCg—23 to 30 inches; olive gray (5Y 5/2) sandy clay loam, light olive gray (5Y 6/2) dry; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; weak medium angular blocky structure parting to moderate fine granular; friable; strong effervescence throughout (HCl, unspecified); 5 percent gravel; moderately alkaline; few iron and manganese concretions; clear wavy boundary.

Cg1—30 to 48 inches; olive gray (5Y 5/2) clay loam, gray (5Y 6/1) dry; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; massive; very hard, firm, moderately sticky and moderately plastic; strong effervescence throughout (HCl, unspecified); 5 percent gravel; moderately alkaline; gradual wavy boundary.

Cg2—48 to 60 inches; olive brown (2.5Y 4/4) clay loam, light yellowish brown (2.5Y 6/4) dry; common fine prominent gray (N 5/0) redoximorphic depletions; massive; very hard, firm, moderately sticky and moderately plastic; strong

effervescence throughout (HCl, unspecified); moderately alkaline.

**Range in Characteristics**

**Notes:** Some pedons have an O horizon up to 4 inches thick on the surface. Some pedons have an E horizon. Some pedons have Byz or Bkz horizons.

**A horizon:**
Texture: loam, clay loam, silt loam, or silty clay loam

**Btg horizon:**
Texture: clay loam or silty clay loam

**Bkg horizon:**
Texture: clay loam, loam, sandy clay loam, silt loam, or silty clay loam

**Cg horizon:**
Texture: loam, sandy clay loam, clay loam, or silty clay loam

## Manning Series

**Depth class:** Very deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Moderately rapid in the upper part and very rapid in the lower part
**Landform:** Terraces
**Parent material:** Fluvial
**Slope:** 3 to 6 percent

**Taxonomic class:** Coarse-loamy over sandy or sandy-skeletal, mixed, superactive Typic Haploborolls

**Typical pedon:** Manning fine sandy loam, 2,040 feet west and 100 feet south of the northeast corner of sec. 15, T. 139 N., R. 97 W.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; few pebbles; neutral; abrupt smooth boundary.

Bw1—5 to 12 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; moderate coarse and medium prismatic structure parting to moderate medium subangular blocky; hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine pores; few faint clay films on faces of peds; few pebbles; neutral; gradual wavy boundary.

Bw2—12 to 18 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; moderate coarse and medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; few faint clay films on faces of prisms; few pebbles and cobbles; neutral; clear wavy boundary.

Bk—18 to 25 inches; dark grayish brown (2.5Y 4/2) fine sandy loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; few roots; common fine pores; about 10 percent gravel; violent effervescence; common fine masses of lime; moderately alkaline; clear wavy boundary.

2C1—25 to 40 inches; olive brown (2.5Y 4/3) sand and gravel, light yellowish brown (2.5Y 6/4) dry; single grain; loose; few fine roots; about 25 percent gravel coarser than 3/4 inch; few cobbles; thin coating of lime on undersides of some pebbles and cobbles; strong effervescence in upper part and slight effervescence in lower part; moderately alkaline; clear wavy boundary.

2C2—40 to 60 inches; dark grayish brown (2.5Y 4/2) sand and strata of fine gravel, light brownish gray (2.5Y 6/2) dry; single grain; loose; about 10 percent gravel; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to lime:** 13 to 28 inches
**Depth to sand and gravel:** 24 to 40 inches

**A horizon:**
Value: 2 or 3, 3 to 5 dry
Chroma: 2 or 3
Texture: fine sandy loam or loam
Notes: It has up to 3 percent rock fragments.

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6 dry
Chroma: 2 to 4
Texture: fine sandy loam or loam
Notes: It has 1 to 10 percent rock fragments.

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 6, 5 to 8 dry
Chroma: 2 or 3

Texture: fine sandy loam, gravelly fine sandy loam, or loam
Notes: It has 2 to 15 percent rock fragments and 5 to 20 percent calcium carbonate.

**2C horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 6, 4 to 7 dry
Chroma: 2 to 4
Texture: fine sand, loamy sand, coarse sand, sand, or loamy coarse sand
Notes: It has up to 75 percent rock fragments.

## Marysland Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Moderate in the upper part and rapid in the lower part
**Landform:** Outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 1 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Calciaquolls

**Typical pedon:**
Marysland loam, 900 feet east and 200 feet north of the southwest corner of sec. 4, T. 121 N., R. 40 W.

A—0 to 9 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; very friable; many roots; slight effervescence; moderately alkaline; abrupt wavy boundary.

Ak—9 to 12 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; many roots; disseminated lime; strong effervescence; moderately alkaline; abrupt wavy boundary.

Bkg1—12 to 15 inches; olive gray (5Y 4/2) loam; many fine faint olive gray (5Y 5/2) and dark gray (5Y 4/1) redoximorphic depletions; weak fine subangular blocky structure; very friable; few roots; disseminated lime; strong effervescence; moderately alkaline; clear irregular boundary.

Bkg2—15 to 20 inches; olive gray (5Y 4/2) loam; few fine prominent olive yellow (2.5Y 6/6) redoximorphic concentrations; weak fine and medium subangular blocky structure; very friable; few dark brown (10YR 4/3) coatings in root channels; few small lime masses; strong effervescence; moderately alkaline; clear wavy boundary.

Bkg3—20 to 27 inches; light olive gray (5Y 6/2) loam; few fine prominent olive yellow (2.5Y 6/6) redoximorphic concentrations; weak medium and fine subangular blocky structure; friable; few grayish brown (2.5Y 5/2) root channel fillings; few small lime and dark-colored masses; strong effervescence; moderately alkaline; clear wavy boundary.

2Cg1—27 to 40 inches; grayish brown (2.5Y 5/2) sand; many fine and medium faint light brownish gray (2.5Y 6/2) and common medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; single grain; loose; slight effervescence; moderately alkaline; gradual wavy boundary.

2Cg2—40 to 60 inches; grayish brown (2.5Y 5/2) sand; many medium faint light brownish gray (2.5Y 6/2) redoximorphic depletions and few medium prominent red (2.5YR 4/8) redoximorphic concentrations; single grain; loose; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 24 inches
**Depth to the calcic horizon:** 0 to 12 inches
**Depth to sand and gravel:** 20 to 40 inches

**A horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 2 or 3
Chroma: 0 or 1

**Bkg horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 3 to 6, 4 to 7 dry
Chroma: 0 to 2

**2Cg horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 6, 4 to 8 dry
Notes: It has 1 to 35 percent gravel.

## Max Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow

**Landform:** Moraines
**Parent material:** Glacial till
**Slope:** 9 to 45 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Haploborolls

**Typical pedon:**
Max loam, 2,350 feet north and 1,440 feet east of the southwest corner of sec. 29, T. 153 N., R. 80 W.

A—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; about 2 percent gravel; neutral; clear wavy boundary.

Bw1—6 to 11 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, sticky and plastic; many very fine and common fine roots; about 2 percent gravel; slightly alkaline; gradual wavy boundary.

Bw2—11 to 16 inches; dark brown (10YR 4/3) loam, brown (10YR 5/3) dry; moderate medium and coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, sticky and plastic; common very fine roots; about 2 percent gravel; slightly alkaline; clear smooth boundary.

Bk1—16 to 26 inches; olive brown (2.5Y 4/4) loam, light yellowish brown (2.5Y 6/4) dry; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, firm, sticky and plastic; few very fine roots; about 5 percent gravel; disseminated lime throughout; strong effervescence; moderately alkaline; gradual smooth boundary.

Bk2—26 to 37 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; about 5 percent gravel; few fine irregularly shaped masses of lime; strong effervescence; moderately alkaline; gradual smooth boundary.

C—37 to 60 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; massive; hard, firm, sticky and plastic; few very fine roots; about 5 percent gravel; few fine irregularly shaped masses of lime; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Notes:** Some pedons have a BCk horizon.

**A horizon:**
Value: 2 or 3, 3 or 4 dry

**Bw horizon:**
Value: 4 to 6 dry
Chroma: 2 or 3

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4

**C horizon:**
Texture: loam or clay loam

## Minnewaukan Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Rapid
**Landform:** Lake plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 3 percent

**Taxonomic class:** Mixed, frigid Typic Psammaquents

**Typical pedon:**
Minnewaukan loamy fine sand, 1,055 feet south and 150 feet west of the northeast corner of sec. 17, T. 151 N., R. 63 W.

A—0 to 3 inches; black (10YR 2/1) loamy fine sand, dark gray (10YR 4/1) dry; weak fine subangular blocky and granular structure; soft, very friable, slightly sticky and nonplastic; many roots; about 1 percent gravel; slight effervescence; slightly alkaline; abrupt smooth boundary.

AC—3 to 5 inches; dark grayish brown and very dark grayish brown (2.5Y 4/2 and 2.5Y 3/2) loamy coarse sand, grayish brown (2.5Y 5/2) dry; single grain; nonsticky and nonplastic; many roots; about 15 percent gravel; slight effervescence; slightly alkaline; clear smooth boundary.

C—5 to 16 inches; dark grayish brown with olive brown (2.5Y 4/2 with 2.5Y 4/4) loamy sand, light brownish gray (2.5Y 6/2) dry; many fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; soft,

very friable, slightly sticky and nonplastic; few roots; about 1 percent gravel; slight effervescence; slightly alkaline; clear wavy boundary.

Cg1—16 to 28 inches; olive gray and olive (5Y 4/2 and 5Y 4/3) loamy sand, light gray and light olive gray (5Y 6/1 and 5Y 6/2) dry; very weak coarse prismatic structure; slightly sticky and nonplastic; few fine roots; about 10 percent pebbles; about 30 percent of sand and pebbles are shale fragments; few fine masses of lime; slight effervescence; slightly alkaline; clear wavy boundary.

Cg2—28 to 36 inches; olive gray and gray (5Y 5/2 and 5Y 5/1) fine sand, light gray (5Y 7/2) dry; single grain; nonsticky and nonplastic; about 1 percent gravel; slight effervescence; slightly alkaline; clear smooth boundary.

Cg3—36 to 50 inches; dark brown (10YR 3/3) fine sand, brown (10YR 4/3 and 10YR 5/3) dry; single grain; nonsticky and nonplastic; few small iron and manganese concretions; slight effervescence; moderately alkaline; clear smooth boundary.

Cg4—50 to 60 inches; olive (5Y 4/3) fine sand, pale olive (5Y 6/3) dry; single grain; nonsticky and nonplastic; slight effervescence; moderately alkaline.

### Range in Characteristics

**10 to 40 inch particle-size control section:** Loamy fine sand, loamy sand, fine sand, or sand
**Notes:** Some pedons have horizons that contain 1 to 20 percent gravel.

**A and AC horizons:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6
Texture: fine sandy loam to sand

**C horizon:**
Hue: 10YR, 2.5Y, 5Y, or 5GY

## Miranda Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Very slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 0 to 9 percent
**Notes:** These soils are saline-sodic.

**Taxonomic class:** Fine, smectitic Leptic Natriborolls

**Typical pedon:**
Miranda loam, 264 feet south and 90 feet west of the northeast corner of sec. 22, T. 124 N., R. 66 W.

E—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; moderate medium subangular blocky structure parting to weak thin platy; hard, friable; neutral; abrupt smooth boundary.

Btn1—4 to 7 inches; very dark brown (10YR 2/2) clay loam, grayish brown (10YR 5/2) dry; strong fine and medium columnar structure; extremely hard, very firm, sticky and plastic; light brownish gray (10YR 6/2) coatings on tops of columns; slightly alkaline; abrupt smooth boundary.

Btn2—7 to 10 inches; dark brown (10YR 3/3) clay loam, brown (10YR 4/3) dry; moderate medium prismatic structure parting to moderate fine and medium blocky; very hard, very firm, sticky and plastic; moderately alkaline; clear wavy boundary.

Btnz—10 to 16 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure parting to weak medium subangular; hard, firm, sticky and plastic; common fine accumulations of salts; strongly alkaline; abrupt wavy boundary.

Bkz—16 to 30 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; few fine distinct strong brown (7.5YR 5/8) moist redoximorphic concentrations; weak coarse blocky structure; hard, firm, sticky and plastic; common fine accumulations of salts; common fine accumulations of carbonates; strong effervescence; strongly alkaline; clear smooth boundary.

C1—30 to 38 inches; light olive brown (2.5Y 5/4) clay loam, pale yellow (2.5Y 7/4) dry; few fine distinct strong brown (7.5YR 5/8) moist redoximorphic concentrations and common medium distinct light gray (10YR 7/1) moist redoximorphic depletions; massive; hard, firm, sticky and plastic; common fine streaks of salt and gypsum; common medium accumulations of carbonates; strong effervescence; strongly alkaline; clear smooth boundary.

C2—38 to 60 inches; light olive brown (2.5Y 5/4) clay loam, pale yellow (2.5Y 7/4) dry; few fine distinct strong brown (7.5YR 5/8) moist redoximorphic concentrations and many fine distinct light gray (10YR 7/1) moist redoximorphic depletions; massive; hard, firm, sticky and plastic; few fine streaks of gypsum; common medium accumulations of carbonates; strong effervescence; strongly alkaline.

**Range in Characteristics**

**Depth to lime:** 5 to 25 inches
**Depth to gypsum and other salts:** 5 to 16 inches
**Percent rock fragments:** 1 to 10 percent throughout
**Notes:** Some pedons have A horizons. The combined thickness of the A and E horizons is 5 inches or less.

**E horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 7, 3 or 4 moist
Chroma: 1 or 2
Texture: loam or silt loam
Notes: The E horizon is absent in some pedons that have an AP horizon.

**Btn horizon:**
Value: 3 to 6
Chroma: 1 to 4
Texture: clay loam, silty clay, or clay
Notes: They average more than 15 percent fine sand or coarser sand.

**Bkz horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 7, 3 to 6 moist

**C horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 8, 3 to 7 moist
Chroma: 1 to 4
Texture: clay loam or loam
Chroma: 1 to 3
Texture: silty clay, clay, or silty clay loam
Notes: They contain nests of gypsum in some pedons.

**Cr horizon**
Hue: 2.5Y or 5Y
Value: 5 to 7, 3 to 6 moist
Chroma: 2 to 4
Notes: It is laminated in some pedons and massive in others. It commonly has nests or lenses of gypsum.

## Mondamin Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 1 to 6 percent

**Taxonomic class:** Fine, smectitic Vertic Argiborolls

**Typical pedon:**
Mondamin silty clay loam, 1,990 feet east and 210 feet north of the southwest corner of sec. 3, T. 122 N., R. 71 W.

Ap—0 to 6 inches; very dark brown (10YR 2/2) silty clay, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky and moderate fine and medium granular structure; hard, friable, slightly sticky and slightly plastic; slightly acid; abrupt smooth boundary.

Bt—6 to 13 inches; very dark brown (10YR 2/2) silty clay, dark grayish brown (10YR 4/2) dry; weak medium prismatic structure parting to moderate medium and coarse blocky; very hard, firm, sticky and plastic; shiny film on faces of peds; neutral; abrupt wavy boundary.

Bk1—13 to 21 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; weak medium prismatic structure parting to moderate medium and coarse blocky and subangular blocky; hard, firm, sticky and plastic; common (1/4 to 1 inch wide) very dark brown (10YR 2/2), dark grayish brown (10YR 4/2) dry, tongues; many very fine striations and few fine accumulations of lime; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—21 to 35 inches; dark grayish brown (2.5Y 4/2) silty clay loam, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; hard, firm, sticky and plastic; few (1/4 to 1/2 inch wide) very dark brown (10YR 2/2), dark grayish brown (10YR 4/2) dry, tongues; common medium and coarse accumulations of lime; strong effervescence; slightly alkaline; gradual wavy boundary.

Bk3—35 to 43 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; many fine distinct light gray (10YR 7/1) dry redoximorphic depletions and brownish yellow (10YR 6/6) dry redoximorphic concentrations; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and medium accumulations of lime; strong effervescence; moderately alkaline; clear wavy boundary.

C—43 to 55 inches; grayish brown (2.5Y 5/2) silty clay loam, light gray (2.5Y 7/2) and light brownish gray (2.5Y 6/2) dry; many medium distinct light gray (10YR 7/1) dry redoximorphic depletions and brownish yellow (10YR 6/6) dry redoximorphic concentrations; massive; slightly hard, very friable, slightly sticky and slightly plastic; thin lenses of very fine sand and fine sand; slight effervescence; moderately alkaline; clear wavy boundary.

Cy—55 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; common fine distinct light gray (10YR 7/1) dry redoximorphic depletions and brownish yellow (10YR 6/6) dry redoximorphic concentrations; massive; slightly hard, very friable, slightly sticky and slightly plastic; thin lenses of very fine sand and fine sand; common medium accumulations of gypsum; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 8 to 16 inches

**Ap horizon:**
Value: 2 or 3, 4 or 5 dry

**Bt horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4
Chroma: 2 or 3

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 2 or 3

**C horizon:**
Value: 4 or 5
Chroma: 2 to 4

## Niobell Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 1 to 6 percent
**Notes:** These soils are sodic.

**Taxonomic class:** Fine, smectitic Glossic Natriborolls

**Typical pedon:**
Niobell loam, 2,215 feet north and 100 feet east of the southwest corner of sec. 25, T. 163 N., R. 97 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine pores; about 2 percent gravel; slightly acid; abrupt smooth boundary.

B/E—6 to 9 inches; dark grayish brown (10YR 4/2) (E) and dark brown (10YR 3/3) (B) loam, light brownish gray (10YR 6/2) (E) and brown (10YR 4/3) (B) dry; weak coarse prismatic (B) and moderate medium and fine platy (E) structure; hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine pores; gray (10YR 6/1) dry patches of silt and sand grains on faces of peds; about 2 percent gravel; slightly acid; clear wavy boundary.

Btn1—9 to 13 inches; dark brown (10YR 3/3) clay loam, brown (10YR 4/3) dry; moderate medium prismatic structure parting to moderate medium and fine angular blocky; hard, firm, sticky and plastic; few very fine roots; common fine pores; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds and lining pores; tops and sides of upper 2 inches of prisms coated with patches of cleaned sand grains; about 2 percent gravel; neutral; gradual wavy boundary.

Btn2—13 to 19 inches; dark grayish brown (10YR 4/2) clay loam, brown (10YR 5/3) dry; moderate medium prismatic structure parting to strong medium and fine angular blocky; very hard, firm, sticky and plastic; few very fine roots; common fine pores; many distinct dark brown (10YR 3/3) clay films on faces of peds and lining pores; about 2 percent gravel; moderately alkaline; clear wavy boundary.

Bky1—19 to 22 inches; olive brown (2.5Y 4/4) loam, light olive brown (2.5Y 5/4) dry; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard,

friable, sticky and slightly plastic; common medium and fine crystals of gypsum; many large masses of lime; about 2 percent gravel; slight effervescence; moderately alkaline; gradual wavy boundary.

Bky2—22 to 29 inches; olive brown (2.5Y 4/3) loam, light yellowish brown (2.5Y 6/3) dry; weak medium and fine subangular blocky structure; hard, friable, sticky and slightly plastic; many fine crystals of gypsum; about 2 percent gravel; common medium and fine masses of lime; violent effervescence; strongly alkaline; gradual wavy boundary.

BCky—29 to 44 inches; olive brown (2.5Y 4/4) loam, light yellowish brown (2.5Y 6/3) dry; massive; very hard, firm, sticky and slightly plastic; common fine crystals of gypsum; about 2 percent gravel; few fine masses of lime; strong effervescence; strongly alkaline; gradual wavy boundary.

C—44 to 60 inches; olive brown (2.5Y 4/4) loam, light yellowish brown (2.5Y 6/4) dry; few fine distinct brown (10YR 5/3) relict redoximorphic concentrations and few fine prominent gray (5Y 5/1) relict redoximorphic depletions; massive; very hard, firm, sticky and slightly plastic; about 2 percent gravel; few small fragments of lignite; few gypsum crystals; few masses of lime; slight effervescence; strongly alkaline.

**Range in Characteristics**

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry
Chroma: 2 or 3

**B/E horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5, 4 to 7 dry
Notes: Some cultivated pedons do not have a B/E horizon.

**Btn horizon:**
Value: 4 to 6 dry
Chroma: 2 to 4

**Bk horizon:**
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

**BCk horizon:**
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam
Notes: Some pedons do not have a BCk horizon.

## Noonan Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 0 to 6 percent
**Notes:** These soils are sodic.

**Taxonomic class:** Fine, smectitic Typic Natriborolls

**Typical pedon:**
Noonan loam, 1,850 feet south and 110 feet west of the northeast corner of sec. 35, T. 163 N., R. 97 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many fine pores; about 2 percent gravel; neutral; abrupt smooth boundary.

Btn1—6 to 9 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; strong coarse and medium columnar structure parting to moderate medium angular blocky; tops of columns capped with gray (10YR 6/1) dry loam; very hard, firm, sticky and plastic; few very fine roots; many distinct very dark brown (10YR 2/2) clay films on faces of peds and lining pores; about 2 percent gravel; strongly alkaline; clear wavy boundary.

Btn2—9 to 12 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (2.5Y 4/2) dry; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, firm, sticky and plastic; few very fine roots; few pores; faces of peds coated with brown (10YR 4/3) clay films; about 2 percent gravel; strongly alkaline; clear wavy boundary.

Bk—12 to 20 inches; olive brown (2.5Y 4/3) clay loam, light olive brown (2.5Y 5/3) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and slightly plastic; few very fine roots; about 2 percent gravel; few medium masses of lime; few fine nests of gypsum in the lower part; strong

effervescence; strongly alkaline; gradual wavy boundary.

Bky—20 to 28 inches; olive brown (2.5Y 4/3) loam, light yellowish brown (2.5Y 6/3) dry; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and slightly plastic; few fine and medium roots; about 2 percent gravel; few fine nests of gypsum; common fine masses of lime; strong effervescence; strongly alkaline; gradual wavy boundary.

BCy—28 to 60 inches; olive brown (2.5Y 4/3) loam, light yellowish brown (2.5Y 6/3) and light olive brown (2.5Y 5/3) dry; weak coarse and medium subangular blocky structure; very hard, firm, sticky and slightly plastic; about 2 percent gravel; common medium nests of gypsum; slight effervescence; strongly alkaline.

### Range in Characteristics

**Depth to gypsum or other salts:** More than 16 inches
**Notes:** Some pedons have an E or C horizon.

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry

**Btn horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4, 3 to 6 dry
Chroma: 2 to 4

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4

**BCy horizon:**
Texture: loam or clay loam

## Nutley Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 6 percent

**Taxonomic class:** Fine, smectitic, frigid Chromic Hapluderts

**Typical pedon:**
Nutley silty clay, 360 feet south and 250 feet east of the northwest corner of sec. 8, T. 121 N., R. 58 W.

Ap—0 to 7 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate fine granular structure; slightly hard, friable, sticky and plastic; slight effervescence; moderately alkaline; abrupt smooth boundary.

Bss—7 to 20 inches; dark grayish brown (2.5Y 4/2) clay, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure parting to moderate very fine and fine blocky; hard, firm, sticky and plastic; tongues 1/4 to 3/4 inches wide of dark gray (10YR 4/1) and black (10YR 2/1); slight effervescence; few intersecting slickensides; moderately alkaline; gradual wavy boundary.

Css—20 to 48 inches; olive (5Y 5/3) clay, pale yellow (5Y 7/3) dry; common fine prominent yellowish red (5YR 4/6) dry and distinct gray (5Y 5/1) dry redoximorphic depletions; weak fine blocky structure; very hard, firm, very sticky and plastic; fine tongues of dark gray (10YR 4/1) and black (10YR 2/1); strong effervescence; few intersecting slickensides; moderately alkaline; diffuse wavy boundary.

C—48 to 60 inches; olive (5Y 5/3) clay, pale yellow (5Y 7/3) dry; many medium prominent yellowish red (5YR 4/6) dry redoximorphic concentrations and many medium distinct gray (5Y 5/1) dry redoximorphic depletions; weak medium and fine blocky structure; very hard, firm, very sticky and plastic; strong effervescence; moderately alkaline.

### Range in Characteristics

**Mollic epipedon thickness:** 7 to 16 inches
**Notes:** Some pedons have a Bk horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry

**Bss horizon:**
Value: 3 to 5, 4 to 6 dry
Chroma: 1 to 3

**C horizon:**
Value: 4 or 5, 6 or 7 dry
Chroma: 2 to 4

## Osakis Series

**Depth class: Very** deep
**Drainage class:** Moderately well drained
**Permeability:** Moderately rapid in the upper part and rapid in the lower part
**Landform:** Outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 2 percent

**Taxonomic class:** Sandy, mixed Aquic Haploborolls

**Typical pedon:**
Osakis loam, about 1,000 feet east and 800 feet south of the northwest corner of sec. 20, T. 132 N., R. 35 W.

Ap—0 to 13 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; very friable; about 3 percent gravel; slightly acid; abrupt smooth boundary.

Bw1—13 to 17 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; few medium faint dark yellowish brown (10YR 4/4) redoximorphic concentrations; moderate medium subangular blocky structure; friable; about 4 percent gravel; slightly acid; abrupt smooth boundary.

2Bw2—17 to 23 inches; very dark grayish brown (10YR 3/2) gravelly loamy sand; few fine faint dark yellowish brown (10YR 4/4) redoximorphic concentrations; weak medium granular structure; friable; about 20 percent gravel; neutral; abrupt smooth boundary.

2C1—23 to 32 inches; light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) gravelly coarse sand; few fine faint dark grayish brown (10YR 4/2) redoximorphic concentrations; single grain; loose; about 30 percent gravel; slight effervescence; slightly alkaline; gradual wavy boundary.

2C2—32 to 60 inches; light brownish gray (10YR 6/2) gravelly coarse sand; few fine faint dark grayish brown (10YR 4/2) redoximorphic concentrations; single grain; loose; about 25 percent gravel; strong effervescence; moderately alkaline.

### Range in Characteristics

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to lime:** 16 to 25 inches
**10 to 40 inch particle-size control section:** 10 to 35 percent rock fragments.

**Ap horizon:**
Value: 2 or 3
Chroma: 1 or 2

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4
Chroma: 2 to 4
Texture: sandy loam or loam

**2Bw horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5
Chroma: 2 to 4
Notes: It has a fine earth fraction of sand, coarse sand, loamy coarse sand, or loamy sand.

**2C horizon**
Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 2 or 3
Notes: It has a fine earth fraction of coarse sand, sand, loamy coarse sand, or loamy sand.

## Overly Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 6 percent

**Taxonomic class:** Fine-silty, mixed, superactive Pachic Udic Haploborolls

**Typical pedon:**
Overly silty clay loam, 300 feet east and 150 feet south of the northwest corner of sec. 18, T. 155 N., R. 53 W.

Ap—0 to 5 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine pores; neutral; abrupt smooth boundary.

A—5 to 10 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate coarse and medium angular blocky structure parting to moderate fine subangular blocky;

hard, friable, sticky and slightly plastic; many roots; many fine pores; neutral; clear wavy boundary.

Bw—10 to 17 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate fine angular blocky; very hard, firm, sticky and plastic; common roots; common fine pores; faint clay films on faces of peds; segregated lime in a few pores and root channels in the lower part; slightly alkaline; clear wavy boundary.

Bk1—17 to 20 inches; very dark grayish brown (2.5Y 3/2) silty clay loam, grayish brown (2.5Y 5/2) dry; few fine faint brown (10YR 4/3) redoximorphic concentrations; moderate fine subangular blocky structure; hard, friable, sticky and slightly plastic; few fine roots; common fine pores; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk2—20 to 28 inches; light olive brown (2.5Y 5/4) silty clay loam, light yellowish brown (2.5Y 6/4) dry; few faint yellowish brown (10YR 5/4) dry redoximorphic concentrations; moderate medium and very fine subangular blocky structure; hard, friable, sticky and slightly plastic; few roots; common fine pores; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk3—28 to 38 inches; olive brown (2.5Y 4/4) silty clay loam, light yellowish brown (2.5Y 6/4) dry; few fine light gray (5Y 7/1) dry redoximorphic depletions and light yellowish brown (10YR 6/4) dry redoximorphic concentrations; moderate very fine subangular blocky structure; hard, friable, sticky and slightly plastic; few roots; few fine pores; strong effervescence; moderately alkaline, clear wavy boundary.

C—38 to 60 inches; light yellowish brown (2.5Y 6/4), pale olive (5Y 6/3), gray (5Y 6/1), and yellowish brown (10YR 5/6) dry laminated silt loam and silty clay loam; gray (5Y 6/1) dry redoximorphic depletions and yellowish brown (10YR 5/6) dry prominent redoximorphic concentrations in the lower part; very hard, firm, sticky and plastic; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to 35 inches

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4, 3 to 5 dry
Chroma: 1 to 3

**Bk horizon:**
Value: 5 to 7 dry

**C horizon:**
Value: 4 to 6, 5 to 7 dry
Chroma: 1 to 6

## Parnell Series

**Depth class:** Very deep
**Drainage class:** Very poorly drained
**Permeability:** Slow
**Landform:** Till plains and moraines
**Parent material:** Alluvium
**Slope:** 0 to 1 percent

**Taxonomic class:** Fine, smectitic, frigid Vertic Argiaquolls

**Typical pedon:**
Parnell silty clay loam, 1,320 feet north and 35 feet west of the southeast corner of sec. 10, T. 125 N., R. 40 W.

A1—0 to 15 inches; black (10YR 2/1) silty clay loam, black (10YR 2/1) dry; few fine distinct dark brown (7.5YR 3/2) and few fine prominent reddish brown (5YR 4/4) redoximorphic concentrations; moderate very fine and fine subangular blocky structure; friable; common roots; neutral; clear smooth boundary.

A2—15 to 22 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; moderate fine and medium platy structure parting to weak very fine subangular blocky; friable; few roots; few patchy gray (10YR 6/1) coatings on faces of peds when dry; slightly acid; clear smooth boundary.

Btg1—22 to 32 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; many thin coatings of clean sand and silt particles on faces of peds; few faint black (10YR 2/1) clay films on faces of peds; slightly acid; gradual smooth boundary.

Btg2—32 to 55 inches; black (10YR 2/1) grading to very dark gray (10YR 3/1) silty clay, very dark gray (10YR 3/1) dry; weak medium prismatic structure parting to strong angular blocky; firm; many faint

black (10YR 2/1) clay films on faces of peds; slightly acid in upper part grading to neutral in lower part; diffuse wavy boundary.

BCg—55 to 80 inches; grayish brown (2.5Y 5/2) grading to olive gray (5Y 5/2) in the lower part, silty clay loam; common fine prominent reddish brown (5YR 4/4) redoximorphic concentrations and common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; weak very fine angular blocky structure; firm in upper part and friable in lower part; few strata of loam and silty clay; few distinct black (10YR 2/1) and very dark gray (10YR 3/1) clay films in upper part; neutral in upper part becoming slightly alkaline; slight effervescence in lower part.

**Range in Characteristics**

**Mollic epipedon thickness:** 24 to more than 60 inches
**Notes:** Some pedons have an O or Cg horizon.

**Btg horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4
Texture: silty clay or silty clay loam

**BCg horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 5
Chroma: 1 or 2

## Parshall Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately rapid
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 0 to 25 percent

**Taxonomic class:** Coarse-loamy, mixed, superactive Pachic Haploborolls

**Typical pedon:**
Parshall fine sandy loam, 1,550 feet north and 950 feet east of southwest corner of sec. 33, T. 139 N., R. 81 W.

Ap—0 to 7 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine pores; neutral; abrupt smooth boundary.

A—7 to 12 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine and few medium roots; many fine and very fine and few medium pores; neutral; clear wavy boundary.

Bw1—12 to 20 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and fine and few medium pores; slightly alkaline; clear wavy boundary.

Bw2—20 to 29 inches; dark olive brown (2.5Y 3/3) fine sandy loam, light olive brown (2.5Y 5/3) dry; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and few fine pores; neutral; abrupt smooth boundary.

Bk1—29 to 42 inches; dark grayish brown (2.5Y 4/2) fine sandy loam, grayish brown (2.5Y 5/2) dry; moderate coarse prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and few fine pores; few fine filaments of lime; strong effervescence; moderately alkaline; clear smooth boundary.

Bk2—42 to 48 inches; dark grayish brown (2.5Y 4/2) fine sandy loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and nonplastic; few fine and very fine roots; common very fine pores; common fine filaments of lime; strong effervescence; moderately alkaline; abrupt wavy boundary.

BCk—48 to 60 inches; olive brown (2.5Y 4/3) loamy fine sand, light yellowish brown (2.5Y 6/3) dry; weak coarse subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few fine and very fine roots; few very fine pores; few fine irregularly shaped masses and common fine filaments of lime; violent effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to 40 inches
**Notes:** Some pedons have an Ab horizon below a depth of 50 inches. Some pedons have a C horizon.

**A horizon:**
Value: 3 or 4 dry

**Bw horizon:**
Chroma: 2 to 4

**Bk horizon:**
Hue: 10YR or 2.5Y
Texture: fine sandy loam or loamy fine sand

## Peta Series

**Depth class:** Very deep
**Drainage class:** Somewhat poorly drained
**Permeability:** Moderate
**Landform:** Alluvial flats
**Parent material:** Alluvium
**Slope:** 0 to 3 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Pachic Argiborolls

**Typical pedon:** Peta loam, 2,150 feet east and 1,900 feet south of the northwest corner of sec. 23, T. 142 N., R. 99 W.

Ap—0 to 5 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; 18 percent clay; neutral; clear smooth boundary.

A—5 to 10 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots throughout; common very fine tubular pores; 18 percent clay; neutral; clear smooth boundary.

Bt1—10 to 20 inches; dark brown (10YR 3/3) loam, brown (10YR 4/3) dry; common fine rounded distinct dark yellowish brown (10YR 4/6) dry redoximorphic concentrations from 16 to 20 inches; weak medium prismatic structure parting to moderate medium subangular blocky; moderately hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; common very fine tubular pores; 25 percent clay; few distinct discontinuous very dark grayish brown (10YR 3/2) clay films throughout; neutral; clear wavy boundary.

Bt2—20 to 26 inches; olive brown (2.5Y 4/4) clay loam, light olive brown (2.5Y 5/4) dry; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; moderately hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; common very fine tubular pores; 23 percent clay; few distinct discontinuous dark brown (10YR 3/3) clay films throughout; neutral; clear wavy boundary.

BC—26 to 36 inches; olive brown (2.5Y 4/4) fine sandy loam, light olive brown (2.5Y 5/4) dry; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations throughout; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots throughout; common very fine tubular pores; 15 percent clay; neutral; gradual wavy boundary.

C1—36 to 48 inches; olive brown (2.5Y 4/4) fine sandy loam, light olive brown (2.5Y 5/4) dry; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations throughout and common fine rounded prominent light olive gray (5Y 6/2) dry redoximorphic depletions throughout; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots throughout; common very fine tubular pores; 11 percent clay; slightly alkaline; gradual wavy boundary.

C2—48 to 53 inches; light olive brown (2.5Y 5/3) loam, light yellowish brown (2.5Y 6/3) dry; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations throughout and common fine rounded distinct light olive gray (5Y 6/2) dry redoximorphic depletions throughout; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 18 percent clay; common fine rounded masses of lime pedogenic throughout; strongly effervescent (HCL, 1 normal); moderately alkaline; gradual wavy boundary.

C3—53 to 80 inches; grayish brown (2.5Y 5/2) fine sandy loam, light brownish gray (2.5Y 6/2) dry; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations throughout; massive; soft, very friable, slightly

sticky and nonplastic; 9 percent clay; slightly effervescent (HCL, 1 normal); moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to 40 inches
**Percent rock fragments:** Less than 1 percent
**Depth to redoximorphic features:** 7 to 32 inches

**A horizon:**
Value: 2 or 3, 3 or 4 dry
Chroma: 1 to 3
Texture: loam or fine sandy loam

**Bt horizon:**
Chroma: 2 to 4
Texture: loam, clay loam, or sandy clay loam
Notes: The percent clay averages 22 to 30.

**BC horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 or 6 dry
Chroma: 2 to 4
Texture: fine sandy loam, sandy loam, or sandy clay loam

**C horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry
Texture: fine sandy loam, loam, sandy loam, or loamy sand

## Rauville Series

**Depth class:** Very deep
**Drainage class:** Very poorly drained
**Permeability:** Moderately slow in the upper part and moderately rapid in the underlying sand and gravel
**Landform:** Flood plains
**Parent material:** Alluvium
**Slope:** 0 to 1 percent
**Notes:** These soils are calcareous.

**Taxonomic class:** Fine-silty, mixed, superactive, calcareous, frigid Cumulic Endoaquolls

**Typical pedon:**
Rauville silty clay loam, 635 feet west and 90 feet south of the northeast corner of sec. 17, T. 120 N., R. 52 W.

A1—0 to 7 inches; black (10YR 2/1) silty clay loam, gray (10YR 5/1) and dark gray (10YR 4/1) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; few fine and medium snail shell fragments; strong effervescence; moderately alkaline; clear smooth boundary.

A2—7 to 27 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; few fine and medium snail shell fragments; strong effervescence; moderately alkaline; gradual smooth boundary.

Cg—27 to 45 inches; dark gray (2.5Y 4/1) silty clay loam, light gray (10YR 6/1) dry; massive; hard, friable, sticky and plastic; few fine roots; common fine and medium snail shell fragments; strong effervescence; moderately alkaline; abrupt smooth boundary.

2Cg—45 to 60 inches; light olive brown (2.5Y 5/3) stratified gravelly sand and clay loam, light yellowish brown (2.5Y 6/3) dry; common medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations and common medium distinct greenish gray (5G 6/1) redoximorphic depletions; massive; very hard, firm; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 24 to more than 60 inches
**Calcium carbonate equivalent:** 20 to 40 percent
**10 to 40 inch particle-size control section:** Silty clay loam or silt loam averaging between 25 and 35 percent clay
**Depth to sand and gravel:** 40 to more than 60 inches

**A horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 2 or 3, 3 to 5 dry
Chroma: 0 to 2
Texture: silty clay loam or silt loam

**Cg horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 2 to 6, 5 to 8 dry
Chroma: 0 or 1
Texture: silty clay loam or silt loam
Notes: It is silty clay, clay loam, or loam below a depth of 40 inches in some pedons.

**2Cg horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 6, 5 to 8 dry

Chroma: 1 to 4
Texture: It is stratified gravelly sand with thin layers of gravelly sandy loam, sandy loam, silt loam, loam, fine sandy loam, and clay loam.
Notes: Some pedons do not have a 2C horizon.

## Reeder Series

**Depth class:** Moderately deep
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Uplands
**Parent material:** Soft mudstone and sandstone
**Slope:** 0 to 6 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Argiborolls

**Typical pedon:**
Reeder loam, 1,575 feet south and 475 feet west of the northeast corner of sec. 14, T. 129 N., R. 100 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak coarse and fine subangular blocky structure parting to weak fine granular; friable; many roots; many fine pores; neutral; abrupt smooth boundary.

Bt1—8 to 12 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; moderate coarse and medium prismatic and moderate medium angular blocky structure; friable; common roots; many fine pores; many faint clay films on vertical and many clay films on horizontal faces of peds; neutral; clear smooth boundary.

Bt2—12 to 17 inches; dark grayish brown (10YR 4/2) clay loam, brown (10YR 5/3) dry; moderate medium prismatic and moderate medium angular blocky structure; friable; many clay films on faces of peds; neutral; gradual wavy boundary.

Bk1—17 to 32 inches; dark grayish brown (2.5Y 4/3) loam, light brownish gray (2.5Y 6/3) dry; weak coarse and medium prismatic and moderate medium subangular blocky structure; friable; few roots; many fine pores; common masses of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk2—32 to 36 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; weak medium subangular blocky structure; friable; few fine roots; many fine threads of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

Cr—36 to 60 inches; olive (5Y 5/3) soft sandstone and siltstone, pale yellow (5Y 7/3) dry; few masses of lime; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to soft bedrock:** 20 to 40 inches
**Notes:** Some pedons have a stratified loam, clay loam, or silty clay loam C horizon.

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry

**Bt horizon:**
Hue: 7.5YR, 10YR, or 2.5Y
Value: 3 to 5, 4 to 6 dry
Chroma: 2 to 4

**Bk horizon:**
Notes: Some pedons do not have a Bk horizon.

## Regan Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Moderately slow
**Landform:** Flood plains
**Parent material:** Alluvium
**Slope:** 0 to 3 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-silty, mixed, superactive, frigid Typic Calciaquolls

**Typical pedon:**
Regan silty clay loam, 1,650 feet south and 1,000 feet east of the northwest corner of sec. 34, T. 144 N., R. 78 W.

A1—0 to 4 inches; very dark gray (2.5Y 3/1) silty clay loam, dark gray (2.5Y 4/1) dry; moderate fine granular structure; hard, friable, slightly sticky and slightly plastic; many roots; slight effervescence; moderately alkaline; clear wavy boundary.

A2—4 to 9 inches; very dark gray (5Y 3/1) silty clay loam, gray (5Y 5/1) dry; strong fine and very fine subangular blocky structure parting to strong fine granular; hard, friable, sticky and slightly plastic; common roots; strong effervescence; moderately alkaline; clear very wavy boundary.

Bkg1—9 to 16 inches; gray (5Y 5/1) silty clay loam, light gray (5Y 6/1) dry; moderate medium granular structure; very hard, friable, sticky and slightly plastic; common roots; violent effervescence; moderately alkaline; gradual wavy boundary.

Bkg2—16 to 28 inches; dark gray (5Y 4/1) silty clay loam, gray (5Y 5/1) dry; massive; extremely hard, firm; few roots; violent effervescence; moderately alkaline; gradual wavy boundary.

2Cg1—28 to 54 inches; olive gray (5Y 4/2) clay loam, gray (5Y 5/1) dry; massive; extremely hard, friable; few roots; few pores; few salt crystals; strong effervescence; moderately alkaline; clear smooth boundary.

2Cg2—54 to 60 inches; olive gray (5Y 4/2) sandy clay loam, gray (5Y 5/1) dry; few fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; massive; stratified with clay loam and sandy loam layers; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches

**A horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 or 3
Chroma: 1 or 2
Texture: silt loam or silty clay loam

**Bkg horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6, 4 to 7 dry
Chroma: 1 or 2
Texture: silt loam or silty clay loam

**2Cg horizon:**
Value: 3 to 5, 5 to 7 dry
Chroma: 1 to 4

## Regent Series

**Depth class:** Moderately deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Uplands
**Parent material:** Soft siltstone and shale
**Slope:** 1 to 6 percent

**Taxonomic class:** Fine, smectitic Vertic Argiborolls

**Typical pedon:**
Regent silty clay loam, northwest corner of sec. 3, T. 139 N., R. 97 W.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky and moderate fine granular structure; firm, plastic; common fine roots; common fine pores; neutral; clear smooth boundary.

Bt1—10 to 18 inches; dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure separating to strong fine angular blocky; firm, plastic; few roots; common fine pores; dark grayish brown (10YR 4/2) dry clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bt2—18 to 26 inches; olive brown (2.5Y 4/3) silty clay, dark grayish brown (2.5Y 4/2) dry; weak coarse prismatic structure separating to moderate medium subangular blocky; firm, plastic; few roots; common very fine pores; faint clay films on faces of peds; few faint white masses of lime; slightly alkaline; gradual wavy boundary.

Bk—26 to 39 inches; olive (5Y 5/3) silty clay loam, pale olive (5Y 6/3) dry; weak coarse prismatic structure separating to moderate medium subangular blocky; firm, plastic; few fine pores; common fine threads and few masses of lime; strong effervescence; moderately alkaline; clear wavy boundary

Cr—39 to 62 inches; pale olive (5Y 6/3) dry soft shale; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to soft bedrock:** 24 to 40 inches

**Ap horizon:**
Value: 2 or 3, 4 or 5 dry

**Bt horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4, 4 to 6 dry
Chroma: 2 to 4

**Bk horizon:**
Notes: Some pedons do not have a Bk horizon.

**Cr horizon:**
Notes: It is soft siltstone or shale.

## Renshaw Series

**Depth class:** Very deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Very rapid
**Landform:** Outwash plains and till plains
**Parent material:** Glacial outwash
**Slope:** 0 to 6 percent

**Taxonomic class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Udic Haploborolls

**Typical pedon:**
Renshaw loam, 80 feet north and 225 feet east of the southwest corner of sec. 5, T. 117 N., R. 53 W.

Ap—0 to 7 inches; black (10YR 2/1), broken face, loam, dark gray (10YR 4/1), broken face, dry; weak fine granular structure; slightly hard, very friable; neutral; clear smooth boundary.

Bw—7 to 15 inches; very dark grayish brown (10YR 3/2), broken face, loam, dark grayish brown (10YR 4/2), broken face, dry; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; few pebbles; neutral; abrupt wavy boundary.

2Bk—15 to 20 inches; varicolored gravelly loamy sand; single grain; loose; masses of lime on undersides of pebbles; slight effervescence throughout (HCl, unspecified); slightly alkaline; diffuse wavy boundary.

2C—20 to 60 inches; varicolored gravelly loamy sand; single grain; loose; strong effervescence throughout (HCl, unspecified); slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to sand and gravel:** 14 to 20 inches
**Notes:** Some pedons have Bk horizons.

**Bw horizon:**
Notes: It has less than 30 percent gravel.

**2Bk and 2C horizons:**
Texture: loamy sand, sand, or coarse sand
Notes: It has 15 to 55 percent gravel.

## Rhoades Series

**Depth class:** Deep
**Drainage class:** Well drained
**Permeability:** Very slow
**Landform:** Uplands
**Parent material:** Soft siltstone or shale
**Slope:** 3 to 9 percent
**Notes:** These soils are saline-sodic.

**Taxonomic class:** Fine, smectitic Leptic Vertic Natriborolls

**Typical pedon:**
Rhoades loam, 2,260 feet north and 125 feet west of the southeast corner of sec. 11, T. 140 N., R. 99 W.

E—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium prismatic structure parting to moderate and strong coarse to fine platy; friable; many roots; common fine pores; peds coated with light gray (10YR 6/1) dry uncoated sand grains; neutral; abrupt smooth boundary

Btn—4 to 11 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; strong coarse columnar structure parting to moderate fine angular blocky in lower part; extremely hard, firm, sticky and plastic; common roots between columns; few medium common fine pores; columns coated with light gray (10YR 7/1) dry layer; dark grayish brown (10YR 4/2) dry clay films on faces of peds; few gypsum crystals in lower part; moderately alkaline; clear wavy boundary.

Btkny—11 to 16 inches; very dark grayish brown (2.5Y 3/2) clay loam, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; extremely hard, firm; common fine pores; faint clay films; common gypsum crystals; many masses of lime; noneffervescent between lime masses; strongly alkaline; gradual wavy boundary.

Bky1—16 to 35 inches; olive brown (2.5Y 4/4) clay loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; extremely hard, firm; common fine pores; few masses of lime; common coarse and fine gypsum crystals; strong effervescence; strongly alkaline; gradual wavy boundary.

Bky2—35 to 49 inches; olive (5Y 5/3) clay loam, olive gray (5Y 5/2) dry; weak fine and medium

subangular blocky structure; extremely hard, firm; few large nests of gypsum crystals; common masses of lime; strong effervescence; strongly alkaline; clear wavy boundary.

Cr—49 to 60 inches; olive gray (5Y 5/2) dry, soft shale that crushes to silty clay; strong effervescence.

### Range in Characteristics

**Depth to gypsum or other salts:** 2 to 16 inches
**Depth to soft bedrock:** 40 to 60 inches
**Notes:** Some pedons have an A horizon 1 to 2 inches thick. Some pedons have a C horizon above the Cr horizon.

**E horizon:**
Value: 2 to 5, 4 to 6 dry

**Btn horizon:**
Value: 2 to 4, 3 to 5 dry
Texture: clay loam, silty clay loam, or silty clay

**Bky horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 5, 4 to 7 dry

**Cr horizon:**
Notes: It is soft siltstone or shale.

## Rusklyn Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 1 to 9 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-silty, mixed, superactive Udic Calciborolls

**Typical pedon:**
Rusklyn silty clay loam, 390 feet north and 1,950 feet west of the southeast corner of sec. 27, T. 124 N., R. 56 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; slightly hard, friable, slightly sticky and plastic; common fine roots; slight effervescence; slightly alkaline; abrupt smooth boundary.

Bk1—9 to 19 inches; light olive brown (2.5Y 5/4) silty clay loam, light yellowish brown (2.5Y 6/4) dry; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and plastic; few fine roots; common fine accumulations of lime; violent effervescence (about 29 percent calcium carbonate equivalent); moderately alkaline; gradual wavy boundary.

Bk2—19 to 28 inches; light olive brown (2.5Y 5/4) silty clay loam, light yellowish brown (2.5Y 6/4) dry; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and plastic; few fine roots; few medium accumulations of lime; violent effervescence (about 26 percent calcium carbonate equivalent); moderately alkaline; gradual wavy boundary.

C1—28 to 53 inches; grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) silty clay loam, light yellowish brown (2.5Y 6/4) and light gray (2.5Y 7/2) dry; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; massive; hard, friable, slightly sticky and plastic; strong effervescence; strongly alkaline; clear wavy boundary.

2C2—53 to 60 inches; grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) clay loam, light brownish gray (2.5Y 6/2) and pale yellow (2.5Y 7/4) dry; common medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; massive; hard, firm, sticky and plastic; about 5 percent pebbles; strong effervescence; strongly alkaline.

### Range in Characteristics

**Mollic epipedon thickness:** 7 to 10 inches
**Depth to the calcic horizon:** 7 to 10 inches

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 2 to 4

**C horizon:**
Texture: silt loam or silty clay loam

**2C horizon:**
Notes: Some pedons do not have a 2C horizon.

many fine and few medium roots; many fine and medium pores; neutral (pH 7.4); clear wavy boundary.

Bt1—2 to 6 inches; very dark grayish brown (2.5Y 3/2) silty clay loam, grayish brown (2.5Y 5/2) dry; moderate medium and coarse prismatic structure parting to moderate medium angular blocky; very hard, firm, very sticky and very plastic; common faint clay films on faces of peds; common very fine roots; common fine tubular pores; neutral (pH 7.4); clear wavy boundary.

Bt2—6 to 16 inches; very dark grayish brown (2.5Y 3/2) silty clay, dark grayish brown (2.5Y 4/2) dry; moderate medium and coarse prismatic structure parting to strong medium angular blocky; very hard, firm, very sticky and very plastic; continuous faint clay films on faces of peds; common very fine roots; common fine tubular pores; slightly alkaline (pH 7.6); clear wavy boundary.

Bk1—16 to 23 inches; dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) dry; strong coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few fine pores; strong effervescence; common fine threads and medium masses of lime; moderately alkaline (pH 8.0); gradual wavy boundary.

Bk2—23 to 29 inches; olive (5Y 4/3) silty clay, olive (5Y 5/3) dry; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common very fine and fine pores; strong effervescence; common fine threads and medium masses of lime; moderately alkaline (pH 8.2); gradual wavy boundary.

Bk3—29 to 39 inches; olive (5Y 4/3) silty clay, olive (5Y 5/3) dry; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; common fine pores; strong effervescence; common fine threads and medium masses of lime; moderately alkaline (pH 8.2); diffuse irregular boundary.

Bk4—39 to 60 inches; olive (5Y 4/3) silty clay loam, pale olive (5Y 6/3) dry; weak coarse subangular blocky structure; few fine roots; few very fine pores; strong effervescence; few fine masses of lime; moderately alkaline (pH 8.2).

**Range in Characteristics**

**Mollic epipedon thickness:** 8 to 16 inches
**Depth to lime:** 12 to 22 inches
**Notes:** Some pedons have a Btk or C horizon.

**A horizon:**
Value: 2 or 3, 3 or 4 dry

**Bt horizon:**
Hue: 10YR or 2.5Y
Chroma: 2 to 4

## Schaller Series

**Depth class:** Very deep
**Drainage class:** Excessively drained
**Permeability:** Very rapid
**Landform:** Eskers and collapsed outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 15 percent

**Taxonomic class:** Sandy, mixed Entic Haploborolls

**Typical pedon:**
Schaller fine sandy loam, 700 feet east and 90 feet south of the northwest corner of sec. 18, T. 131 N., R. 84 W.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark brown (10YR 3/3) dry; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; 5 percent gravel; neutral; clear wavy boundary.

Bk—9 to 15 inches; dark grayish brown (10YR 4/2) fine sandy loam, grayish brown (10YR 5/2) dry; single grain; loose, nonsticky and nonplastic; few fine roots; 5 percent gravel; fine masses of lime; strong effervescence; slightly alkaline; abrupt wavy boundary.

C—15 to 60 inches; light olive brown (2.5Y 5/4) gravelly loamy coarse sand, light yellowish brown (2.5Y 6/4) dry; single grain; loose, nonsticky and nonplastic; few very fine roots; 20 percent gravel; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 10 to 14 inches

**A horizon:**
Value: 2 or 3

**Bk horizon:**
Notes: Some pedons do not have a Bk horizon.

**C horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4
Notes: It has 2 to 35 percent gravel.

## Shambo Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Fans
**Parent material:** Alluvium
**Slope:** 0 to 35 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Haploborolls

**Typical pedon:**
Shambo loam, 1,715 feet south and 1,420 feet west of the northeast corner of sec. 19, T. 129 N., R. 100 W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many roots; many fine pores; neutral; clear smooth boundary.

Bw1—5 to 10 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium prismatic structure parting to moderate medium angular blocky; hard, friable, slightly sticky and slightly plastic; many roots; common medium and fine pores; neutral; clear smooth boundary.

Bw2—10 to 16 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine pores; thin coatings of very dark grayish brown (10YR 3/2) on faces of peds; neutral; clear wavy boundary.

Bw3—16 to 19 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; few masses of lime; slight effervescence; moderately alkaline; clear wavy boundary.

Bk1—19 to 22 inches; dark grayish brown (2.5Y 4/2) loam, light brownish gray (2.5Y 6/2) dry; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; many fine masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Bk2—22 to 32 inches; light olive brown (2.5Y 5/3) loam, light yellowish brown (2.5Y 6/3) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; few tubular pores; many irregular masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

C1—32 to 46 inches; olive brown (2.5Y 4/3) and light olive brown (2.5Y 5/3) loam, light olive brown (2.5Y 5/3) and light yellowish brown (2.5Y 6/3) dry; massive, hard, friable, slightly sticky and slightly plastic; few fine roots; few pores; few pebbles; few small masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

2C2—46 to 60 inches; grayish brown (2.5Y 5/2) gravelly sandy loam, light brownish gray (2.5Y 6/2) dry; single grain; loose; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to lime:** 10 to 35 inches
**Depth to the 2C horizon:** More than 40 inches
**Notes:** Some pedons have a Cr horizon below a depth of 40 inches.

**A horizon:**
Value: 2 or 3, 3 to 5 dry
Chroma: 2 or 3
Texture: loam, silt loam, clay loam, or fine sandy loam

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6 dry
Chroma: 2 to 4
Texture: loam, silt loam, or clay loam

**Bk horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4

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

**C horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4

**2C horizon:**
Notes: Some pedons do not have a 2C horizon.

## Sinai Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 1 percent

**Taxonomic class:** Fine, smectitic, frigid Typic Hapluderts

**Typical pedon:**
Sinai silty clay, 740 feet west and 310 feet south of the northeast corner of sec. 4, T. 124 N., R. 55 W.

Ap—0 to 7 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, sticky and plastic; few fine roots; slightly acid; abrupt smooth boundary.

A—7 to 12 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure parting to moderate medium granular; very hard, firm, sticky and plastic; few fine roots; slightly acid; cracks 1/2 inch to 1 inch wide; clear smooth boundary.

Bss—12 to 23 inches; very dark grayish brown (10YR 3/2) silty clay, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure parting to moderate medium granular; very hard, firm, sticky and plastic; few fine roots; slightly acid; cracks 1/2 inch to 1 inch wide; clear smooth boundary.

Sioux Srei 2 perTf 0 T2j 0.0004 Tc -10.020-00.330 T6 -m (Depear) s mi

**Typical pedon:**
Sioux loam, 1,200 feet west and 2,375 feet south of the northeast corner of sec. 33, T. 126 N., R. 53 W.

A—0 to 5 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak fine and medium granular structure; soft, very friable; many fine roots; slightly alkaline; clear smooth boundary.

AC—5 to 8 inches; very dark grayish brown (10YR 3/2) gravelly loam, grayish brown (10YR 5/2) dry; weak coarse granular structure; soft, very friable; common fine roots; slight effervescence; moderately alkaline; clear smooth boundary.

C—8 to 60 inches; brown (10YR 5/3) and dark yellowish brown (10YR 4/4) very gravelly sand, light brownish gray (10YR 6/2) and pale brown (10YR 6/3) dry; single grain; loose; lime coatings are on the undersides of pebbles in the upper part; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 12 inches
**Depth to sand and gravel:** 6 to 14 inches
**Notes:** Some pedons have a Bk horizon.

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry

**AC horizon:**
Notes: Some pedons do not have an AC horizon.

**C horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 7 dry

## Southam Series

**Depth class:** Very deep
**Drainage class:** Very poorly drained
**Permeability:** Slow
**Landform:** Till plains and lake plains
**Parent material:** Alluvium
**Slope:** 0 to 1 percent
**Notes:** These soils are calcareous.

**Taxonomic class:** Fine, smectitic, calcareous, frigid Cumulic Vertic Endoaquolls

**Typical pedon:**
Southam silty clay loam, 2,450 feet north and 1,050 feet west of the southeast corner of sec. 6, T. 153 N., R. 61 W.

Ag1—0 to 16 inches; black (5Y 2/1) silty clay loam, dark gray (5Y 4/1) dry; massive; firm, sticky and plastic; common fine snail shell fragments; strong effervescence; slightly alkaline; gradual wavy boundary.

Ag2—16 to 26 inches; black (5Y 2/1) silty clay, dark gray (5Y 4/1) dry; few fine prominent olive brown (2.5Y 4/4) redoximorphic concentrations; massive; firm, sticky and plastic; common fine snail shell fragments; strong effervescence; slightly alkaline; gradual wavy boundary.

Ag3—26 to 32 inches; black (5Y 2/1) silty clay, dark gray (5Y 4/1) dry; few fine prominent olive brown (2.5Y 4/4) redoximorphic concentrations; massive; very firm, very sticky and very plastic; common fine snail shell fragments; common fine concentrations of gypsum in nests and along planes; strong effervescence; moderately alkaline; gradual wavy boundary.

Ag4—32 to 40 inches; black (5Y 2/1 and 5Y 2/2) silty clay, dark gray (5Y 4/1) and olive gray (5Y 4/2) dry; few fine prominent olive brown (2.5Y 4/4) redoximorphic concentrations; massive; very firm, very sticky and very plastic; common fine snail shell fragments; common fine concentrations of gypsum in nests and along planes; slight effervescence; moderately alkaline; gradual wavy boundary.

Cg1—40 to 48 inches; very dark grayish brown (2.5Y 3/2) and dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) dry; few fine prominent yellowish red (5YR 4/6) and few fine distinct olive brown (2.5Y 4/4) redoximorphic concentrations; massive; very firm, very sticky and very plastic; few fine rounded manganese concretions; common fine snail shell fragments; common fine concentrations of gypsum in nests and along planes; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg2—48 to 54 inches; grayish brown (2.5Y 5/2) silty clay, light brownish gray (2.5Y 6/2) dry; fine and medium distinct olive brown (2.5Y 4/4) and few medium prominent yellowish red (5YR 4/6) redoximorphic concentrations; few medium prominent threadlike light gray (N 7/0) redoximorphic depletions; massive; very firm, very sticky and very plastic; many common fine snail shell fragments; common fine rounded manganese concretions; common fine concentrations of

gypsum in nests and along planes; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg3—54 to 60 inches; dark grayish brown (2.5Y 4/2) and light gray (N 7/0) silty clay, light gray (2.5Y 7/2) and white (2.5Y 8/2) dry; common medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) redoximorphic concentrations; massive; very firm, very sticky and very plastic; common fine snail shell fragments; few fine rounded manganese concretions; common fine concentrations of gypsum in nests and along planes; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Notes:** Some pedons have an O horizon up to 4 inches thick. Some pedons have a 2C horizon at a depth of 40 to 60 inches.

**Ag horizon:**
Hue: 10YR, 2.5Y, or 5Y

**Cg horizon:**
Hue: 2.5Y, 5Y, or neutral
Value: 3 to 6, 5 to 8 dry
Texture: clay loam, silty clay, or silty clay loam

## Spottswood Series

**Depth class:** Very deep
**Drainage class:** Somewhat poorly drained
**Permeability:** Moderate over very rapid
**Landform:** Outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 3 percent

**Taxonomic class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Pachic Udic Haploborolls

**Typical pedon:**
Spottswood loam, 390 feet north and 950 feet east of the southwest corner of sec. 19, T. 110 N., R. 50 W.

Ap—0 to 10 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure parting to moderate fine and medium granular; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine pores; common fine worm casts; 2 percent subrounded gravel; neutral; abrupt smooth boundary.

Bw1—10 to 17 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine pores; common fine worm casts; 1 percent subrounded gravel; neutral; gradual wavy boundary.

Bw2—17 to 22 inches; olive brown (2.5Y 4/3) sandy loam, light olive brown (2.5Y 5/3) dry; weak coarse prismatic structure parting to moderate coarse subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; common discontinuous black (10YR 2/1) organic coats on faces of peds; 11 percent subrounded gravel; slightly alkaline; clear wavy boundary.

BC—22 to 26 inches; olive brown (2.5Y 4/3) sandy loam, light olive brown (2.5Y 5/3) dry; common fine prominent yellowish brown (10YR 5/6 and 10YR 5/4) iron masses; weak coarse subangular blocky structure; slightly hard, very friable; few fine roots; common fine pores; few discontinuous black (10YR 2/1) organic coats on faces of peds; very slight effervescence; 13 percent subrounded gravel; slightly alkaline; abrupt smooth boundary.

2C—26 to 80 inches; grayish brown (2.5Y 5/2) gravelly sand, light brownish gray (2.5Y 6/2) dry; few fine prominent yellowish brown (10YR 5/6) iron masses; single grain; loose; few discontinuous lime coats on sand and gravel; strong effervescence; 27 percent subrounded gravel; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to more than 60 inches
**Depth to lime:** 16 to more than 60 inches
**Depth to sand and gravel:** 20 to 40 inches
**Notes:** Some pedons have a Bk horizon that is loam or clay loam. Some pedons have a 2Bk horizon that is loamy sand, loamy fine sand, fine sandy loam, or sandy loam.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry
Texture: loam, clay loam, or silt loam

**Bw horizon:**
Chroma: 1 to 3
Texture: clay loam, loam, or sandy loam

**BC horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4

**2C horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: sand, loamy sand, gravelly or very gravelly sand, or loamy sand

## Stady Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate in the upper part and very rapid in the lower part
**Landform:** Terraces
**Parent material:** Alluvium over glaciofluvial deposits
**Slope:** 0 to 9 percent

**Taxonomic class:** Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Haploborolls

**Typical pedon:**
Stady loam, 220 feet north and 115 feet east of the southwest corner of sec. 35, T. 133 N., R. 100 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; many roots; many very fine pores; neutral; abrupt smooth boundary.

Bw1—6 to 12 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; strong coarse prismatic and moderate medium subangular blocky structure; friable; common roots; common very fine pores; faint clay films on prism faces; neutral; gradual smooth boundary.

Bw2—12 to 15 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; moderate coarse prismatic structure; friable; few roots; common very fine pores; neutral; clear wavy boundary.

Bk1—15 to 18 inches; dark grayish brown (2.5Y 4/2) loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic and moderate coarse and medium subangular blocky structure; friable; few roots; disseminated lime throughout; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—18 to 29 inches; dark grayish brown (2.5Y 4/2) loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic and weak coarse subangular blocky structure; friable; few roots; few stones; common masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

2Bk3—29 to 42 inches; grayish brown (2.5Y 5/2) sand and gravel, light brownish gray (2.5Y 6/2) dry; single grain; loose; thin lime crusts coat bottom of all pebbles; violent effervescence; moderately alkaline, gradual boundary.

2C—42 to 60 inches; dark yellowish brown (10YR 4/4) sand and gravel, light yellowish brown (10YR 6/4) dry; single grain; loose; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Depth to lime:** 15 to 25 inches
**Depth to sand and gravel:** 20 to 40 inches

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry
Texture: loam or silt loam

**Bw horizon:**
Value: 2 to 4, 4 to 6 dry
Chroma: 2 to 4

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 6 or 7 dry
Chroma: 2 to 4

**2Bk and 2C horizons:**
Value: 4 or 5

## Stirum Series

**Depth Class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Moderately slow in the upper part and rapid in the lower part
**Landform:** Flood plains
**Parent material:** Alluvium
**Slope:** 0 to 3 percent
**Notes:** These soils are saline-sodic.

**Taxonomic class:** Coarse-loamy, mixed, superactive, frigid Typic Natraquolls

**Typical pedon:**
Stirum fine sandy loam, 2,290 feet south and 240 feet east of the northwest corner of sec. 24, T. 138 N., R. 54 W.

Ap—0 to 7 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure; very friable; slight effervescence; moderately alkaline; abrupt smooth boundary.

Btn—7 to 15 inches; dark grayish brown (10YR 4/2) fine sandy loam, gray (10YR 5/1) dry; strong coarse columnar structure parting to moderate fine and medium angular blocky; very hard, firm, slightly sticky and plastic; very dark grayish brown (10YR 3/2) clay films on faces of peds; slight effervescence; strongly alkaline; gradual wavy boundary.

Bk—15 to 26 inches; light brownish gray (2.5Y 6/2) loam, light gray (2.5Y 7/2) dry; common fine prominent yellowish brown (10YR 5/4) redoximorphic concentrations; strong very coarse prismatic structure parting to weak fine and medium angular blocky; very hard, firm, and plastic; strong effervescence; very strongly alkaline; gradual wavy boundary.

Bg—26 to 34 inches; olive gray (5Y 5/2) very fine sandy loam, light gray (5Y 7/2) dry; common medium prominent yellowish brown (10YR 5/4) and many medium very dark grayish brown (10YR 3/2) redoximorphic concentrations; weak subangular blocky structure; very friable, slightly sticky; slight effervescence; strongly alkaline; clear wavy boundary.

Bkg—34 to 44 inches; light olive gray (5Y 6/2) silt loam, light gray (5Y 7/2) dry; many medium prominent dark brown (7.5YR 4/4) and many coarse very dark grayish brown (10YR 3/2) redoximorphic concentrations; weak fine angular blocky structure; slightly plastic; strong effervescence; strongly alkaline; clear wavy boundary.

2Cg—44 to 60 inches; gray (5Y 5/1) loamy fine sand, light gray (5Y 7/1) dry; many medium prominent dark yellowish brown (10YR 4/4) and few very dark grayish brown (10YR 3/2) redoximorphic concentrations; single grain; strongly alkaline.

**Range in Characteristics**

**Notes:** Some pedons have an E, Btnz, or C horizon.

**Ap horizon:**
Hue: 10YR or 2.5Y
Value: 2 or 3, 3 to 5 dry
Chroma: 1 or 2

**Btn horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 3 or 4, 4 to 6 dry

**Bk horizon:**
Notes: Some pedons do not have a Bk horizon.

**2Cg horizon:**
Texture: fine sandy loam, loamy fine sand, or fine sand
Notes: Some pedons do not have a 2Cg horizon.

## Svea Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Moderately slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 1 to 6 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Pachic Udic Haploborolls

**Typical pedon:**
Svea loam, 500 feet north and 10 feet east of the southwest corner of sec. 19, T. 136 N., R. 59 W.

Ap—0 to 7 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak coarse subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine pores; neutral; abrupt smooth boundary.

A—7 to 10 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak coarse prismatic structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common fine pores; neutral; clear wavy boundary.

Bw—10 to 21 inches; very dark grayish brown (2.5Y 3/2) loam, dark grayish brown (2.5Y 4/2) dry; moderate medium prismatic structure parting to moderate coarse subangular blocky; hard, friable, slightly sticky and slightly plastic; faint patches of clay films on vertical faces of peds; common fine roots; common fine pores; neutral; clear wavy boundary.

Bk—21 to 36 inches; light olive brown (2.5Y 5/4) clay loam, pale yellow (2.5Y 7/4) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; few medium masses of lime; strong

effervescence; moderately alkaline; gradual wavy boundary.

C—36 to 60 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; few fine distinct yellowish red (5YR 4/6) dry redoximorphic concentrations and few fine faint gray (5Y 5/1) dry redoximorphic depletions increasing to common coarse distinct redoximorphic features at a depth of about 42 inches; massive, breaks with slight pressure into weak subangular blocky and platy fragments characteristic of till; hard, friable, slightly sticky and slightly plastic; few masses of lime; slight effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to 30 inches
**Notes:** Some pedons have a BCk horizon.

**A horizon:**
Value: 2 or 3, 3 or 4 dry

**Bw horizon:**
Value: 2 or 3, 3 to 5 dry
Chroma: 1 to 3

**Bk horizon:**
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4

**C horizon:**
Notes: Some pedons do not have a C horizon.

## Swenoda Series

**Depth class:** Very deep
**Drainage class:** Moderately well drained
**Permeability:** Moderately rapid over moderate
**Landform:** Till plains
**Parent material:** Glaciolacustrine deposits over glacial till
**Slope:** 0 to 9 percent

**Taxonomic class:** Coarse-loamy, mixed, superactive Pachic Udic Haploborolls

**Typical pedon:**
Swenoda fine sandy loam, 330 feet west and 100 feet north of the southeast corner of sec. 33, T. 128 N., R. 58 W.

Ap—0 to 8 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

A—8 to 15 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; very weak coarse subangular blocky structure parting to weak fine and medium granular; soft, very friable; neutral; gradual smooth boundary.

Bw1—15 to 22 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak medium prismatic structure parting to weak coarse and very coarse subangular blocky; soft, very friable; slightly alkaline; gradual smooth boundary.

Bw2—22 to 29 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; common fine prominent reddish brown (5YR 5/4) dry redoximorphic concentrations; weak medium prismatic structure parting to weak coarse and very coarse subangular blocky; soft, very friable; slightly alkaline; abrupt wavy boundary.

2Bk—29 to 36 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; common fine prominent reddish brown (5YR 5/4) dry redoximorphic concentrations; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; disseminated lime throughout; violent effervescence; moderately alkaline; clear smooth boundary.

2C—36 to 60 inches; light olive brown (2.5Y 5/4) silt loam, pale yellow (2.5Y 7/4) dry; common fine distinct gray (5Y 5/1) dry redoximorphic depletions and reddish brown (5YR 5/4) dry redoximorphic concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** More than 16 inches
**Depth to lime:** 20 and 40 inches
**Depth to glacial till:** 20 and 40 inches

**A horizon:**
Hue: 2 or 3, 2 to 4 dry
Texture: fine sandy loam, sandy loam, or loam

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4, 3 to 6 dry
Chroma: 1 to 4
Texture: fine sandy loam or sandy loam

**2Bk horizon:**
Hue: 2.5Y or 5Y

Value: 4 to 6, 6 to 8 dry
Chroma: 2 to 6
Texture: silt loam, silty clay loam, loam, or clay loam

**2C horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 6 to 8 dry
Chroma: 2 to 6
Texture: silt loam, silty clay loam, loam, or clay loam

## Tally Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately rapid
**Landform:** Terraces and uplands
**Parent material:** Alluvium
**Slope:** 0 to 25 percent

**Taxonomic class:** Coarse-loamy, mixed, superactive Typic Haploborolls

**Typical pedon:**
Tally sandy loam, 1,200 feet east and 2,000 feet south of the northwest corner of sec. 7, T. 20 N., R. 56 E.

Ap—0 to 6 inches; very dark brown (10YR 2/2) sandy loam, dark brown (10YR 3/3) dry; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; neutral; abrupt smooth boundary.

Bw1—6 to 14 inches; very dark brown (10YR 2/2) sandy loam, dark brown (10YR 3/3) dry; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; many fine and very fine pores; neutral; clear smooth boundary.

Bw2—14 to 32 inches; dark brown (10YR 4/3) sandy loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine and very fine roots; many fine and very fine pores; neutral; clear smooth boundary.

Bk1—32 to 38 inches; dark brown (10YR 4/3) sandy loam, brown (10YR 5/3) dry; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine roots; common very fine pores; disseminated lime; strong effervescence; moderately alkaline; clear smooth boundary.

Bk2—38 to 60 inches; light olive brown (2.5Y 5/4) sandy loam, light yellowish brown (2.5Y 6/4) dry; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; common very fine pores; disseminated lime; violent effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Percent rock fragments:** Up to 15 percent above 40 inches and up to 25 percent below 40 inches
**Depth to the Bk horizon:** 15 to 35 inches
**Depth to loamy fine sand and coarser material:** More than 20 inches
**Notes:** Some pedons have a C horizon.

**Ap horizon:**
Hue: 7.5YR, 10YR, or 2.5Y
Value: 2 to 4, 3 to 5 dry
Texture: fine sandy loam, sandy loam, or loam

**Bw horizon:**
Hue: 7.5YR, 10YR, or 2.5Y
Texture: fine sandy loam or sandy loam

**Bk horizon:**
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: fine sandy loam or sandy loam
Notes: It has a calcium carbonate equivalent of 5 to 15 percent. It has textures of loamy fine sand, loamy sand, or fine sand below a depth of 40 inches in some pedons.

## Telfer Series

**Depth class:** Very deep
**Drainage class:** Somewhat excessively drained
**Permeability:** Rapid
**Landform:** Lake plains and uplands
**Parent material:** Eolian
**Slope:** 0 to 15 percent

**Taxonomic class:** Sandy, mixed Entic Haploborolls

**Typical pedon:**
Telfer loamy sand, 265 feet north and 150 feet west of the center of sec. 32, T. 138 N., R. 79 W.

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

single grain; loose; many roots; neutral; clear smooth boundary.

AC—6 to 14 inches; very dark grayish brown (10YR 3/2) fine sand, grayish brown (10YR 5/2) dry; single grain; loose; common roots; neutral; gradual boundary.

C—14 to 60 inches; dark grayish brown (2.5Y 4/2) fine sand, light olive brown (2.5Y 5/4) dry; single grain; loose; few roots at top and few fine roots at 40 inches; neutral.

**Range in Characteristics**

**Mollic epipedon thickness:** 10 to 20 inches

**A horizon:**
Value: 2 or 3, 3 to 5 dry
Texture: loamy sand or loamy fine sand in the lower part

**AC horizon:**
Value: 4 or 5 dry
Texture: loamy sand, fine sand, or loamy fine sand

**C horizon:**
Hue: 10YR or 2.5Y
Value: 4 or 5, 4 to 7 dry
Texture: fine sand or sand

## Tonka Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Slow
**Landform:** Till plains
**Parent material:** Alluvium
**Slope:** 0 to 1 percent

**Taxonomic class:** Fine, smectitic, frigid Argiaquic Argialbolls

**Typical pedon:**
Tonka silt loam, 2,500 feet west and 590 feet south of the northeast corner of sec. 2, T. 136 N., R. 56 W.

A—0 to 13 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure parting to moderate thin platy; soft, friable, slightly sticky and slightly plastic; many fine roots; many fine pores; slightly acid; abrupt wavy boundary.

E—13 to 19 inches; dark gray (10YR 4/1) loam, light gray (10YR 7/1) dry; many medium prominent dark brown (10YR 3/3) and dark yellowish brown (10YR 3/4) redoximorphic concentrations; moderate thin platy and moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; moderately acid; abrupt irregular boundary.

Bt1—19 to 24 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; common fine faint brown (10YR 4/3) redoximorphic concentrations; strong coarse prismatic structure parting to moderate very fine angular blocky; very hard, firm, sticky and slightly plastic; common fine roots; bleached sand grains coat tops of prisms and vertical faces of peds; moderately acid; gradual wavy boundary.

Bt2—24 to 34 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; moderate coarse prismatic structure parting to moderate very fine angular blocky; very hard, firm, sticky and slightly plastic; common fine roots; bleached sand grains coat faces of peds; moderately acid; gradual wavy boundary.

2BC—34 to 50 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; common medium distinct dark yellowish brown (10YR 3/4) redoximorphic concentrations; weak coarse prismatic structure parting to moderate fine subangular blocky; very hard, firm, sticky and slightly plastic; few fine roots; common fine very dark brown (10YR 2/2) manganese concretions; about 2 percent gravel; neutral; gradual boundary.

2Cg—50 to 60 inches; gray (5Y 5/1) clay loam, light gray (5Y 6/1) dry; many medium distinct dark brown (7.5YR 4/4) redoximorphic concentrations; weak fine platy and moderate very fine angular blocky structure; hard, friable, sticky and slightly plastic; few fine roots; common fine very dark brown (10YR 2/2) manganese concretions; about 3 percent gravel; strong effervescence; slightly alkaline.

**Range in Characteristics**

**Depth to lime:** 20 to more than 60 inches
**Depth to the Bt horizon:** 12 to 28 inches
**Notes:** Some pedons have a Bk horizon.

**A horizon:**
Hue: 10YR or neutral
Value: 2 or 3, 3 to 5 dry
Chroma: 0 or 1
Texture: silt loam, loam, clay loam, or silty clay loam

**E horizon:**
Hue: 10YR, 2.5Y, or neutral
Value: 3 to 5, 5 to 7 dry
Chroma: 0 to 2
Texture: loam, silt loam, very fine sandy loam, or silty clay loam

**Bt horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4
Texture: clay loam, silty clay loam, silty clay, or clay

**2Cg horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 6, 3 to 7 dry
Chroma: 1 to 6
Texture: silty clay loam, clay loam, or loam

## Towner Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Rapid or moderately rapid over moderate or moderately slow
**Landform:** Lake plains and till plains
**Parent material:** Eolian over glacial till
**Slope:** 0 to 6 percent

**Taxonomic class:** Sandy over loamy, mixed, superactive Udorthentic Haploborolls

**Typical pedon:**
Towner loamy fine sand, 552 feet west and 530 feet south of the northeast corner of sec. 5, T. 153 N., R. 74 W.

A1—0 to 6 inches; black (10YR 2/1), broken face, loamy fine sand, dark gray (10YR 4/1), broken face, dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots throughout; neutral; clear wavy boundary.

A2—6 to 20 inches; black (10YR 2/1), broken face, loamy fine sand, dark gray (10YR 4/1), broken face, dry; weak very coarse prismatic structure parting to weak medium subangular blocky and weak coarse subangular blocky; soft, very friable, nonsticky and nonplastic; common fine roots throughout; slightly alkaline; clear wavy boundary.

Bw—20 to 29 inches; very dark grayish brown (10YR 3/2), broken face, loamy fine sand, grayish brown (10YR 5/2), broken face, dry; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots throughout; slightly alkaline; abrupt wavy boundary.

2Bk—29 to 36 inches; grayish brown (2.5Y 5/2), broken face, loam, light gray (2.5Y 7/2), broken face, dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; violent effervescence throughout (HCl, unspecified); moderately alkaline; gradual wavy boundary.

2C—36 to 60 inches; olive brown (2.5Y 4/4), broken face, loam, light brownish gray (2.5Y 6/2), broken face, dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; strong effervescence throughout (HCl, unspecified); moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to 30 inches
**Depth to the glacial till:** 20 to 40 inches

**2Bk and 2C horizons:**
Texture: loam or clay loam

## Vallers Series

**Depth class:** Very deep
**Drainage class:** Poorly drained
**Permeability:** Moderately slow
**Landform:** Till plains and moraines
**Parent material:** Glacial till
**Slope:** 0 to 3 percent
**Notes:** These soils are highly calcareous and saline.

**Taxonomic class:** Fine-loamy, mixed, superactive, frigid Typic Calciaquolls

**Typical pedon:**
Vallers silty clay loam, 2,270 feet south and 2,040 feet west of the northeast corner of sec. 32, T. 124 N., R. 39 W.

A1—0 to 8 inches; black (10YR 2/1) silty clay loam; moderate fine subangular blocky structure; friable; strong effervescence; moderately alkaline; abrupt smooth boundary.

A2—8 to 12 inches; black (2.5Y 2.5/1) silty clay loam; weak very fine subangular blocky structure; friable; strong effervescence; moderately alkaline; clear wavy boundary.

Bkg1—12 to 15 inches; dark gray (2.5Y 4/1) clay loam; weak very fine subangular blocky structure; friable;

violent effervescence; moderately alkaline; gradual wavy boundary.

Bkg2—15 to 21 inches; gray (5Y 5/1) clay loam; few fine distinct grayish brown (2.5Y 5/2) and few fine prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; weak fine subangular blocky structure; friable; violent effervescence; moderately alkaline; gradual wavy boundary.

Cg1—21 to 32 inches; olive gray (5Y 5/2) loam; many fine prominent light olive brown (10YR 5/6) and many fine faint grayish brown (2.5Y 5/2) redoximorphic concentrations; weak fine subangular blocky structure; friable; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg2—32 to 60 inches; olive gray (5Y 5/2) loam; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; massive; friable; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 22 inches
**Depth to the calcic horizon:** 4 to 16 inches
**Notes:** Some pedons have an ABk horizon. Some pedons have a BCk horizon.

**Az horizon:**
Hue: 10YR, 2.5Y, or neutral
Value: 2 or 3, 3 to 5 dry
Chroma: 0 or 1

**Bk horizon:**
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 3 to 6, 4 to 8 dry
Chroma: 0 to 2
Texture: loam or clay loam

**C horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 7, 5 to 8 dry
Chroma: 2 or 3
Notes: Some pedons do not have a C horizon.

## Vebar Series

**Depth class:** Moderately deep
**Drainage class:** Well drained
**Permeability:** Moderately rapid
**Landform:** Uplands
**Parent material:** Soft sandstone
**Slope:** 1 to 35 percent

**Taxonomic class:** Coarse-loamy, mixed, superactive Typic Haploborolls

**Typical pedon:**
Vebar fine sandy loam, 2,570 feet west and 355 feet south of the northeast corner of sec. 16, T. 138 N., R. 95 W.

A—0 to 5 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak coarse and medium prismatic structure parting to weak fine subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; many roots; many fine pores; slightly acid; gradual wavy boundary.

Bw1—5 to 14 inches; dark brown (10YR 3/3) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; many fine pores; slightly acid; gradual wavy boundary.

Bw2—14 to 19 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; moderate coarse prismatic structure parting to weak medium and fine subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; common fine pores; neutral; clear wavy boundary.

Bw3—19 to 26 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; weak coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; few roots; common fine pores; neutral; clear wavy boundary.

C—26 to 32 inches; light olive brown (2.5Y 5/4) fine sandy loam, light yellowish brown (2.5Y 6/4) dry; massive; slightly hard, very friable, nonsticky and nonplastic; few hard sandstone fragments; few small sandstone fragments; few small lime accumulations; strong effervescence (2 percent calcium carbonate equivalent); slightly alkaline; clear wavy boundary.

Cr—32 to 60 inches; light yellowish brown (2.5Y 6/4) dry soft sandstone; strong effervescence in upper part and slight effervescence in lower part; lense of hard sandstone 3 inches thick at 43 inches with

lime accumulations around hard fragments; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to soft bedrock:** 20 to 40 inches

**A horizon:**
Value: 2 or 3, 3 to 5 dry

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6 dry
Chroma: 2 to 4

**C horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: fine sandy loam or loamy fine sand

## Vida Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 0 to 35 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Argiborolls

**Typical pedon:**
Vida clay loam, 1,050 feet south of the northwest corner of sec. 20, T. 23 N., R. 50 E.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine pores; moderately alkaline (pH 8.0); clear smooth boundary.

Bt—5 to 9 inches; very dark grayish brown (10YR 3/2) clay loam, brown (10YR 4/3) dry; moderate coarse and medium prismatic and subangular blocky structure; hard, firm, sticky and plastic; common fine and medium roots; common fine and very fine pores; many faint clay films on faces of peds; moderately alkaline (pH 8.0); clear wavy boundary.

Bk1—9 to 22 inches; grayish brown (2.5Y 5/2) clay loam, light brownish gray (2.5Y 6/2) dry; moderate coarse prismatic structure; hard, firm, sticky and plastic; common fine and few medium roots; common fine and very fine pores; few thin clay films on faces of peds; few fine coal chips; many fine and medium threads of lime; strong effervescence; moderately alkaline (pH 8.4); gradual smooth boundary.

Bk2—22 to 60 inches; grayish brown (2.5Y 5/2) clay loam, light gray (2.5Y 7.2) dry; weak coarse prismatic structure; hard, firm, sticky and plastic; few fine and medium roots; common very fine pores; many coal chips and few shale fragments; common fine threads of lime; disseminated lime; strong effervescence; strongly alkaline (pH 8.8).

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 10 inches
**10 to 40 inch particle-size control section:** 25 to 35 percent clay
**Depth to the Bk horizon:** 6 to 10 inches
**Notes:** Uncultivated pedons have an A horizon up to 3 inches thick.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry
Chroma: 2 or 3
Texture: loam or clay loam

**Bt horizon:**
Value: 3 or 4, 4 or 5 dry
Chroma: 2 or 3
Texture: loam, clay loam, or clay

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 2 to 4
Texture: loam or clay loam
Notes: The calcium carbonate equivalent is 2 to 15 percent. It has 25 to 35 percent clay.

## Wabek Series

**Depth class:** Very deep
**Drainage class:** Excessively drained
**Permeability:** Very rapid
**Landform:** Outwash plains and collapsed outwash plains

**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 25 percent

**Taxonomic class:** Sandy-skeletal, mixed Entic Haploborolls

**Typical pedon:**
Wabek loam, 2,490 feet north of the southeast corner of sec. 1, T. 140 N., R. 77 W.

A—0 to 5 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many roots; about 3 percent rock fragments; neutral; gradual wavy boundary.

Bk—5 to 9 inches; brown (10YR 4/3) gravelly coarse sandy loam, light brownish gray (10YR 6/2) dry; single grain; common roots; about 25 percent rock fragments; lime crusts coat undersides of rock fragments; strong effervescence; slightly alkaline; diffuse boundary.

C—9 to 60 inches; grayish brown (10YR 5/2) very gravelly coarse sand, pale brown (10YR 6/3) dry; stratified with varying amounts and mixtures of gravel and cobblestones; single grain; few roots in upper 10 inches; about 50 percent rock fragments; strong effervescence decreasing to slight effervescence in the lower part; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 11 inches
**Depth to sand and gravel:** 7 to 14 inches

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry

**C horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 6, 4 to 7 dry
Chroma: 2 to 4

## Werner Series

**Depth class:** Shallow
**Drainage class:** Well drained
**Permeability:** Moderate
**Landform:** Uplands
**Parent material:** Soft mudstone and sandstone
**Slope:** 3 to 50 percent

**Taxonomic class:** Loamy, mixed, superactive, shallow Entic Haploborolls

**Typical pedon:**
Werner loam, 1,585 feet north and 150 feet west of the southeast corner of sec. 31, T. 140 N., R. 80 W.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to moderate very fine subangular blocky; hard, friable, slightly sticky and slightly plastic; many roots; many fine pores; few small stones; neutral; clear wavy boundary.

ABk—6 to 13 inches; very dark grayish brown (2.5Y 3/2) loam, grayish brown (2.5Y 5/2) dry; weak medium prismatic structure parting to weak medium and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many roots; common fine pores; few small pebbles; few fine masses of lime; slight effervescence; slightly alkaline; clear wavy boundary.

Bk—13 to 17 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; weak medium prismatic structure parting to weak fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common roots; few fine pores; few pebbles; common fine masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Cr1—17 to 30 inches; pale yellow (2.5Y 7/4) dry soft argillaceous sandstone; massive but fractures to plates; few roots in cracks; lime accumulations in cracks; slight effervescence; gradual boundary.

Cr2—30 to 60 inches; light gray (5Y 7/2) dry soft shale and sandstone strata; light yellowish brown and yellow (10Y 6/4 and 2.5Y 7/6) dry on faces of plates and blocks; slight effervescence.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 13 inches
**Depth to soft bedrock:** 7 to 20 inches

**A horizon:**
Hue: 10YR or 2.5Y
Value: 2 or 3, 4 or 5 dry
Chroma: 2 or 3

**ABk horizon:**
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 6 dry
Chroma: 2 or 3
Texture: loam or clay loam

**Bk horizon:**
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4

**Cr horizon:**
Notes: It is soft mudstone, sandstone, or shale.

## Wildrose Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Slow
**Landform:** Lake plains
**Parent material:** Glaciolacustrine deposits
**Slope:** 0 to 1 percent
**Taxonomic class:** Fine, smectitic, frigid Udic Haplusterts

**Typical pedon:**
Wildrose clay, 530 feet north and 150 feet west of the southeast corner of sec. 2, T. 159 N., R. 97 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) clay, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; many very fine and few fine roots; 2 to 15 mm wide vertical cracks about 25 cm apart; slight effervescence; neutral; abrupt smooth boundary.

A—6 to 14 inches; very dark grayish brown (2.5Y 3/2) clay, grayish brown (2.5Y 5/2) dry; moderate medium subangular blocky structure parting to moderate fine platy; extremely hard, extremely firm, very sticky and very plastic; common very fine roots; 2 to 15 mm wide vertical cracks about 25 cm apart; slight effervescence; slightly alkaline; clear smooth boundary.

Bss1—14 to 21 inches; very dark grayish brown (2.5Y 3/2) clay, grayish brown (2.5Y 5/2) dry; strong medium prismatic structure parting to moderate medium angular blocky; extremely hard, extremely firm, very sticky and very plastic; common very fine and few fine roots in pores and along faces of peds and slickensides; few non-intersecting slickensides; 2 to 15 mm wide vertical cracks about 25 cm apart; slight effervescence; slightly alkaline; clear smooth boundary.

Bss2—21 to 31 inches; very dark grayish brown (2.5Y 3/2) clay, grayish brown (2.5Y 5/2) dry; strong medium prismatic structure parting to moderate medium angular blocky; extremely hard, extremely firm, very sticky and very plastic; common very fine roots along faces of peds and slickensides; few very fine roots in pores; common intersecting slickensides; common wedge shape natural aggregates tilted 30 degrees to 60 degrees from horizontal; 2 to 15 mm wide vertical cracks about 25 cm apart; slight effervescence; moderately alkaline; clear smooth boundary.

Bss3—31 to 38 inches; dark olive gray (5Y 3/2) clay, olive gray (5Y 4/2) dry; strong medium prismatic structure parting to moderate medium subangular blocky; extremely hard, extremely firm, very sticky and very plastic; common very fine roots along faces of peds and slickensides; few very fine roots in pores; few non-intersecting slickensides; slight effervescence; slightly alkaline; clear wavy boundary.

By—38 to 44 inches; dark olive gray (5Y 3/2) clay, olive gray (5Y 5/2) dry; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; many fine threads and masses of gypsum; slight effervescence; slightly alkaline; clear wavy boundary.

BC—44 to 58 inches; olive gray (5Y 4/2) clay, olive gray (5Y 5/2) dry; strong coarse prismatic structure parting to moderate medium subangular blocky; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; few fine threads and masses of gypsum; slight effervescence; slightly alkaline; gradual wavy boundary.

C—58 to 60 inches; olive (5Y 4/3) silty clay, pale olive (5Y 6/3) dry; common fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations and few fine distinct very dark brown (10YR 2/2) manganese stains; massive; extremely hard, extremely firm, very sticky and very plastic; slight effervescence; slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to more than 40 inches

**A horizon:**
Value: 2 or 3, 3 to 5 dry
Chroma: 1 or 2

**Bss horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4
Chroma: 1 to 3
Texture: silty clay or clay

**By horizon:**
Notes: Some pedons do not have a By horizon.

**C horizon:**
Hue: 2.5Y or 5Y
Value: 3 to 5, 5 to 7 dry
Chroma: 2 to 4

## Williams Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Till plains and moraines
**Parent material:** Glacial till
**Slope:** 0 to 15 percent

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Argiborolls

**Typical pedon:**
Williams loam, 1,050 feet east and 60 feet south of the northwest corner of sec. 5, T. 158 N., R. 94 W.

Ap—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; few pebbles; neutral; abrupt smooth boundary.

Bt1—6 to 10 inches; dark brown (10YR 3/3) clay loam, brown (10YR 4/3) dry; strong medium prismatic structure parting to strong medium angular blocky; hard, firm, sticky and plastic; common very fine roots; many distinct clay films on faces of peds and lining pores; few pebbles; neutral; clear wavy boundary.

Bt2—10 to 15 inches; dark grayish brown (10YR 4/2) clay loam, grayish brown (10YR 5/2) dry; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and plastic; common very fine roots; many distinct clay films on faces of peds and lining pores; slightly alkaline; clear wavy boundary.

Btk—15 to 24 inches; olive brown (2.5Y 4/4) clay loam, light olive brown (2.5Y 5/4) dry; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common very fine roots; few faint clay films on faces of peds; few pebbles; common medium irregular masses of lime; violent effervescence; slightly alkaline; gradual wavy boundary.

Bk—24 to 36 inches; grayish brown (2.5Y 5/2) clay loam, light brownish gray (2.5Y 6/2) and light gray (2.5Y 7/2) dry; weak medium prismatic structure parting to weak medium subangular blocky; soft, friable, sticky and plastic; few very fine roots; few cobbles; lime disseminated throughout and in common masses; violent effervescence; moderately alkaline; gradual wavy boundary.

C—36 to 60 inches; grayish brown (2.5Y 5/2) clay loam, light brownish gray (2.5Y 6/2) dry; few fine prominent yellowish brown (10YR 5/6) dry redoximorphic concentrations and light gray (10YR 7/2) dry redoximorphic depletions; massive; soft, friable, sticky and plastic; few pebbles and cobbles; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to lime:** 11 to 18 inches
**Notes:** Some pedons have a BCk horizon.

**Ap horizon:**
Value: 2 or 3, 3 or 4 dry

**Bt horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5, 4 to 6 dry
Chroma: 2 to 4

**Btk horizon:**
Notes: Some pedons do not have a Btk horizon.

**Bk horizon:**
Hue: 10YR or 2.5Y
Value: 3 to 5, 4 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

**C horizon:**
Hue: 2.5Y or 5Y
Value: 4 to 6, 6 or 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

## Wilton Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderate in the upper part and moderately slow in the lower part
**Landform:** Uplands
**Parent material:** Loess over glacial till
**Slope:** 0 to 9 percent

**Taxonomic class:** Fine-silty, mixed, superactive Pachic Haploborolls

**Typical pedon:**
Wilton silt loam, 1,600 feet east and 300 feet north of the southwest corner of sec. 31, T. 147 N., R. 83 W.

Ap—0 to 8 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common roots; neutral; abrupt smooth boundary.

Bw1—8 to 13 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common fine pores; neutral; clear wavy boundary.

Bw2—13 to 18 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; faint clay films on some vertical faces of peds; very dark brown (10YR 2/2) coatings on peds; neutral; gradual wavy boundary.

Bw3—18 to 27 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; slight effervescence in spots; slightly alkaline; clear wavy boundary.

2Bk1—27 to 36 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable, sticky and plastic; few fine roots; common fine pores; about 5 percent rock fragments; strong effervescence; many medium and few large masses of lime; slightly alkaline; gradual wavy boundary.

2Bk2—36 to 60 inches; olive brown (2.5Y 4/3) clay loam, light brownish gray (2.5Y 6/2) dry; few fine prominent strong brown (7.5YR 5/6) dry redoximorphic concentrations; massive; hard, friable, sticky and plastic; few roots; about 5 percent rock fragments; strong effervescence; common masses of lime; moderately alkaline.

### Range in Characteristics

**Mollic epipedon thickness:** 16 inches to more than 30 inches
**Depth to glacial till:** 20 to 40 inches
**Notes:** Some pedons have a 2C horizon

**Ap horizon:**
Value: 2 or 3, 3 to 5 dry

**Bw horizon:**
Hue: 10YR or 2.5Y
Value: 2 to 4
Chroma: 2 to 4

**2Bk horizon:**
Hue: 2.5Y or 5Y
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam
Notes: It has 2 to 10 percent rock fragments.

## Wyard Series

**Depth class:** Very deep
**Drainage class:** Somewhat poorly drained
**Permeability:** Moderate
**Landform:** Till plains
**Parent material:** Alluvium
**Slope:** 0 to 1 percent

**Taxonomic class:** Fine-loamy, mixed, superactive, frigid Typic Endoaquolls

**Typical pedon:**
Wyard loam, 1,000 feet north and 200 feet east of the southwest corner of sec. 15, T. 148 N., R. 67 W.

Ap—0 to 6 inches; black (10YR 2/1), broken face, loam, dark gray (10YR 4/1), broken face, dry; weak medium granular structure; hard, friable, slightly sticky and slightly plastic; many fine roots throughout; many worm casts; neutral; abrupt smooth boundary.

A1—6 to 10 inches; black (10YR 2/1), broken face, loam, dark gray (10YR 4/1), broken face, dry; moderate coarse prismatic structure parting to weak coarse subangular blocky and weak medium platy; hard, friable, slightly sticky and slightly plastic; many fine roots throughout; few sand coats on faces of peds; many worm casts; neutral; gradual wavy boundary.

A2—10 to 20 inches; very dark brown (10YR 2/2), broken face, loam, gray (10YR 5/1), broken face, dry; moderate coarse prismatic structure parting to moderate medium and fine subangular blocky and moderate medium platy; hard, friable, slightly sticky and slightly plastic; many fine roots throughout; many fine pores; few patchy gray (10YR 6/1), dry, sand coats on faces of peds and few patchy gray (10YR 6/1), dry, silt coats on faces of peds; few medium distinct yellowish brown (10YR 5/4) masses of iron accumulation pedogenic throughout; neutral; clear wavy boundary.

Bw1—20 to 26 inches; dark grayish brown (2.5Y 4/2), broken face, loam, grayish brown (2.5Y 5/2), broken face, dry; moderate coarse prismatic structure parting to moderate medium and fine subangular blocky and weak medium platy; hard, friable, slightly sticky and slightly plastic; few roots throughout; many fine pores; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulation pedogenic throughout; neutral; gradual wavy boundary.

Bw2—26 to 32 inches; dark grayish brown (2.5Y 4/2), broken face, loam, light olive brown (2.5Y 5/4), broken face, dry; moderate coarse prismatic structure parting to moderate medium and fine angular blocky; hard, friable, slightly sticky and slightly plastic; few roots throughout; common fine pores; common fine distinct light olive brown (2.5Y 5/6) masses of iron accumulation pedogenic throughout; 2 percent mixed gravel; neutral; clear wavy boundary.

Bk—32 to 42 inches; light olive brown (2.5Y 5/4), broken face, loam, pale yellow (2.5Y 7/4), broken face, dry; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few medium distinct light olive brown (2.5Y 5/6) masses of iron accumulation pedogenic; common masses of lime pedogenic; 2 percent mixed gravel; violent effervescence throughout (HCl, unspecified); moderately alkaline; gradual wavy boundary.

C—42 to 60 inches; olive brown (2.5Y 4/4), broken face, loam, light yellowish brown (2.5Y 6/4), broken face, dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium distinct light olive brown (2.5Y 5/6) masses of iron accumulation pedogenic; few fine masses of lime pedogenic; 2 percent mixed gravel; strong effervescence throughout (HCl, unspecified); moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 16 to 24 inches
**Depth to lime:** 20 to 48 inches

## Wyrene Series

**Depth class:** Very deep
**Drainage class:** Somewhat poorly drained
**Permeability:** Moderately rapid in the upper part and rapid in the lower part
**Landform:** Outwash plains
**Parent material:** Glaciofluvial deposits
**Slope:** 0 to 3 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Sandy, mixed, frigid Aeric Calciaquolls

**Typical pedon:**
Wyrene sandy loam, 2,420 feet south and 1,450 feet west of the northeast corner of sec. 22, T. 148 N., R. 64 W.

A—0 to 8 inches; black (10YR 2/1), broken face, sandy loam, dark gray (10YR 4/1), broken face, dry; weak fine granular structure; slightly hard, very friable,

slightly sticky and slightly plastic; many roots throughout; strong effervescence throughout (HCl, unspecified); moderately alkaline; gradual wavy boundary.

Bk1—8 to 13 inches; dark gray (10YR 4/1), broken face, sandy loam, gray (10YR 6/1), broken face, dry; moderate coarse prismatic structure parting to moderate coarse and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common roots throughout; violent effervescence throughout (HCl, unspecified); moderately alkaline; gradual wavy boundary.

Bk2—13 to 21 inches; dark gray (10YR 4/1), broken face, sandy loam, gray (10YR 6/1), broken face, dry; moderate coarse and medium prismatic structure parting to moderate coarse and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine roots throughout; violent effervescence throughout (HCl, unspecified); moderately alkaline; clear wavy boundary.

2C1—21 to 29 inches; light olive brown (2.5Y 5/4) coarse sand, light yellowish brown (2.5Y 6/4) dry; single grain; slight effervescence throughout (HCl, unspecified); moderately alkaline; clear wavy boundary.

2C2—29 to 42 inches; light olive brown (2.5Y 5/4) coarse sand, light yellowish brown (2.5Y 6/4) dry; single grain; common distinct dark yellowish brown (10YR 4/4) moist masses of iron accumulation pedogenic throughout; 3 percent mixed gravel; slight effervescence throughout (HCl, unspecified); moderately alkaline; clear wavy boundary.

2C3—42 to 60 inches; very dark grayish brown (2.5Y 3/2) coarse sand, light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) dry; single grain; 5 percent mixed gravel; slight effervescence throughout (HCl, unspecified); slightly alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 16 inches
**Depth to sand and gravel:** 20 to 32 inches

**A and Bk horizons:**
Note: They have up to 10 percent gravel.

**2C horizon:**
Notes: It has up to 35 percent gravel.

## Zahill Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Till plains
**Parent material:** Glacial till
**Slope:** 0 to 35 percent
**Notes:** These soils are calcareous.

**Taxonomic class:** Fine-loamy, mixed, superactive, frigid Calcic Ustochrepts

**Typical pedon:**
Zahill clay loam, 200 feet west and 100 feet south of the northeast corner of sec. 25, T. 35 N., R. 57 E.

Ap—0 to 6 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; weak fine crumb structure; slightly hard, friable, sticky and plastic; many roots; 5 percent pebbles; disseminated lime; strong effervescence; moderately alkaline; clear wavy boundary.

Bk—6 to 30 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; weak coarse prismatic structure; hard, friable, sticky and plastic; many fine roots; 5 percent pebbles, 1 percent stones; continuous faint to distinct lime coatings and casts on underside of rock fragments; common fine and medium masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

Cy—30 to 60 inches; olive gray (5Y 4/2) clay loam, olive gray (5Y 5/2) dry; weak very thick platy structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; few lignite chips; 1 percent stones, 5 percent pebbles; common fine crystals of gypsum; disseminated lime; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Percent rock fragments:** 0 to 15 percent
**Depth to the Bk horizon:** 3 to 8 inches

**Ap horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 5 to 7 dry

Chroma: 2 to 4
Texture: loam or clay loam

**Bk horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

**Cy horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

## Zahl Series

**Depth class:** Very deep
**Drainage class:** Well drained
**Permeability:** Moderately slow
**Landform:** Till plains and moraines
**Parent material:** Glacial till
**Slope:** 3 to 45 percent
**Notes:** These soils are highly calcareous.

**Taxonomic class:** Fine-loamy, mixed, superactive Typic Calciborolls

**Typical pedon:**
Zahl loam, 2,335 feet east and 25 feet south of the northwest corner of sec. 14, T. 156 N., R. 90 W.

A—0 to 5 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine pores; strong effervescence; slightly alkaline; clear wavy boundary.

Bk—5 to 20 inches; dark grayish brown (2.5Y 4/2) loam, light brownish gray (2.5Y 6/2) dry; weak medium and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; many fine pores; few pebbles; many masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

C—20 to 60 inches; olive brown and light olive brown (2.5Y 4/4 and 2.5Y 5/4) clay loam, light yellowish brown and light olive brown (2.5Y 6/4 and 2.5Y 5/4) dry; common fine faint olive gray (5Y 5/2) dry and common fine distinct gray (5Y 5/1) dry redoximorphic depletions; massive; soft, friable, sticky and plastic; few very fine roots to 40 inches; few pebbles; strong effervescence; moderately alkaline.

**Range in Characteristics**

**Mollic epipedon thickness:** 7 to 10 inches
**Depth to lime:** 0 to 9 inches

**Ap horizon:**
Hue: 10YR or 2.5Y
Value: 2 or 3, 3 to 5 dry

**Bk horizon:**
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

**C horizon:**
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

# Agronomy

**Cropland Limitations and Management**

**Figure 11. An area of Svea-Barnes loam, 0 to 3 percent slopes, used for production of buckwheat. Field windbreaks protect the soils from erosion.**

**Alkalinity.**

**Excessive saturated hydraulic conductivity.**

**Areas of rock outcrop.**

**Flooding.**

**Channels.**

**Gullies.**

**Dense layer.**

**High sodium content.**

**Depth to rock.**

**Depth to sand and gravel.**

**High water table.**

Pesticide and nutrient runoff.

Lime content.

Ponding.

Limited available water capacity.

Poor tilth and compaction.

Limited organic matter.

Restricted saturated hydraulic conductivity.

Pesticide and nutrient leaching.

Root limiting.

**Salt content.**

**Slick spots.**

**Slope.**

**Soil slumping.**

**Surface crusting.**

**Surface rock fragments.**

**Surface stones.**

**Water erosion.**

**Wind erosion.**

## Erosion Factors

## Prime Farmland and Other Important Farmland

### Farmland of Statewide Importance

### Other Land

## Productivity Indexes and Crop Yield Estimates

# Land Capability Classification

## Capability classes

## Capability subclasses

**Pasture and Hayland Groups**

**Clayey.**

## Pasture and Hayland Interpretations

**Clayey Subsoils.**

**Claypan.**

**Limy Subirrigated.**

**Loamy and Silty.**

**Sands.**

**Moderately Deep Sandy.**

**Sands Soils.**

**Moderately Deep Silty.**

**Sandy.**

**Overflow and Run-On.**

**Shallow.**

**Shallow to Gravel.**

**Saline.**

**Sodic-Saline.**

**Steeply Sloping.**

**Stony.**

**Strongly Saline.**

**Thin Claypan.**

**Thin Upland.**

**Very Shallow to Gravel.**

**Wet.**

**Wetland.**

## Management of Saline and Sodic Soils

**Figure 12. A dense sodic subsoil restricts the penetration of roots.**

# Soil Quality

## Definition of Soil Quality

## Functions of Soil

## Importance of Soil Quality to Landowners

## Soil Quality Indicators

# Woodland, Windbreaks and Environmental Plantings

## Windbreak suitability groups

## Windbreak Suitability Groups

### Group 1.

**Group 1K.**

**Group 2.**

**Group 2H.**

**Group 2K.**

**Group 3.**

**Group 4.**

**Group 4C.**

**Group 5.**

**Group 6D.**

**Group 6G.**

Table 6.-Potential Cropland Limitations and Hazards

(See text for a description and criteria of the limitations and hazards listed in this table.)

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 30: | |
| Amor | Depth to rock<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity |
| Arnegard | Pesticide and nutrient runoff |
| 40: | |
| Amor | Depth to rock<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Water erosion |
| Werner | Alkalinity<br>Depth to rock<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Farnuf | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| 41: | |
| Amor | Depth to rock<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Water erosion |
| Werner | Alkalinity<br>Depth to rock<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 76: | |
| Arvilla | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Wind erosion |
| 118: | |
| Barnes | Pesticide and nutrient runoff |
| Buse | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Surface crusting<br>Wind erosion |
| 156: | |
| Barnes | Pesticide and nutrient runoff |
| Svea | Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| 313: | |
| Buse | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Barnes | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| 314: | |
| Buse | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Barnes | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| 319: | |
| Buse | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Barnes | Pesticide and nutrient runoff<br>Slope<br>Water erosion |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 450: | |
| Colvin | Alkalinity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Surface crusting<br>Wind erosion |
| 511: | |
| Divide | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Surface crusting<br>Wind erosion |
| 674: | |
| Farnuf | None |
| 712: | |
| Flaxton | Excessive saturated hydraulic conductivity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Wind erosion |
| Williams | Pesticide and nutrient runoff |
| 714: | |
| Flaxton | Excessive saturated hydraulic conductivity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Wind erosion |
| Williams | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| 727: | |
| Fordville | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| 863: | |
| Hamerly | Alkalinity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Surface crusting<br>Wind erosion |
| 883: | |
| Hamerly | Alkalinity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Surface crusting<br>Wind erosion |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 883:(cont.) | |
| Tonka | High water table<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Ponding<br>Restricted saturated hydraulic conductivity |
| Parnell | High water table<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Ponding<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity |
| 1011: | |
| Karlsruhe | Alkalinity<br>Excessive saturated hydraulic conductivity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Wind erosion |
| 1181: | |
| Lohnes | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Wind erosion |
| 1202: | |
| Maddock | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Wind erosion |
| 1249: | |
| Appam | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Wind erosion |
| 1267: | |
| Marysland | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Surface crusting<br>Wind erosion |
| 1372: | |
| Noonan | High sodium content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Surface crusting |
| Williams | Pesticide and nutrient runoff |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 1374: | |
| Nutley | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Wind erosion |
| 1375: | |
| Nutley | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Wind erosion |
| 1427: | |
| Parnell | High water table<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Ponding<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity |
| 1437: | |
| Parshall | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Wind erosion |
| 1466: | |
| Pits, gravel and sand | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Limited organic matter<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Surface rock fragments<br>Water erosion |
| 1676: | |
| Wildrose | Alkalinity<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Wind erosion |
| 1697: | |
| Sioux | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching |
| Arvilla | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Wind erosion |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 1710: | |
| Southam | Alkalinity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Ponding<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Salt content<br>Surface crusting<br>Wind erosion |
| 1762: | |
| Svea | Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| Barnes | Pesticide and nutrient runoff |
| 1805: | |
| Telfer | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Wind erosion |
| 1886: | |
| Hamerly, saline | Alkalinity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Salt content<br>Surface crusting<br>Wind erosion |
| Vallers, saline | Alkalinity<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Salt content<br>Surface crusting<br>Wind erosion |
| 1898: | |
| Vebar | Depth to rock<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Wind erosion |
| 1978: | |
| Water | Onsite required |
| 2006: | |
| Williams | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| 2014: | |
| Williams | Pesticide and nutrient runoff |
| Bowbells | Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2015: | |
| Williams | Pesticide and nutrient runoff |
| Bowbells | Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| 2031: | |
| Williams | Pesticide and nutrient runoff |
| Zahl | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Surface crusting<br>Wind erosion |
| 2037: | |
| Williams | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| Zahl | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Parnell | High water table<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Ponding<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity |
| 2073: | |
| Zahl | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Max | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| 2081: | |
| Zahl | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Williams | Pesticide and nutrient runoff<br>Slope<br>Water erosion |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2175: | |
| Zahl | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Williams | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| 2188: | |
| Wabek | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Surface crusting<br>Wind erosion |
| Lehr | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| 2234: | |
| Amor | Depth to rock<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity |
| Werner | Alkalinity<br>Depth to rock<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Surface crusting<br>Wind erosion |
| 2235: | |
| Arnegard | Pesticide and nutrient runoff |
| 2240: | |
| Bowdle | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| Lehr | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| 2241: | |
| Bryant | Pesticide and nutrient runoff |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2242: | |
| Cohagen | Alkalinity<br>Depth to rock<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Limited organic matter<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Vebar | Depth to rock<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Water erosion<br>Wind erosion |
| Parshall | Alkalinity<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Water erosion<br>Wind erosion |
| 2243: | |
| Vebar | Depth to rock<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Water erosion<br>Wind erosion |
| Flasher | Alkalinity<br>Depth to rock<br>Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Limited organic matter<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Water erosion<br>Wind erosion |
| 2244: | |
| Daglum | High sodium content<br>Limited available water capacity<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Salt content<br>Surface crusting |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2244:(cont.) | |
| Belfield | Restricted saturated hydraulic conductivity<br>Root limiting<br>Salt content |
| 2246: | |
| Grail | Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity |
| 2248: | |
| Lehr | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| Bowdle | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff |
| 2249: | |
| Makoti | Pesticide and nutrient runoff |
| 2250: | |
| Makoti | Pesticide and nutrient runoff |
| Rusklyn | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Surface crusting<br>Wind erosion |
| 2252: | |
| Max | Pesticide and nutrient runoff<br>Slope<br>Surface stones<br>Water erosion |
| Zahl | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Surface stones<br>Water erosion |
| Arnegard | Pesticide and nutrient runoff<br>Slope<br>Surface stones<br>Water erosion |
| 2253: | |
| Mondamin | Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Wind erosion |
| 2254: | |
| Overly | Pesticide and nutrient runoff |
| 2255: | |
| Overly | Pesticide and nutrient runoff |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2255:(cont.) | |
| Rusklyn | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Surface crusting<br>Wind erosion |
| 2257: | |
| Reeder | Depth to rock<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity |
| Arnegard | Pesticide and nutrient runoff |
| 2258: | |
| Regent | Depth to rock<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Water erosion |
| Savage | Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Water erosion |
| 2259: | |
| Rhoades | High sodium content<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Salt content<br>Surface crusting |
| Daglum | High sodium content<br>Limited available water capacity<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Salt content<br>Surface crusting |
| 2260: | |
| Rusklyn | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Surface crusting<br>Wind erosion |
| 2261: | |
| Schaller | Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Wind erosion |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2262: | |
| Schaller | Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Water erosion<br>Wind erosion |
| 2263: | |
| Sinai | Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Wind erosion |
| 2264: | |
| Vebar | Depth to rock<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Wind erosion |
| Cohagen | Alkalinity<br>Depth to rock<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Limited organic matter<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| 2265: | |
| Wabek | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Surface crusting<br>Wind erosion |
| Appam | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Wind erosion |
| 2266: | |
| Wabek | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2266:(cont.) | |
| Appam | Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Water erosion<br>Wind erosion |
| 2267: | |
| Werner | Alkalinity<br>Depth to rock<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Soil slumping<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Amor | Depth to rock<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Restricted saturated hydraulic conductivity<br>Slope<br>Water erosion |
| Arnegard | Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| 2269: | |
| Cavour | High sodium content<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Salt content<br>Surface crusting |
| Barnes | Pesticide and nutrient runoff |
| 2270: | |
| Harriet | Alkalinity<br>Flooding<br>High sodium content<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Salt content<br>Surface crusting |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2270:(cont.) | |
| Stirum | Alkalinity<br>Excessive saturated hydraulic conductivity<br>Flooding<br>High sodium content<br>High water table<br>Lime content<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity<br>Salt content<br>Surface crusting<br>Wind erosion |
| 2271: | |
| Lohnes | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Water erosion<br>Wind erosion |
| 2272: | |
| Sioux | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Lime content<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| Arvilla | Alkalinity<br>Depth to sand and gravel<br>Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Wind erosion |
| 2273: | |
| Svea | Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Water erosion |
| Buse | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |
| Parnell | High water table<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Ponding<br>Poor tilth and compaction<br>Restricted saturated hydraulic conductivity |

Table 6.-Potential Cropland Limitations and Hazards--Continued

| Map symbol and component name | Cropland limitations and hazards |
|---|---|
| 2274: | |
| Towner | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Wind erosion |
| Maddock | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Wind erosion |
| 2275: | |
| Towner | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Water erosion<br>Wind erosion |
| Maddock | Excessive saturated hydraulic conductivity<br>Limited available water capacity<br>Pesticide and nutrient leaching<br>Pesticide and nutrient runoff<br>Slope<br>Water erosion<br>Wind erosion |
| Buse | Alkalinity<br>Lime content<br>Pesticide and nutrient runoff<br>Slope<br>Surface crusting<br>Water erosion<br>Wind erosion |

Table 7.-Map Unit Productivity Index and Farmland Designation

(Dashes (--) indicate an assignment has not been made. Entries in ( ) are for undrained conditions.)

| Map symbol | Spring wheat productivity index | Farmland designation |
|---|---|---|
| 30 | 81 | Farmland of statewide importance |
| 40 | 58 | Farmland of statewide importance |
| 41 | 41 | Other land |
| 76 | 38 | Other land |
| 118 | 74 | Prime farmland |
| 156 | 82 | Prime farmland |
| 313 | 57 | Other land |
| 314 | 42 | Other land |
| 319 | 28 | Other land |
| 450 | 70 (38) | Prime farmland if drained |
| 511 | 65 | Farmland of statewide importance |
| 674 | 88 | Farmland of statewide importance |
| 712 | 71 | Farmland of statewide importance |
| 714 | 55 | Other land |
| 727 | 60 | Prime farmland |
| 863 | 81 | Farmland of statewide importance |
| 883 | 81 (57) | Prime farmland if drained |
| 1011 | 53 | Other land |
| 1181 | 29 | Other land |
| 1202 | 43 | Other land |
| 1249 | 40 | Other land |
| 1267 | 59 (34) | Prime farmland if drained |
| 1372 | 58 | Other land |
| 1374 | 85 | Prime farmland |
| 1375 | 80 | Prime farmland |
| 1427 | 74 (21) | Other land |
| 1437 | 69 | Farmland of statewide importance |
| 1466 | 7 | Other land |
| 1676 | 87 | Farmland of statewide importance |
| 1697 | 40 | Other land |

Table 7.-Map Unit Productivity Index and Farmland Designation--Continued

| Map symbol | Spring wheat productivity index | Farmland designation |
|---|---|---|
| 1710 | 51 (3) | Other land |
| 1762 | 91 | Prime farmland |
| 1805 | 45 | Other land |
| 1886 | 43 (25) | Other land |
| 1898 | 61 | Farmland of statewide importance |
| 1978 | 0 | Other land |
| 2006 | 71 | Farmland of statewide importance |
| 2014 | 93 | Farmland of statewide importance |
| 2015 | 85 | Farmland of statewide importance |
| 2031 | 75 | Other land |
| 2037 | 67 (51) | Other land |
| 2073 | 26 | Other land |
| 2081 | 45 | Other land |
| 2175 | 58 | Other land |
| 2188 | 36 | Other land |
| 2234 | 72 | Farmland of statewide importance |
| 2235 | 94 | Farmland of statewide importance |
| 2240 | 53 | Other land |
| 2241 | 87 | Farmland of statewide importance |
| 2242 | 16 | Other land |
| 2243 | 26 | Other land |
| 2244 | 51 | Other land |
| 2246 | 94 | Farmland of statewide importance |
| 2248 | 49 | Other land |
| 2249 | 91 | Farmland of statewide importance |
| 2250 | 78 | Other land |
| 2252 | 33 | Other land |
| 2253 | 80 | Farmland of statewide importance |
| 2254 | 91 | Prime farmland |
| 2255 | 78 | Farmland of statewide importance |
| 2257 | 81 | Farmland of statewide importance |

Table 7.-Map Unit Productivity Index and Farmland Designation--Continued

| Map symbol | Spring wheat productivity index | Farmland designation |
|---|---|---|
| 2258 | 83 | Farmland of statewide importance |
| 2259 | 42 | Other land |
| 2260 | 64 | Other land |
| 2261 | 30 | Other land |
| 2262 | 24 | Other land |
| 2263 | 88 | Prime farmland |
| 2264 | 43 | Other land |
| 2265 | 29 | Other land |
| 2266 | 20 | Oher land |
| 2267 | 24 | Other land |
| 2269 | 62 | Other land |
| 2270 | 27 | Other land |
| 2271 | 25 | Other land |
| 2272 | 24 | Other land |
| 2273 | 70 (55) | Other land |
| 2274 | 55 | Other land |
| 2275 | 44 | Other land |

Table 8.-Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Entries in () are for undrained conditions)

| Map symbol and soil name | Barley | Grass-legume hay | Oats | Sunflowers | Wheat |
|---|---|---|---|---|---|
| | Bu | Tons | Bu | Lbs | Bu |
| 30: Amor-Arnegard | 54 | 2.1 | 71 | 1,700 | 33 |
| 40: Amor-Werner-Farnuf | 39 | 1.8 | 51 | 1,200 | 24 |
| 41: Amor-Werner | 27 | 1.3 | 36 | 850 | 17 |
| 76: Arvilla | 25 | 1.8 | 33 | 800 | 16 |
| 118: Barnes-Buse | 49 | 2.1 | 64 | 1,500 | 30 |
| 156: Barnes-Svea | 55 | 2.7 | 71 | 1,700 | 34 |
| 313: Buse-Barnes | 38 | 1.8 | 50 | 1,200 | 23 |
| 314: Buse-Barnes | 28 | 1.4 | 37 | 900 | 17 |
| 319: Buse-Barnes | 19 | 0.9 | 24 | 600 | 11 |
| 450: Colvin | 47 (25) | 2.3 (2.7) | 61 (33) | 1,450 (750) | 29 (16) |
| 511: Divide | 43 | 2.3 | 57 | 1,350 | 27 |
| 674: Farnuf | 59 | 2.3 | 77 | 1,800 | 36 |
| 712: Flaxton-Williams | 47 | 1.9 | 62 | 1,500 | 29 |
| 714: Flaxton-Williams | 37 | 1.9 | 48 | 1,150 | 23 |
| 727: Fordville | 40 | 2.3 | 52 | 1,250 | 25 |
| 863: Hamerly | 54 | 2.3 | 71 | 1,700 | 33 |
| 883: Hamerly-Tonka-Parnell | 54 (38) | 2.6 (2.1) | 71 (50) | 1,700(1,150) | 33 (23) |
| 1011: Karlsruhe | 35 | 1.6 | 46 | 1,100 | 22 |
| 1181: Lohnes | 19 | 1.6 | 25 | 600 | 12 |

Table 8.-Yields per Acre of Crops--Continued

| Map symbol and soil name | Barley | Grass-legume hay | Oats | Sunflowers | Wheat |
|---|---|---|---|---|---|
| | Bu | Tons | Bu | Lbs | Bu |
| 1202: Maddock | 29 | 1.8 | 37 | 900 | 18 |
| 1249: Appam | 27 | 1.6 | 35 | 800 | 16 |
| 1267: Marysland | 39 (23) | 2.3 (2.7) | 51 (30) | 1,200 (700) | 24 (14) |
| 1372: Noonan-Williams | 39 | 2.0 | 51 | 1,200 | 24 |
| 1374: Nutley | 57 | 2.2 | 74 | 1,750 | 35 |
| 1375: Nutley | 53 | 2.2 | 70 | 1,650 | 33 |
| 1427: Parnell | 49 (14) | 2.8 (0.5) | 64 (18) | 1,550 (450) | 30 (9) |
| 1437: Parshall | 46 | 1.6 | 60 | 1,400 | 28 |
| 1466: Pits, gravel and sand | 5 | 0.2 | 6 | 150 | 3 |
| 1676: Wildrose | 58 | 1.8 | 76 | 1,800 | 36 |
| 1697: Sioux-Arvilla | 27 | 1.3 | 35 | 800 | 16 |
| 1710: Southam | 34 (2) | 2.7 (0.1) | 44 (3) | 1,050 (50) | 21 (1) |
| 1762: Svea-Barnes | 61 | 2.7 | 79 | 1,900 | 37 |
| 1805: Telfer | 30 | 1.6 | 39 | 950 | 18 |
| 1886: Hamerly, saline, and Vallers, saline | 29 (17) | 2.1 (0.9) | 37 (22) | 900 (500) | 18 (10) |
| 1898: Vebar | 41 | 1.6 | 53 | 1,250 | 25 |
| 1978: Water | 0 | 0 | 0 | 0 | 0 |
| 2006: Williams | 47 | 2.3 | 62 | 1,450 | 29 |
| 2014: Williams-Bowbells | 62 | 2.4 | 81 | 1,900 | 38 |
| 2015: Williams-Bowbells | 57 | 2.4 | 74 | 1,750 | 35 |

Table 8.-Yields per Acre of Crops--Continued

| Map symbol and soil name | Barley | Grass-legume hay | Oats | Sunflowers | Wheat |
|---|---|---|---|---|---|
| | Bu | Tons | Bu | Lbs | Bu |
| 2031: Williams-Zahl | 50 | 1.8 | 65 | 1,550 | 31 |
| 2037: Williams-Zahl-Parnell | 45 (34) | 2.0 (1.5) | 58 (44) | 1,400(1,050) | 27 (21) |
| 2073: Zahl-Max | 17 | 0.8 | 23 | 550 | 11 |
| 2081: Zahl-Williams | 30 | 1.2 | 39 | 950 | 18 |
| 2175: Zahl-Williams | 39 | 1.6 | 51 | 1,200 | 24 |
| 2188: Wabek-Lehr | 24 | 1.2 | 31 | 750 | 15 |
| 2234: Amor-Werner | 48 | 1.3 | 63 | 1,500 | 30 |
| 2235: Arnegard | 63 | 2.3 | 82 | 1,950 | 39 |
| 2240: Bowdle-Lehr | 39 | 1.8 | 51 | 1,200 | 24 |
| 2241: Bryant | 58 | 2.2 | 76 | 1,800 | 36 |
| 2242: Cohagen-Vebar-Parshall | 11 | 0.5 | 14 | 350 | 7 |
| 2243: Vebar-Flasher | 17 | 0.8 | 23 | 550 | 11 |
| 2244: Daglum-Belfield | 34 | 1.3 | 44 | 1,050 | 21 |
| 2246: Grail | 62 | 2.3 | 82 | 1,950 | 39 |
| 2248: Lehr-Bowdle | 33 | 1.9 | 43 | 1,000 | 20 |
| 2249: Makoti | 61 | 2.3 | 79 | 1,850 | 37 |
| 2250: Makoti-Rusklyn | 52 | 2.1 | 68 | 1,600 | 32 |
| 2252: Max-Zahl-Arnegard | 22 | 0.8 | 29 | 700 | 14 |
| 2253: Mondamin | 53 | 1.8 | 70 | 1,650 | 33 |
| 2254: Overly | 61 | 2.6 | 79 | 1,850 | 37 |

Table 8.-Yields per Acre of Crops--Continued

| Map symbol and soil name | Barley | Grass-legume hay | Oats | Sunflowers | Wheat |
|---|---|---|---|---|---|
| | Bu | Tons | Bu | Lbs | Bu |
| 2255: Overly-Rusklyn | 52 | 2.2 | 68 | 1,600 | 32 |
| 2257: Reeder-Arnegard | 54 | 2.3 | 71 | 1,700 | 33 |
| 2258: Regent-Savage | 55 | 1.8 | 72 | 1,700 | 34 |
| 2259: Rhoades-Daglum | 28 | 1.0 | 37 | 850 | 17 |
| 2260: Rusklyn | 43 | 1.1 | 56 | 1,350 | 26 |
| 2261: Schaller | 20 | 1.6 | 26 | 650 | 12 |
| 2262: Schaller | 16 | 1.2 | 21 | 500 | 10 |
| 2263: Sinai | 59 | 1.8 | 77 | 1,800 | 36 |
| 2264: Vebar-Cohagen | 29 | 1.2 | 37 | 900 | 18 |
| 2265: Wabek-Appam | 19 | 1.2 | 25 | 600 | 12 |
| 2266: Wabek-Appam | 13 | 0.8 | 17 | 400 | 8 |
| 2267: Werner-Amor-Arnegard | 16 | 0.8 | 21 | 500 | 10 |
| 2269: Cavour-Barnes | 41 | 1.6 | 54 | 1,300 | 25 |
| 2270: Harriet and Stirum | 18 | 1.4 | 24 | 550 | 11 |
| 2271: Lohnes | 17 | 1.6 | 22 | 550 | 10 |
| 2272: Sioux-Arvilla | 16 | 0.9 | 21 | 500 | 10 |
| 2273: Svea-Buse-Parnell | 47 (36) | 2.4 (1.7) | 61 (48) | 1,400(1,100) | 28 (22) |
| 2274: Towner-Maddock | 37 | 1.8 | 48 | 1,150 | 23 |
| 2275: Towner-Maddock-Buse | 29 | 1.5 | 38 | 900 | 18 |

Table 9.-Interpretive Groupings Report

(Dashes (--) indicate an interpretive group is not assigned. Entries in () are for undrained conditions.)

| Map symbol and soil name | Pasture and hayland group | Land capability class | Windbreak suitability group |
|---|---|---|---|
| 30: | | | |
| Amor | Moderately Deep Silty F2 | 2s | 6d |
| Arnegard | Overflow and Run-on A3 | 2c | 1 |
| 40: | | | |
| Amor | Moderately Deep Silty F2 | 3e | 6d |
| Werner | Shallow H4 | 6e | 10 |
| Farnuf | Loamy and Silty A1 | 3c | 3 |
| 41: | | | |
| Amor | Moderately Deep Silty F2 | 4e | 6d |
| Werner | Shallow H4 | 6e | 10 |
| 76: | | | |
| Arvilla | Shallow to Gravel B1 | 3e | 6g |
| 118: | | | |
| Barnes | Loamy and Silty A1 | 2e | 3 |
| Buse | Steeply Sloping H3 | 3e | 8 |
| 156: | | | |
| Barnes | Loamy and Silty A1 | 2e | 3 |
| Svea | Loamy and Silty A1 | 2e | 1 |
| 313: | | | |
| Buse | Thin Upland A2 | 4e | 8 |
| Barnes | Loamy and Silty A1 | 3e | 3 |
| 314: | | | |
| Buse | Thin Upland A2 | 6e | 10 |
| Barnes | Loamy and Silty A1 | 4e | 3 |
| 319: | | | |
| Buse | Steeply Sloping H3 | 7e | 10 |
| Barnes | Loamy and Silty A1 | 6e | 10 |
| 450: | | | |
| Colvin | Limy Subirrigated A5 (Wet C1) | 2w | 1k |
| 511: | | | |
| Divide | Limy Subirrigated A5 | 2s | 1k |
| 674: | | | |
| Farnuf | Loamy and Silty A1 | 2c | 3 |
| 712: | | | |
| Flaxton | Sandy A6 | 3e | 5 |
| Williams | Loamy and Silty A1 | 2e | 3 |

Table 9.-Interpretive Groupings Report--Continued

| Map symbol and soil name | Pasture and hayland group | Land capability class | Windbreak suitability group |
|---|---|---|---|
| 714: | | | |
| Flaxton | Sandy A6 | 4e | 5 |
| Williams | Loamy and Silty A1 | 3e | 3 |
| 727: | | | |
| Fordville | Loamy and Silty A1 | 2s | 6g |
| 863: | | | |
| Hamerly | Limy Subirrigated A5 | 2e | 1k |
| 883: | | | |
| Hamerly | Limy Subirrigated A5 | 2e | 1k |
| Tonka | Clayey A4 (Wet C1) | 2w | 1 |
| Parnell | Wet C1 (Wetland H6) | 3w | 2 |
| 1011: | | | |
| Karlsruhe | Sands A7 | 3e | 1k |
| 1181: | | | |
| Lohnes | Sands A7 | 6e | 10 |
| 1202: | | | |
| Maddock | Sands A7 | 4e | 7 |
| 1249: | | | |
| Appam | Shallow to Gravel B1 | 3e | 6g |
| 1267: | | | |
| Marysland | Limy Subirrigated A5 (Wet C1) | 2w | 1k |
| 1372: | | | |
| Noonan | Claypan G1 | 4s | 9l |
| Williams | Loamy and Silty A1 | 2e | 3 |
| 1374: | | | |
| Nutley | Clayey A4 | 2e | 4c |
| 1375: | | | |
| Nutley | Clayey A4 | 2e | 4c |
| 1427: | | | |
| Parnell | Wet C1 (Wetland H6) | 3w | 2 |
| 1437: | | | |
| Parshall | Sandy A6 | 3e | 5 |
| 1466: | | | |
| Pits, gravel and sand | NR | 8s | 10 |
| 1676: | | | |
| Wildrose | Clayey A4 | 2e | 4c |
| 1697: | | | |
| Sioux | Very Shallow to Gravel B2 | 6s | 10 |
| Arvilla | Shallow to Gravel B1 | 3e | 6g |

Table 9.-Interpretive Groupings Report--Continued

| Map symbol and soil name | Pasture and hayland group | Land capability class | Windbreak suitability group |
|---|---|---|---|
| 1710: | | | |
| Southam--------- | Wet C1 (Wetland H6) | 3w | 2k |
| 1762: | | | |
| Svea---------- | Overflow and Run-on A3 | 2c | 1 |
| Barnes---------- | Loamy and Silty A1 | 2c | 3 |
| 1805: | | | |
| Telfer---------- | Sands A7 | 4e | 7 |
| 1886: | | | |
| Hamerly, saline- | Saline G4 | 3s | 9w |
| Vallers, saline- | Saline G4 | 3s | 9w |
| 1898: | | | |
| Vebar---------- | Moderately Deep Sandy F3 | 3e | 6d |
| 1978: | | | |
| Water---------- | --- | --- | 10 |
| 2006: | | | |
| Williams-------- | Loamy and Silty A1 | 3e | 3 |
| 2014: | | | |
| Williams-------- | Loamy and Silty A1 | 2c | 3 |
| Bowbells-------- | Overflow and Run-on A3 | 2c | 1 |
| 2015: | | | |
| Williams-------- | Loamy and Silty A1 | 2e | 3 |
| Bowbells-------- | Overflow and Run-on A3 | 2e | 1 |
| 2031: | | | |
| Williams-------- | Loamy and Silty A1 | 2e | 3 |
| Zahl---------- | Thin Upland A2 | 3e | 8 |
| 2037: | | | |
| Williams-------- | Loamy and Silty A1 | 4e | 3 |
| Zahl---------- | Thin Upland A2 | 6e | 10 |
| Parnell--------- | Wetland H6 | 3w | 10 |
| 2073: | | | |
| Zahl---------- | Steeply Sloping H3 | 7e | 10 |
| Max---------- | Steeply Sloping H3 | 7e | 10 |
| 2081: | | | |
| Zahl---------- | Thin Upland A2 | 6e | 10 |
| Williams-------- | Loamy and Silty A1 | 4e | 3 |
| 2175: | | | |
| Zahl---------- | Thin Upland A2 | 4e | 8 |
| Williams-------- | Loamy and Silty A1 | 3e | 3 |

Table 9.-Interpretive Groupings Report--Continued

| Map symbol and soil name | Pasture and hayland group | Land capability class | Windbreak suitability group |
|---|---|---|---|
| 2188: | | | |
| Wabek---------- | Very Shallow to Gravel B2 | 6s | 10 |
| Lehr---------- | Shallow to Gravel B1 | 3e | 6g |
| 2234: | | | |
| Amor---------- | Moderately Deep Silty F2 | 2e | 6d |
| Werner---------- | Shallow H4 | 6s | 10 |
| 2235: | | | |
| Arnegard-------- | Loamy and Silty A1 | 2c | 1 |
| 2240: | | | |
| Bowdle---------- | Loamy and Silty A1 | 2s | 6g |
| Lehr---------- | Shallow to Gravel B1 | 3s | 6g |
| 2241: | | | |
| Bryant---------- | Loamy and Silty A1 | 2e | 3 |
| 2242: | | | |
| Cohagen--------- | Shallow H4 | 7e | 10 |
| Vebar---------- | Steeply Sloping H3 | 7e | 10 |
| Parshall-------- | Sandy A6 | 6e | 10 |
| 2243: | | | |
| Vebar---------- | Moderately Deep Sandy F3 | 6e | 6d |
| Flasher--------- | Shallow H4 | 6e | 10 |
| 2244: | | | |
| Daglum---------- | Claypan G1 | 4s | 9c |
| Belfield-------- | Clayey Subsoil F1 | 2s | 4 |
| 2246: | | | |
| Grail---------- | Loamy and Silty A1 | 2c | 1 |
| 2248: | | | |
| Lehr---------- | Shallow to Gravel B1 | 3e | 6g |
| Bowdle---------- | Loamy and Silty A1 | 3e | 6g |
| 2249: | | | |
| Makoti---------- | Loamy and Silty A1 | 2c | 1 |
| 2250: | | | |
| Makoti---------- | Loamy and Silty A1 | 2e | 1 |
| Rusklyn--------- | Thin Upland A2 | 3e | 8 |
| 2252: | | | |
| Max---------- | Steeply Sloping H3 | 7s | 10 |
| Zahl---------- | Steeply Sloping H3 | 7s | 10 |
| Arnegard-------- | Loamy and Silty A1 | 6s | 10 |

Table 9.-Interpretive Groupings Report--Continued

| Map symbol and soil name | Pasture and hayland group | Land capability class | Windbreak suitability group |
|---|---|---|---|
| 2253: | | | |
| Mondamin | Clayey A4 | 2e | 4c |
| 2254: | | | |
| Overly | Loamy and Silty A1 | 2c | 1 |
| 2255: | | | |
| Overly | Loamy and Silty A1 | 2e | 1 |
| Rusklyn | Thin Upland A2 | 3e | 8 |
| 2257: | | | |
| Reeder | Moderately Deep Silty F2 | 2e | 6d |
| Arnegard | Loamy and Silty A1 | 2e | 1 |
| 2258: | | | |
| Regent | Moderately Deep Silty F2 | 2e | 4 |
| Savage | Clayey A4 | 2e | 4 |
| 2259: | | | |
| Rhoades | Thin Claypan G2 | 6s | 10 |
| Daglum | Claypan G1 | 4s | 9c |
| 2260: | | | |
| Rusklyn | Thin Upland A2 | 3e | 8 |
| 2261: | | | |
| Schaller | Very Shallow to Gravel B2 | 4e | 10 |
| 2262: | | | |
| Schaller | Very Shallow to Gravel B2 | 6e | 10 |
| 2263: | | | |
| Sinai | Clayey A4 | 2e | 4c |
| 2264: | | | |
| Vebar | Moderately Deep Sandy F3 | 4e | 6d |
| Cohagen | Shallow H4 | 6e | 10 |
| 2265: | | | |
| Wabek | Very Shallow to Gravel B2 | 6s | 10 |
| Appam | Shallow to Gravel B1 | 3e | 6g |
| 2266: | | | |
| Wabek | Very Shallow to Gravel B2 | 6e | 10 |
| Appam | Shallow to Gravel B1 | 6e | 10 |
| 2267: | | | |
| Werner | Shallow H4 | 7e | 10 |
| Amor | Moderately Deep Silty F2 | 6e | 10 |
| Arnegard | Loamy and Silty A1 | 6e | 10 |

Table 9.-Interpretive Groupings Report--Continued

| Map symbol and soil name | Pasture and hayland group | Land capability class | Windbreak suitability group |
|---|---|---|---|
| 2269: | | | |
| Cavour---------- | Claypan G1 | 4s | 9l |
| Barnes---------- | Loamy and Silty A1 | 2e | 3 |
| 2270: | | | |
| Harriet--------- | Sodic and Saline G3 | 6s | 10 |
| Stirum---------- | Sodic-Saline G3 | 6s | 10 |
| 2271: | | | |
| Lohnes---------- | Sands A7 | 6e | 10 |
| 2272: | | | |
| Sioux---------- | Very Shallow to Gravel B2 | 6s | 10 |
| Arvilla--------- | Shallow to Gravel B1 | 3e | 10 |
| 2273: | | | |
| Svea---------- | Loamy and Silty A1 | 3e | 3 |
| Buse---------- | Thin Upland A2 | 6e | 10 |
| Parnell--------- | Wet C1 (Wetland H6) | 5w | 10 |
| 2274: | | | |
| Towner---------- | Sands A7 | 3e | 5 |
| Maddock--------- | Sands A7 | 4e | 7 |
| 2275: | | | |
| Towner---------- | Sands A7 | 6e | 10 |
| Maddock--------- | Sands A7 | 6e | 10 |
| Buse---------- | Thin Upland A2 | 6e | 10 |

Table 10.—Windbreak Suitability Groups

Expected Shrub Heights at 20 Years

(Dashes (—) indicate the species are not expected to perform adequately on these suitability groups under most conditions.)

| Species | Windbreak suitability groups | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 1K | 2 | 2K | 2H | 3 |
| | ft. | ft. | ft. | ft. | ft. | ft. |
| Almond, Russian | 4-6 | 3-4 | — | — | — | 4-6 |
| Buffaloberry, Silver | 8-12 | 8-12 | — | — | — | 8-11 |
| Caragana (Peashrub, Siberian) | 8-10 | 8-10 | — | — | — | 8-10 |
| Cherry, Mongolian | 5-6 | — | — | — | — | 4-6 |
| Cherry, Nanking | 6-8 | — | — | — | — | 5-7 |
| Chokecherry, Common | 10-12 | 8-10 | — | — | — | 8-10 |
| Cotoneaster, Europian | 10-12 | 8-11 | — | — | — | 9-11 |
| Cotoneaster, Peking | 6-8 | 5-7 | — | — | — | 5-7 |
| Currant, Golden | 5-7 | 4-6 | — | — | — | 5-6 |
| Dogwood, Redosier | 6-7 | — | 6-7 | — | 4-6 | 4-6 |
| Forsythia, ‘Meadowlark’ | 6-10 | 5-7 | — | — | — | 6-8 |
| Honeysuckle, Amur | 8-10 | 7-9 | — | — | — | 6-8 |
| Honeysuckle, Blueleaf ‘Freedom’ | 8-10 | 7-9 | — | — | — | 7-9 |
| Honeysuckle, Tatarian | 8-10 | 6-8 | — | — | — | 7-9 |
| Indigo, False | 6-8 | 5-7 | 6-8 | 5-7 | — | 4-6 |
| Juneberry (Serviceberry) | 5-6 | — | — | — | — | 4-6 |
| Lilac, Common | 8-10 | 8-10 | — | — | — | 7-9 |
| Lilac, Late | 8-10 | 6-8 | — | — | — | 7-9 |
| Plum, American | 5-8 | — | — | — | — | 6-8 |
| Rose, Species | 4-5 | 4-5 | — | — | — | 4-5 |
| Sandcherry, Western | 4-6 | — | — | — | — | 4-6 |
| Sea-buckthorn | 8-10 | 8-10 | — | — | — | 6-8 |
| Silverberry | 5-7 | 5-7 | — | — | — | 5-7 |
| Snowberry | 1-3 | — | — | — | — | 1-3 |
| Sumac, Skunkbush | 3-9 | 3-7 | — | — | — | 3-9 |
| Viburnum, Nannyberry | 10-14 | — | — | — | — | 8-10 |
| Willow, Bebbs | 12-15 | — | 10-14 | — | 10-14 | — |
| Willow, Purple-osier | 8-13 | — | 8-13 | — | 8-13 | — |
| Willow, Sandbar | 5-6 | — | 5-7 | — | 5-7 | — |

Table 10.—Windbreak Suitability Groups--Continued

Expected Shrub Heights at 20 Years

| Species | Windbreak suitability groups | | | | | |
|---|---|---|---|---|---|---|
| | 4 | 4C | 5 | 6D | 6G | 7 |
| | ft. | ft. | ft. | ft. | ft. | ft. |
| Almond, Russian | 4-5 | 4-5 | 3-4 | — | — | — |
| Buffaloberry, Silver | 6-8 | 6-8 | 4-7 | 4-5 | 4-5 | — |
| Caragana (Peashrub, Siberian) | 7-8 | 5-6 | 7-9 | 6-8 | 6-8 | — |
| Cherry, Mongolian | — | — | — | — | — | — |
| Cherry, Nanking | — | — | — | — | — | — |
| Chokecherry, Common | 7-9 | 6-8 | 6-8 | 4-6 | 4-6 | — |
| Cotoneaster, Europian | 5-7 | 4-6 | 4-6 | — | — | — |
| Cotoneaster, Peking | — | — | — | — | — | — |
| Currant, Golden | 3-5 | 3-5 | 3-5 | — | — | — |
| Dogwood, Redosier | 4-6 | — | — | — | — | — |
| Forsythia, ‘Meadowlark’ | 4-6 | 4-6 | 5-7 | — | — | — |
| Honeysuckle, Amur | 6-8 | 6-8 | 5-7 | — | — | — |
| Honeysuckle, Blueleaf ‘Freedom’ | 5-7 | 5-7 | 4-6 | 3-5 | 3-5 | — |
| Honeysuckle, Tatarian | 6-8 | 6-8 | 5-7 | 4-6 | 4-6 | — |
| Indigo, False | — | — | — | — | — | — |
| Juneberry (Serviceberry) | 3-5 | 3-5 | — | — | — | — |
| Lilac, Common | 6-7 | 5-6 | 6-8 | 4-6 | 4-6 | — |
| Lilac, Late | 5-7 | 5-7 | — | — | — | — |
| Plum, American | 5-7 | 5-7 | 4-6 | — | — | — |
| Rose, Species | 3-5 | 3-5 | 3-4 | 2-4 | 2-4 | — |
| Sandcherry, Western | — | — | 3-5 | 2-4 | 2-4 | — |
| Sea-buckthorn | 6-8 | 6-8 | 5-7 | — | — | — |
| Silverberry | 5-7 | 5-7 | 4-6 | 4-5 | 4-5 | — |
| Snowberry | 1-3 | 1-3 | 1-3 | — | — | — |
| Sumac, Skunkbush | 3-7 | 3-7 | 3-7 | 3-5 | 3-5 | — |
| Viburnum, Nannyberry | 5-7 | 5-7 | — | — | — | — |
| Willow, Bebbs | — | — | — | — | — | — |
| Willow, Purple-osier | — | — | — | — | — | — |
| Willow, Sandbar | — | — | — | — | — | — |

Table 10.—Windbreak Suitability Groups--Continued

Expected Shrub Heights at 20 Years

| Species | Windbreak suitability groups | | | | |
|---|---|---|---|---|---|
| | 8 | 9C | 9L | 9W | 10 |
| | ft. | ft. | ft. | ft. | ft. |
| Almond, Russian | — | — | — | — | — |
| Buffaloberry, Silver | 3-5 | 3-5 | 3-5 | 3-5 | — |
| Caragana (Peashrub, Siberian) | 4-5 | 3-5 | 3-5 | — | — |
| Cherry, Mongolian | — | — | — | — | — |
| Cherry, Nanking | — | — | — | — | — |
| Chokecherry, Common | — | — | — | — | — |
| Cotoneaster, Europian | — | — | — | — | — |
| Cotoneaster, Peking | — | — | — | — | — |
| Currant, Golden | — | — | — | — | — |
| Dogwood, Redosier | — | — | — | — | — |
| Forsythia, ‘Meadowlark’ | — | — | — | — | — |
| Honeysuckle, Amur | — | — | — | — | — |
| Honeysuckle, Blueleaf ‘Freedom’ | — | — | — | — | — |
| Honeysuckle, Tatarian | 4-6 | 4-6 | 4-6 | — | — |
| Indigo, False | — | — | — | — | — |
| Juneberry, (Serviceberry) | — | — | — | — | — |
| Lilac, Common | 4-6 | 3-5 | 3-5 | — | — |
| Lilac, Late | — | — | — | — | — |
| Plum, American | — | — | — | — | — |
| Rose, Species | — | — | — | — | — |
| Sandcherry, Western | — | — | — | — | — |
| Sea-buckthorn | 3-5 | 3-5 | 3-5 | 3-4 | — |
| Silverberry | 3-5 | 3-5 | 3-5 | 3-4 | — |
| Snowberry | — | — | — | — | — |
| Sumac, Skunkbush | — | 3-5 | 3-5 | — | — |
| Viburnum, Nannyberry | — | — | — | — | — |
| Willow, Bebbs | — | — | — | — | — |
| Willow, Purple-osier | — | — | — | — | — |
| Willow, Sandbar | — | — | — | — | — |

Table 10.—Windbreak Suitability Groups--Continued

Expected Deciduous Heights at 20 Years

| Species | Windbreak suitability groups | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 1K | 2 | 2K | 2H | 3 |
| | ft. | ft. | ft. | ft. | ft. | ft. |
| Apricot, Species | 10-12 | — | — | — | — | 9-11 |
| Ash, Green | 18-22 | 16-20 | — | — | — | 17-21 |
| Aspen, Quaking | 25-30 | 20-25 | — | 17-23 | — | 18-20 |
| Boxelder | 15-18 | 13-15 | — | — | — | 13-16 |
| Cottonwood, Species | 38-46 | 34-42 | — | 34-42 | — | — |
| Crabapple, Species | 15-16 | — | — | — | — | 13-16 |
| Elm, Siberian | 24-30 | 24-30 | — | — | — | 22-27 |
| Hackberry, Common | 18-22 | 16-20 | — | — | — | 17-21 |
| Hawthorn, Arnold | 12-16 | 10-14 | — | — | — | 11-13 |
| Hawthorn, Downy | 10-12 | — | — | — | — | 9-11 |
| Maple, Amur | 10-12 | — | — | — | — | 9-10 |
| Maple, Tatarian | 10-12 | — | — | — | — | 9-10 |
| Oak, Bur | 17-20 | 15-18 | — | — | — | 17-20 |
| Pear, Ussurian(Harbin) | 15-17 | — | — | — | — | 15-17 |
| Poplar, Hybrid Species | 40-45 | — | — | — | — | — |
| Poplar, White | 28-35 | — | — | — | — | 20-30 |
| Russian-olive | 13-16 | 12-15 | — | 10-13 | — | 12-15 |
| Willow, Laurel | 20-25 | — | 15-20 | — | 15-20 | — |
| Willow, Missouri River | 21-23 | — | 17-20 | — | 17-20 | — |
| Willow, Peachleaf | 18-23 | — | 16-21 | — | 16-21 | — |
| Willow, White | 20-25 | — | 18-23 | — | 18-23 | — |

Table 10.—Windbreak Suitability Groups--Continued

Expected Deciduous Heights at 20 Years

| Species | Windbreak suitability groups | | | | | |
|---|---|---|---|---|---|---|
| | 4 | 4C | 5 | 6D | 6G | 7 |
| | ft. | ft. | ft. | ft. | ft. | ft. |
| Apricot, Species | 8-10 | 8-10 | 8-10 | — | — | — |
| Ash, Green | 14-18 | 14-18 | 13-16 | 12-15 | 12-15 | — |
| Aspen, Quaking | — | — | — | — | — | — |
| Boxelder | — | — | — | — | — | — |
| Cottonwood, Species | — | — | — | — | — | — |
| Crabapple, Species | 13-15 | 13-15 | 10-12 | — | — | — |
| Elm, Siberian | 16-20 | 16-20 | 20-25 | 16-20 | 16-20 | — |
| Hackberry, Common | 15-17 | 15-17 | — | — | — | — |
| Hawthorn, Arnold | 8-10 | 8-10 | 11-13 | 7-9 | 7-9 | — |
| Hawthorn, Downy | 6-8 | 6-8 | — | — | — | — |
| Maple, Amur | — | — | — | — | — | — |
| Maple, Tatarian | — | — | — | — | — | — |
| Oak, Bur | 14-16 | 14-16 | 12-15 | — | — | — |
| Pear, Ussurian(Harbin) | — | — | 10-12 | — | — | — |
| Poplar, Hybrid Species | — | — | — | — | — | — |
| Poplar, White | — | — | — | — | — | — |
| Russian-olive | 10-12 | 10-12 | 11-14 | 10-12 | 10-12 | — |
| Willow, Laurel | — | — | — | — | — | — |
| Willow, Missouri River | — | — | — | — | — | — |
| Willow, Peachleaf | — | — | — | — | — | — |
| Willow, White | — | — | — | — | — | — |

Table 10.—Windbreak Suitability Groups--Continued

Expected Deciduous Heights at 20 Years

| Species | Windbreak suitability groups | | | | |
|---|---|---|---|---|---|
| | 8 | 9C | 9L | 9W | 10 |
| | ft. | ft. | ft. | ft. | ft. |
| Apricot, Species | — | — | — | — | — |
| Ash, Green | 8-9 | 8-10 | 8-12 | — | — |
| Aspen, Quaking | — | — | — | — | — |
| Boxelder | — | — | — | — | — |
| Cottonwood, Species | — | — | — | — | — |
| Crabapple, Species | — | — | — | — | — |
| Elm, Siberian | 10-12 | 9-11 | 9-11 | — | — |
| Hackberry, Common | — | — | — | — | — |
| Hawthorn, Arnold | — | — | — | — | — |
| Hawthorn, Downy | — | — | — | — | — |
| Maple, Amur | — | — | — | — | — |
| Maple, Tatarian | — | — | — | — | — |
| Oak, Bur | — | — | — | — | — |
| Pear, Ussurian(Harbin) | — | — | — | — | - |
| Poplar, Hybrid Species | — | — | — | — | — |
| Poplar, White | — | — | — | — | — |
| Russian-olive | 8-9 | 6-8 | 6-8 | 5-7 | — |
| Willow, Laurel | — | — | — | — | — |
| Willow, Missouri River | — | — | — | — | — |
| Willow, Peachleaf | — | — | — | — | — |
| Willow, White | — | — | — | — | — |

Table 10.—Windbreak Suitability Groups--Continued

Expected Conifer Heights at 20 Years

| Species | Windbreak suitability groups | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 1K | 2 | 2K | 2H | 3 |
| | ft. | ft. | ft. | ft. | ft. | ft. |
| Juniper, Rocky Mountain | 10-12 | 9-11 | — | — | — | 10-12 |
| Larch, Siberian | 14-18 | — | — | — | — | 13-16 |
| Pine, Ponderosa | 16-20 | 14-16 | — | — | — | 16-20 |
| Pine, Scotch | 16-18 | — | — | — | — | 14-17 |
| Redcedar, Eastern | 10-12 | 9-11 | — | — | — | 10-12 |
| Spruce, Black Hills | 16-20 | — | — | — | — | 15-19 |
| Spruce, Colorado Blue | 16-20 | — | — | — | — | 15-19 |

Table 10.—Windbreak Suitability Groups--Continued

Expected Conifer Heights at 20 Years

| Species | Windbreak suitability groups | | | | | |
|---|---|---|---|---|---|---|
| | 4 | 4C | 5 | 6D | 6G | 7 |
| | ft. | ft. | ft. | ft. | ft. | ft. |
| Juniper, Rocky Mountain | 9-11 | 9-11 | 8-10 | 7-9 | 7-9 | 7-9 |
| Larch, Siberian | — | — | 12-15 | — | — | — |
| Pine, Ponderosa | 15-17 | 15-17 | 13-18 | 12-14 | 12-14 | 11-13 |
| Pine, Scotch | 13-16 | 13-16 | 14-17 | 11-13 | 11-13 | — |
| Redcedar, Eastern | 9-11 | 9-11 | 8-10 | 7-9 | 7-9 | 7-9 |
| Spruce, Black Hills | — | — | — | — | — | — |
| Spruce, Colorado Blue | 10-15 | — | — | — | — | — |

Table 10.—Windbreak Suitability Groups--Continued

Expected Conifer Heights at 20 Years

| Species | Windbreak suitability groups | | | | |
|---|---|---|---|---|---|
| | 8 | 9C | 9L | 9W | 10 |
| | ft. | ft. | ft. | ft. | ft. |
| Juniper, Rocky Mountain | 6-8 | 5-7 | 5-7 | — | — |
| Larch, Siberian | — | — | — | — | — |
| Pine, Ponderosa | 11-13 | — | — | — | — |
| Pine, Scotch | — | — | — | — | — |
| Redcedar, Eastern | 6-8 | 5-7 | 5-7 | — | — |
| Spruce, Black Hills | — | — | — | — | — |
| Spruce, Colorado Blue | — | — | — | — | — |

# Rangeland

**Clayey range site.**

## Range Sites

**Range Site**

**Closed Depression range site.**

**Claypan range site.**

**Limy Subirrigated range site.**

**Saline Lowland range site.**

**Overflow range site.**

**Sands range site.**

**Sandy range site.**

**Sandy Claypan range site.**

**Shallow to Gravel range site.**

**Shallow range site.**

**Shallow Clay range site.**

**Silty range site.**

**Subirrigated Sands range site.**

**Subirrigated range site.**

**Thin Claypan range site.**

**Thin Sands range site.**

**Thin Upland range site.**

**Very Shallow range site.**

**Wetland range site.**

**Wet Meadow range site.**

## Range Site Plant Community, Composition, and Production

excellent, good, fair, poor,

Excellent

characteristic vegetation

good fair
poor

common name composition by weight

Total annual production

## Range Management

favorable average unfavorable

Stocking rates
animal-unit months
excellent good fair poor

## Range Condition

Table 11.-Range Site Report

(Dashes (—) indicate an range site is not assigned. Range sites are for undrained conditions.)

| Map symbol and soil name | Range site |
|---|---|
| 30: | |
| Amor | Silty |
| Arnegard | Overflow |
| 40: | |
| Amor | Silty |
| Werner | Shallow |
| Farnuf | Silty |
| 41: | |
| Amor | Silty |
| Werner | Shallow |

Table 11.-Range Site Report--Continued

| Map symbol and soil name | Range site |
|---|---|
| 714: | |
| Flaxton | Sandy |
| Williams | Silty |
| 727: | |
| Fordville | Silty |
| 863: | |
| Hamerly | Limy Subirrigated |
| 883: | |
| Hamerly | Limy Subirrigated |
| Tonka | Wet Meadow |
| Parnell | Wetland |
| 1011: | |
| Karlsruhe | Limy Subirrigated |
| 1181: | |
| Lohnes | Sands |
| 1202: | |
| Maddock | Sands |
| 1249: | |
| Appam | Shallow to Gravel |
| 1267: | |
| Marysland | Wet Meadow |
| 1372: | |
| Noonan | Claypan |
| Williams | Silty |
| 1374: | |
| Nutley | Clayey |
| 1375: | |
| Nutley | Clayey |
| 1427: | |
| Parnell | Wetland |
| 1437: | |
| Parshall | Sandy |
| 1466: | |
| Pits, gravel and sand | NR |
| 1676: | |
| Wildrose | Clayey |
| 1697: | |
| Sioux | Very Shallow |
| Arvilla | Shallow to Gravel |
| 1710: | |
| Southam | — |

Table 11.-Range Site Report--Continued

| Map symbol and soil name | Range site |
|---|---|
| 1762: | |
| Svea | Overflow |
| Barnes | Silty |
| 1805: | |
| Telfer | Sands |
| 1886: | |
| Hamerly, saline | Saline Lowland |
| Vallers, saline | Saline Lowland |
| 1898: | |
| Vebar | Sandy |
| 1978: | |
| Water | — |
| 2006: | |
| Williams | Silty |
| 2014: | |
| Williams | Silty |
| Bowbells | Overflow |
| 2015: | |
| Williams | Silty |
| Bowbells | Silty |
| 2031: | |
| Williams | Silty |
| Zahl | Thin Upland |
| 2037: | |
| Williams | Silty |
| Zahl | Thin Upland |
| Parnell | Wetland |
| 2073: | |
| Zahl | Thin Upland |
| Max | Silty |
| 2081: | |
| Zahl | Thin Upland |
| Williams | Silty |
| 2175: | |
| Zahl | Thin Upland |
| Williams | Silty |
| 2188: | |
| Wabek | Very Shallow |
| Lehr | Shallow to Gravel |

Table 11.-Range Site Report--Continued

| Map symbol and soil name | Range site |
|---|---|
| 2234: | |
| Amor | Silty |
| Werner | Shallow |
| 2235: | |
| Arnegard | Overflow |
| 2240: | |
| Bowdle | Silty |
| Lehr | Shallow to Gravel |
| 2241: | |
| Bryant | Silty |
| 2242: | |
| Cohagen | Shallow |
| Vebar | Sandy |
| Parshall | Sandy |
| 2243: | |
| Vebar | Sandy |
| Flasher | Shallow |
| 2244: | |
| Daglum | Claypan |
| Belfield | Clayey |
| 2246: | |
| Grail | Clayey |
| 2248: | |
| Lehr | Shallow to Gravel |
| Bowdle | Silty |
| 2249: | |
| Makoti | Silty |
| 2250: | |
| Makoti | Silty |
| Rusklyn | Thin Upland |
| 2252: | |
| Max | Silty |
| Zahl | Thin Upland |
| Arnegard | Overflow |
| 2253: | |
| Mondamin | Clayey |
| 2254: | |
| Overly | Silty |

Table 11.-Range Site Report--Continued

| Map symbol and soil name | Range site |
|---|---|
| 2255: | |
| Overly | Silty |
| Rusklyn | Thin Upland |
| 2257: | |
| Reeder | Silty |
| Arnegard | Overflow |
| 2258: | |
| Regent | Clayey |
| Savage | Clayey |
| 2259: | |
| Rhoades | Thin Claypan |
| Daglum | Claypan |
| 2260: | |
| Rusklyn | Thin Upland |
| 2261: | |
| Schaller | Shallow to Gravel |
| 2262: | |
| Schaller | Shallow to Gravel |
| 2263: | |
| Sinai | Clayey |
| 2264: | |
| Vebar | Sandy |
| Cohagen | Shallow |
| 2265: | |
| Wabek | Very Shallow |
| Appam | Shallow to Gravel |
| 2266: | |
| Wabek | Very Shallow |
| Appam | Shallow to Gravel |
| 2267: | |
| Werner | Shallow |
| Amor | Silty |
| Arnegard | Overflow |
| 2269: | |
| Cavour | Claypan |
| Barnes | Silty |
| 2270: | |
| Harriet | Thin Claypan |
| Stirum | Subirrigated |

Table 11.-Range Site Report--Continued

| Map symbol and soil name | Range site |
|---|---|
| 2271: | |
| Lohnes | Sands |
| 2272: | |
| Sioux | Very Shallow |
| Arvilla | Shallow to Gravel |
| 2273: | |
| Svea | Silty |
| Buse | Thin Upland |
| Parnell | $ilty |
| 2272: | |
| SBuse-s Parnell | e\|2272: |
| Sioux | |
| SBuse-s Parnell | e\|2272: |
| Sn Upland | |
| Parnell | |

Table 12.— Range Site Descriptions (MLRA 53B)

Clayey Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 35 |
| | Blue Grama | 10 |
| | Green Needlegrass | 10 |
| | Needleandthread | 5 |
| | Prairie Junegrass | 5 |
| | Porcupinegrass * | |
| | Prairie Dropseed * | 5 |
| | Slender Wheatgrass * | |
| | Bearded Wheatgrass * | |
| | Plains Reedgrass * | 5 |
| | Other Perennial Grasses * | |
| | Needleleaf Sedge * | |
| | Penn Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Fringed Sagewort * | |
| | Goatsbeard * | |
| | Prairie Coneflower * | 10 |
| | Scarlet Globemallow * | |
| | Silverleaf Scurfpea * | |
| | Western Yarrow * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Prairie Rose * | |
| | Western Snowberry * | 5 |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2100 to 2300 |
| Average | 1800 to 2000 |
| Unfavorable | 1500 to 1700 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.60 to 0.80 |
| Good | 0.40 to 0.60 |
| Fair | 0.20 to 0.40 |
| Poor | 0.10 to 0.20 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Claypan Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 40 |
| | Blue Grama | 20 |
| | Green Needlegrass | 5 |
| | Needleandthread | 5 |
| | Prairie Junegrass | 5 |
| | Inland Saltgrass * | |
| | Porcupinegrass * | 5 |
| | Sandberg Bluegrass * | |
| | Other Perennial Grasses * | |
| | Needleleaf Sedge * | |
| | Penn Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Mouseear Chickweed * | |
| | Rush Skeletonplant * | 5 |
| | Scarlet Globemallow * | |
| | Silverleaf Scurfpea * | |
| | Western Yarrow * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed * | |
| | Prairie Rose * | 5 |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1600 to 1800 |
| Average | 1350 to 1550 |
| Unfavorable | 1100 to 1300 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.45 to 0.60 |
| Good | 0.30 to 0.45 |
| Fair | 0.15 to 0.30 |
| Poor | 0.10 to 0.15 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Closed Depression Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 35 |
| | Prairie Cordgrass | 15 |
| | Fowl Bluegrass | 5 |
| | Foxtail Barley | 5 |
| | Inland Saltgrass | 5 |
| | Slender Wheatgrass * | 5 |
| | Other Perennial Grasses * | |
| | Common Spikerush * | |
| | Needle Spikerush * | 15 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Field Mint * | |
| | Nuttall Cinquefoil * | |
| | Povertyweed * | 15 |
| | Smartweed Species * | |
| | Western Dock * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2750 to 3000 |
| Average | 2400 to 2650 |
| Unfavorable | 2050 to 2300 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.75 to 1.00 |
| Good | 0.50 to 0.75 |
| Fair | 0.25 to 0.50 |
| Poor | 0.10 to 0.25 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Limy Subirrigated Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Little Bluestem | 45 |
| | Big Bluestem | 15 |
| | Indiangrass * | 10 |
| | Switchgrass * | |
| | Green Needlegrass * | |
| | Needleandthread * | 10 |
| | Slender Wheatgrass * | |
| | Western Wheatgrass * | |
| | Other Perennial Grasses * | |
| | Rushes * | 10 |
| | Sedge Species * | |
| Forbs (5% to 15% of Total) | American Licorice * | |
| | Goldenrod Species * | |
| | Maximillian Sunflower * | 10 |
| | Stiff Sunflower * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 3700 to 4100 |
| Average | 3200 to 3600 |
| Unfavorable | 2700 to 3100 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.05 to 1.40 |
| Good | 0.70 to 1.05 |
| Fair | 0.30 to 0.70 |
| Poor | 0.10 to 0.30 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Overflow Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Big Bluestem | 25 |
| | Green Needlegrass | 10 |
| | Western Wheatgrass | 10 |
| | Blue Grama | 5 |
| | Little Bluestem | 5 |
| | Needleandthread | 5 |
| | Porcupinegrass | 5 |
| | Other Perennial Grasses | 5 |
| | Bearded Wheatgrass * | |
| | Prairie Dropseed * | 5 |
| | Switchgrass * | |
| | Canada Wildrye * | |
| | Indiangrass * | 5 |
| | Northern Reedgrass * | |
| | Prairie Cordgrass * | |
| | Fescue Sedge * | |
| | Penn Sedge * | 5 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Fringed Sagewort * | |
| | Heath Aster * | |
| | Maximillian Sunflower * | |
| | Silverleaf Scurfpea * | 10 |
| | Wavyleaf Thistle * | |
| | Woolly Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Western Snowberry * | 5 |
| | Other Perennial Forbs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 3050 to 3450 |
| Average | 2600 to 3000 |
| Unfavorable | 2150 to 2550 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.90 to 1.20 |
| Good | 0.60 to 0.90 |
| Fair | 0.30 to 0.60 |
| Poor | 0.10 to 0.30 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Saline Lowland Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 35 |
| | Inland Saltgrass | 15 |
| | Nuttall Alkaligrass | 15 |
| | Slender Wheatgrass | 10 |
| | Foxtail Barley | 5 |
| | Alkali Cordgrass * | |
| | Alkali Muhly * | 5 |
| | Plains Bluegrass * | |
| | Mat Muhly * | Trace |
| | Other Perennial Grasses * | |
| | Prairie Bulrush * | 5 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Alkali Plantain * | |
| | Pursh Seepweed * | |
| | Silverweed Cinquefoil * | 10 |
| | Western Dock * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2800 to 3150 |
| Average | 2425 to 2775 |
| Unfavorable | 2050 to 2400 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.83 to 1.10 |
| Good | 0.55 to 0.83 |
| Fair | 0.28 to 0.55 |
| Poor | 0.10 to 0.28 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Sands Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 20 |
| | Prairie Sandreed | 20 |
| | Blue Grama | 5 |
| | Prairie Junegrass | 5 |
| | Sand Bluestem | 5 |
| | Western Wheatgrass | 5 |
| | Bearded Wheatgrass * | |
| | Canada Wildrye * | |
| | Green Needlegrass * | 5 |
| | Little Bluestem * | |
| | Porcupinegrass * | |
| | Sand Dropseed * | |
| | Panicum * | Trace |
| | Other Perennial Grasses * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 15 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Green Sagewort * | |
| | Hairy Goldaster * | |
| | Purple Coneflower * | 15 |
| | Purple Prairieclover * | |
| | Silky Prairie-Clover * | |
| | Stiff Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Leadplant Amorpha * | |
| | Prairie Rose * | 5 |
| | Western Snowberry * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2400 to 2700 |
| Average | 2050 to 2350 |
| Unfavorable | 1700 to 2000 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.68 to 0.90 |
| Good | 0.45 to 0.68 |
| Fair | 0.23 to 0.45 |
| Poor | 0.10 to 0.23 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Sandy Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 25 |
| | Prairie Sandreed | 20 |
| | Blue Grama | 5 |
| | Green Needlegrass | 5 |
| | Prairie Junegrass | 5 |
| | Western Wheatgrass | 5 |
| | Other Perennial Grasses | 5 |
| | Little Bluestem * | |
| | Panicum * | |
| | Porcupinegrass * | Trace |
| | Sand Dropseed * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 15 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Fringed Sagewort * | |
| | Green Sagewort * | |
| | Heath Aster * | 10 |
| | Missouri Goldenrod * | |
| | Western Ragweed * | |
| | Western Yarrow * | |
| | Woolly Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Leadplant Amorpha * | |
| | Prairie Rose * | 5 |
| | Western Snowberry * | |
| | Other Perennial Forbs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2500 to 2700 |
| Average | 2200 to 2400 |
| Unfavorable | 1900 to 2100 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.68 to 0.90 |
| Good | 0.45 to 0.68 |
| Fair | 0.23 to 0.45 |
| Poor | 0.10 to 0.23 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Sandy Claypan Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 35 |
| | Needleandthread | 20 |
| | Blue Grama | 15 |
| | Green Needlegrass | 5 |
| | Prairie Junegrass | 5 |
| | Inland Saltgrass | 5 |
| | Other Perennial Grasses | 5 |
| | Sun sedge * | 5 |
| | Threadleaf sedge * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Rush skeletonplant * | 5 |
| | Scarlet Globemallow * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | * | Trace |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2500 to 3000 |
| Average | 1500 to 2000 |
| Unfavorable | 500 to 1000 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.60 to 0.80 |
| Good | 0.40 to 0.60 |
| Fair | 0.20 to 0.40 |
| Poor | 0.10 to 0.20 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Shallow Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Little Bluestem | 25 |
| | Needleandthread | 15 |
| | Western Wheatgrass | 10 |
| | Blue Grama | 5 |
| | Plains Muhly | 5 |
| | Prairie Sandreed | 5 |
| | Sideoats Grama | 5 |
| | Green Needlegrass * | |
| | Porcupinegrass * | Trace |
| | Prairie Dropseed * | |
| | Prairie Junegrass * | |
| | Red Threeawn * | 5 |
| | Other Perennial Grasses * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Blacksamson * | |
| | Cudweed Sagewort * | |
| | Fringed Sagewort * | |
| | Hairy Goldaster * | 10 |
| | Purple Prairieclover * | |
| | Rush Skeletonplant * | |
| | Stiff Sunflower * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Buffaloberry * | |
| | Prairie Rose * | 5 |
| | Western Snowberry * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1850 to 2000 |
| Average | 1600 to 1750 |
| Unfavorable | 1350 to 1500 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.53 to 0.70 |
| Good | 0.35 to 0.53 |
| Fair | 0.18 to 0.35 |
| Poor | 0.10 to 0.18 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Shallow Clay Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | | 15 |
| | Green Needlegrass | | 15 |
| | Needleandthread | | 10 |
| | Blue Grama | | 5 |
| | Plains Muhly | | 5 |
| | Sideoats Grama | | 5 |
| | Little bluestem | | 5 |
| | Porcupinegrass | | 5 |
| | Prairie Dropseed | * | Trace |
| | Prairie Junegrass | * | |
| | Red Threeawn | * | 10 |
| | Other Perennial Grasses | | |
| | Penn Sedge | * | |
| | Threadleaf Sedge | * | 10 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Blacksamson | * | |
| | Cudweed Sagewort | * | |
| | Fringed Sagewort | * | |
| | Hairy Goldaster | * | 10 |
| | Purple Prairieclover | * | |
| | Rush Skeletonplant | * | |
| | Stiff Sunflower | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Buffaloberry | * | |
| | Prairie Rose | * | 5 |
| | Western Snowberry | * | |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1850 to 2000 |
| Average | 1600 to 1750 |
| Unfavorable | 1350 to 1500 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.53 to 0.70 |
| Good | 0.35 to 0.53 |
| Fair | 0.18 to 0.35 |
| Poor | 0.10 to 0.18 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Shallow to Gravel Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | | 35 |
| | Blue Grama | | 10 |
| | Green Needlegrass | | 10 |
| | Western Wheatgrass | | 10 |
| | Prairie Junegrass | | 5 |
| | Plains Muhly | * | |
| | Porcupinegrass | * | 5 |
| | Red Threeawn | * | |
| | Other Perennial Grasses | * | |
| | Needleleaf Sedge | * | |
| | Penn Sedge | * | 10 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Dotted Gayfeather | * | |
| | Fringed Sagewort | * | |
| | Hoods Phlox | * | |
| | Rush Skeletonplant | * | 10 |
| | Scarlet Globemallow | * | |
| | Woolly Goldenrod | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Prairie Rose | * | |
| | Western Snowberry | * | 5 |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1600 to 1850 |
| Average | 1300 to 1550 |
| Unfavorable | 1000 to 1250 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.45 to 0.60 |
| Good | 0.30 to 0.45 |
| Fair | 0.15 to 0.30 |
| Poor | 0.10 to 0.15 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Silty Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 20 |
| | Western Wheatgrass | 20 |
| | Blue Grama | 10 |
| | Green Needlegrass | 10 |
| | Porcupinegrass | 5 |
| | Prairie Junegrass | 5 |
| | Bearded Wheatgrass * | |
| | Prairie Dropseed * | Trace |
| | Other Perennial Grasses * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 15 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Dotted Gayfeather * | |
| | Fringed Sagewort * | |
| | Heath Aster * | 10 |
| | Silverleaf Scurfpea * | |
| | Stiff Sunflower * | |
| | Western Ragweed * | |
| | Western Yarrow * | |
| | Woolly Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Prairie Rose * | |
| | Western Snowberry * | 5 |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2200 to 2400 |
| Average | 1900 to 2100 |
| Unfavorable | 1600 to 1800 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.60 to 0.80 |
| Good | 0.40 to 0.60 |
| Fair | 0.20 to 0.40 |
| Poor | 0.10 to 0.20 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Subirrigated Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Big Bluestem | 40 |
| | Switchgrass | 15 |
| | Little Bluestem | 5 |
| | Prairie Cordgrass | 5 |
| | Indiangrass * | |
| | Northern Reedgrass * | 5 |
| | Slender Wheatgrass * | |
| | Mat Muhly * | |
| | Tall Dropseed * | 5 |
| | Western Wheatgrass * | |
| | Fowl Bluegrass * | |
| | Mat Muhly * | 5 |
| | Other Perennial Grasses * | |
| | Baltic Rush * | |
| | Common Spikerush * | |
| | Fescue Sedge * | 10 |
| | Slim Sedge * | |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Field Mint * | |
| | Maximillian Sunflower * | |
| | Rydberg's Sunflower * | 10 |
| | Tall Goldenrod * | |
| | Tall White Aster * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 3850 to 4250 |
| Average | 3425 to 3825 |
| Unfavorable | 3000 to 3400 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.13 to 1.50 |
| Good | 0.75 to 1.13 |
| Fair | 0.38 to 0.75 |
| Poor | 0.10 to 0.38 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Thin Claypan Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | | 45 |
| | Blue Grama | | 25 |
| | Inland Saltgrass | | 5 |
| | Prairie Junegrass | | 5 |
| | Sandberg Bluegrass | | 5 |
| | Alkali Muhly | * | |
| | Needleandthread | * | |
| | Nuttall Alkaligrass | * | Trace |
| | Tumble Grass | * | |
| | Other Perennial Grasses | * | |
| | Needleleaf Sedge | * | 5 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Bladderpod | * | |
| | Fringed Sagewort | * | |
| | Lemon Scurfpea | * | 5 |
| | Rush Skeletonplant | * | |
| | Scarlet Globemallow | * | |
| | Western Yarrow | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed | * | 5 |
| | Other Perennial Shrubs | * | |

| Total Annual Production (Excellent Condition) | |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 850 to 1100 |
| Average | 575 to 825 |
| Unfavorable | 300 to 550 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.23 to 0.30 |
| Good | 0.15 to 0.23 |
| Fair | 0.08 to 0.15 |
| Poor | 0.05 to 0.08 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Thin Sands Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 25 |
| | Prairie Sandreed | 25 |
| | Blue Grama | 5 |
| | Prairie Junegrass | 5 |
| | Sand Bluestem | 5 |
| | Other Perennial Grasses | 5 |
| | Canada Wildrye * | |
| | Little Blustem * | Trace |
| | Sand Dropseed * | |
| | Western Wheatgrass * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Green Sagewort * | |
| | Hairy Goldaster * | |
| | Lemon Scurfpea * | 10 |
| | Missouri Golderod * | |
| | Prairie Spiderwort * | |
| | Silky Prairie-Clover * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed * | |
| | Leadplant Amorpha * | 10 |
| | Prairie Rose * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1700 to 1950 |
| Average | 1400 to 1650 |
| Unfavorable | 1100 to 1350 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.45 to 0.60 |
| Good | 0.30 to 0.45 |
| Fair | 0.15 to 0.30 |
| Poor | 0.10 to 0.15 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Thin Upland Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (0% to 85% of Total) | Little Bluestem | 20 |
| | Needleandthread | 15 |
| | Western Wheatgrass | 10 |
| | Sideoats Grama | 10 |
| | Blue Grama | 5 |
| | Plains Muhly | 5 |
| | Prairie Sandreed | 5 |
| | Green Needlegrass * | |
| | Hooker Oatgrass * | Trace |
| | Prairie Junegrass * | |
| | Porcupinegrass * | |
| | Red Threeawn * | 5 |
| | Other Perennial Grasses * | |
| | Sunn Sedge * | |
| | Threadleaf Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (0% to 10% of Total) | Dotted Gayfeather * | |
| | Fringed Sagewort * | |
| | Missouri Golderod * | |
| | Pasqueflower * | 10 |
| | Hoods Phlox * | |
| | Black Samson * | |
| | Purple Prairieclover * | |
| | Stiff Sunflower * | |
| | Broom Snakeweed * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% to 5% of Total) | Western Snowberry | |
| | Prairie Rose * | 5 |
| | Silverberry * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2100 to 2300 |
| Average | 1800 to 2000 |
| Unfavorable | 1500 to 1700 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.53 to 0.70 |
| Good | 0.35 to 0.53 |
| Fair | 0.18 to 0.35 |
| Poor | 0.10 to 0.18 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Very Shallow Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | | 35 |
| | Blue Grama | | 10 |
| | Western Wheatgrass | | 10 |
| | Plains Muhly | | 5 |
| | Prairie Junegrass | | 5 |
| | Red Threeawn | | 5 |
| | Bearded Wheatgrass | * | |
| | Sand Dropseed | * | 5 |
| | Sideoats Grama | * | |
| | Other Perennial Grasses | * | |
| | Needleleaf Sedge | * | |
| | Penn Sedge | * | 10 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Dotted Gayfeather | * | |
| | Fringed Sagewort | * | |
| | Green Sagewort | * | |
| | Purple Prairieclover | * | 10 |
| | Rush Skeletonplant | * | |
| | Western Yarrow | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed | * | |
| | Prairie Rose | * | 5 |
| | Western Snowberry | * | |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 900 to 1100 |
| Average | 675 to 875 |
| Unfavorable | 450 to 650 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.23 to 0.30 |
| Good | 0.15 to 0.23 |
| Fair | 0.08 to 0.15 |
| Poor | 0.05 to 0.08 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Wet Meadow Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Prairie Cordgrass | 10 |
| | Fescue Sedge | 5 |
| | Northern Reedgrass | 5 |
| | Switchgrass | 5 |
| | Fowl Bluegrass * | |
| | Mat Muhly * | 5 |
| | Other Perennial Grasses * | |
| | Slim Sedge * | 55 |
| | Woolly Sedge * | |
| | Baltic Rush * | |
| | Common Spikerush * | 5 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | False Aster * | |
| | Field Mint * | |
| | Germander * | 10 |
| | Macoun's Buttercup * | |
| | Rydberg's Sunflower * | |
| | Tall White Aster * | |
| | Western Waterhorehound * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 4500 to 4900 |
| Average | 4000 to 4200 |
| Unfavorable | 3500 to 3900 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.28 to 1.70 |
| Good | 0.85 to 1.28 |
| Fair | 0.43 to 0.85 |
| Poor | 0.10 to 0.85 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 53B)--Continued

Wetland Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Rivergrass | | 35 |
| | Northern Reedgrass | | 5 |
| | Prairie Cordgrass | | 5 |
| | American Mannagrass | * | |
| | American Sloughgrass | * | |
| | Reed Canarygrass | * | 5 |
| | Other Perennial Grasses | * | |
| | Baltic Rush | * | |
| | Common Spikerush | * | 5 |
| | Other Sedged/Rushes | * | |
| | Beaked Sedge | * | |
| | Slough Sedge | * | 35 |
| | Smooth-Cone Sedge | * | |
| | Water Sedge | * | |
| | Slim Sedge | * | 5 |
| | Woolly Sedge | * | |
| Forbs (5% to 15% of Total) | Longroot Smartweed | * | |
| | Mexican Dock | * | |
| | Nuttall Cinquefoil | * | 5 |
| | Waterparsnip | * | |
| | Waterplantain | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Sandbar Willow | * | Trace |
| | Willow Species | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 5700 to 6100 |
| Average | 5200 to 5600 |
| Unfavorable | 4700 to 5100 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.65 to 2.20 |
| Good | 1.10 to 1.65 |
| Fair | 0.55 to 1.10 |
| Poor | 0.10 to 0.55 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)

Clayey Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 40 |
| | Blue Grama | 10 |
| | Green Needlegrass | 10 |
| | Prairie Junegrass | 5 |
| | Needleandthread * | |
| | Porcupinegrass * | 5 |
| | Sandberg Bluegrass * | |
| | Plains Reedgrass * | 10 |
| | Other Perennial Grasses * | |
| | Needleleaf Sedge * | |
| | Penn Sedge * | 5 |
| | Other Sedges/Rushes * | |
| | Slender Wheatgrass * | 5 |
| | Thickspike Wheatgrass * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Goatsbeard * | |
| | Prairie Coneflower * | |
| | Prairie Onion * | 5 |
| | Prairie Themopsis * | |
| | Scarlet Globemallow * | |
| | Western Yarrow * | |
| | Other Perennial Shrubs * | |
| Shrubs and Trees (5% to 15% of Total) | Prairie Rose * | |
| | Silver Sagebrush * | |
| | Western Snowberry * | 5 |
| | Winterfat * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1600 to 1700 |
| Average | 1400 to 1500 |
| Unfavorable | 1200 to 1300 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.45 to 0.60 |
| Good | 0.30 to 0.45 |
| Fair | 0.15 to 0.30 |
| Poor | 0.10 to 0.15 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Claypan Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | | 25 |
| | Blue Grama | | 20 |
| | Needleandthread | | 15 |
| | Green Needlegrass | | 5 |
| | Prairie Junegrass | | 5 |
| | Sandberg Bluegrass | | 5 |
| | Inland Saltgrass | * | 5 |
| | Buffalograss | * | |
| | Praire Sandreed | * | |
| | Sand Dropseed | * | |
| | Needleleaf Sedge | * | |
| | Penn Sedge | * | 10 |
| | Threadleaf Sedge | * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort | * | |
| | Mouseear Chickweed | * | |
| | Rush Skeletonplant | * | |
| | Scarlet Globemallow | * | 5 |
| | Silverleaf Scurfpea | * | |
| | Small Clubmoss | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed | * | 5 |
| | Big Sagebrush | * | |
| | Silver Sagebrush | * | |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1450 to 1650 |
| Average | 1200 to 1400 |
| Unfavorable | 950 to 1150 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.38 to 0.50 |
| Good | 0.25 to 0.38 |
| Fair | 0.13 to 0.25 |
| Poor | 0.10 to 0.13 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Closed Depression Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 50 |
| | Prairie Cordgrass | 10 |
| | Foxtail Barley | 5 |
| | Common Spikerush | 5 |
| | Fowl Bluegrass | 5 |
| | Needle Spikerush | Trace |
| | Other Sedges/Rushes | Trace |
| | Inland Saltgrass * | |
| | Slender Wheatgrass * | 10 |
| | Other Perennial Grasses * | |
| Forbs (5% to 15% of Total) | Curly Dock | 5 |
| | Nuttail Cinquefoil * | |
| | Povertyweed * | 10 |
| | Smartweed Species * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production (Excellent Condition) | |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2500 to 2800 |
| Average | 2100 to 2400 |
| Unfavorable | 1700 to 2000 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.88 to 0.90 |
| Good | 0.45 to 0.68 |
| Fair | 0.23 to 0.45 |
| Poor | 0.10 to 0.23 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Overflow Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Big Bluestem | 20 |
| | Western Wheatgrass | 20 |
| | Green Needlegrass | 15 |
| | Needleandthread | 5 |
| | Other Perennial Grasses | 5 |
| | Blue Grama * | |
| | Canada Wildrye * | |
| | Little Bluestem * | 10 |
| | Porcupinegrass * | |
| | Prairie Dropseed * | |
| | Bicknell's Sedge * | |
| | Fescue Sedge * | 5 |
| | Penn Sedge * | |
| | Other Sedges/Rushes * | |
| | Bearded Wheatgrass * | |
| | Bluebunch Wheatgrass * | 5 |
| | Slender Wheatgrass * | |
| Forbs (5% to 15% of Total) | American Vetch * | |
| | Heath Aster * | |
| | Missouri Goldenrod * | 10 |
| | Prairie Coneflower * | |
| | Silverleaf Scurfpea * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Juneberry * | 2 |
| | Western Snowberry * | |
| | American Elm * | |
| | Bur Oak * | |
| | Common Chokecherry * | 3 |
| | Green Ash * | |
| | Quaking Aspen * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2700 to 3000 |
| Average | 2300 to 2600 |
| Unfavorable | 1900 to 2200 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.75 to 1.00 |
| Good | 0.50 to 0.75 |
| Fair | 0.25 to 0.50 |
| Poor | 0.10 to 0.25 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Saline Lowland Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 35 |
| | Inland Saltgrass | 20 |
| | Nuttall Alkaligrass | 15 |
| | Slender Wheatgrass | 5 |
| | Alkali Cordgrass * | 5 |
| | Foxtail Barley * | |
| | Little Bluestem * | 5 |
| | Mat Muhly * | |
| | Alkali Muhly * | |
| | Plains Bluegrass * | 5 |
| | Other Perennial Grasses * | |
| | Prairie Bulrush * | Trace |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Alkali Plantain * | |
| | Sock Species * | 10 |
| | Pursh Seepweed * | |
| | Silverweed Cinquefoil * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production (Excellent Condition) | |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2550 to 2850 |
| Average | 2200 to 2500 |
| Unfavorable | 1850 to 2150 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.75 to 1.00 |
| Good | 0.50 to 0.75 |
| Fair | 0.25 to 0.50 |
| Poor | 0.10 to 0.25 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Sands Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 20 |
| | Prairie Sandreed | 20 |
| | Blue Grama | 10 |
| | Little Bluestem | 5 |
| | Western Wheatgrass | 5 |
| | Prairie Junegrass * | |
| | Sand Bluestem * | 10 |
| | Sand Dropseed * | |
| | Porcupinegrass * | 5 |
| | Other Perennial Grasses * | |
| | Penn Sedge * | |
| | Sun Sedge * | 10 |
| | Threadleaf Sedge * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Gray Goldenrod * | |
| | Green Sagewort * | |
| | Hairy Goldaster * | 10 |
| | Prairie Spiderwort * | |
| | Purple Coneflower * | |
| | Stiff Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Leadplant Amorpha * | |
| | Prairie Rose * | |
| | Silver Sagebrush * | 5 |
| | Western Snowberry * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2200 to 2500 |
| Average | 1850 to 2150 |
| Unfavorable | 1500 to 1800 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.60 to 0.80 |
| Good | 0.40 to 0.60 |
| Fair | 0.20 to 0.40 |
| Poor | 0.10 to 0.20 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Sandy Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Prairie Sandreed | 20 |
| | Needleandthread | 20 |
| | Blue Grama | 10 |
| | Western Wheatgrass | 10 |
| | Green Needlegrass | 5 |
| | Prairie Junegrass | 5 |
| | Other Perennial Grasses * | 5 |
| | Sand Dropseed * | |
| | Penn Sedge * | |
| | Sun Sedge * | 10 |
| | Threadleaf Sedge * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Gray Goldenrod * | |
| | Large Beardtongue * | 10 |
| | Prairie Spiderwort * | |
| | Silverleaf Scurfpea * | |
| | Western Yarrow * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Leadplant Amorpha * | |
| | Prairie Rose * | |
| | Silver Sagebrush * | 5 |
| | Western Snowberry * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2100 to 2300 |
| Average | 1800 to 2000 |
| Unfavorable | 1500 to 1700 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.60 to 0.80 |
| Good | 0.40 to 0.60 |
| Fair | 0.20 to 0.40 |
| Poor | 0.10 to 0.20 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Sandy Claypan Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 35 |
| | Needleandthread | 20 |
| | Blue Grama | 20 |
| | Prairie Junegrass * | 5 |
| | Other Perennial Grasses * | |
| | PraSilv.060.06br((14 -2.571 Td (Prairie Junegrass)Tj 11leandthread)]Tewort | |
| | Sun Sedge * | 5 |
| | Threadleaf sedge * | |
| Forbs | Fringed Sagewort * | |

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Shallow Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Little Bluestem | | 24 |
| | Needleandthread | | 10 |
| | Prairie Sandreed | | 10 |
| | Western Wheatgrass | | 5 |
| | Plains Muhly | | 5 |
| | Blue Grama | | 5 |
| | Sideoats Grama | | 5 |
| | Plains Reedgrass | * | |
| | Prairie Junegrass | * | 5 |
| | Porcupinegrass | * | |
| | Red Threeawn | * | |
| | Other Perennial Grasses | | 5 |
| | Penn Sedge | * | |
| | Threadleaf Sedge | * | 10 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Blacksamson | * | |
| | Fringed Sagewort | * | |
| | Dotted Gayfeather | * | |
| | Green Sagewort | * | |
| | Rush Skeletonplant | * | 10 |
| | Purple Prairieclover | * | |
| | Stiff Sunflower | * | |
| | Hairy Goldaster | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Shrubby Cinquefoil | * | |
| | Winterfat | * | 5 |
| | Western Snowberry | * | |
| | Other Perennial Shrubs | * | |

| Total Annual Production (Excellent Condition) | |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1550 to 1650 |
| Average | 1200 to 1400 |
| Unfavorable | 950 to 1150 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.45 to 0.60 |
| Good | 0.30 to 0.45 |
| Fair | 0.15 to 0.30 |
| Poor | 0.10 to 0.15 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Shallow Clay Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | | 50 |
| | Green Needlegrass | | 5 |
| | Plains Muhly | | 5 |
| | Sandberg Bluegrass | | 5 |
| | Blue Grama | | 5 |
| | Plains Reedgrass | * | |
| | Sideoats Grama | * | 5 |
| | Thickspike Wheatgrass | * | |
| | Inland Saltgrass | * | |
| | Little Bluestem | * | |
| | Needleandthread | * | 5 |
| | Prairie Junegrass | * | |
| | Other Perennial Grasses | * | |
| | Needleleaf Sedge | * | Trace |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Eriogonum Species | * | |
| | Fringed Sagewort | * | |
| | Povertyweed | * | 10 |
| | Priarie Themopsis | * | |
| | Rush Skeletonplant | * | |
| | Woolly Indianwheat | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed | * | |
| | Green Plume Rabbitbrush | * | 10 |
| | Nuttall Saltbush | * | |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1100 to 1200 |
| Average | 900 to 1000 |
| Unfavorable | 700 to 800 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.45 to 0.60 |
| Good | 0.30 to 0.45 |
| Fair | 0.15 to 0.30 |
| Poor | 0.10 to 0.15 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Shallow to Gravel Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 25 |
| | Blue Grama | 20 |
| | Western Wheatgrass | 10 |
| | Plains Muhly | 5 |
| | Prairie Junegrass | 5 |
| | Red Threeawn | 5 |
| | Green Needlegrass * | |
| | Prairie Sandreed * | Trace |
| | Other Perennial Grasses * | |
| | Needleleaf Sedge * | |
| | Penn Sedge * | 15 |
| | Threadleaf Sedge * | |
| Forbs (5% to 15% of Total) | Dotted Gayfeather * | |
| | Fringed Sagewort * | |
| | Hoods Phlox * | |
| | Rush Skeletonplant * | 10 |
| | Scarlet Globemallow * | |
| | Woolly Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Ball Cactus * | |
| | Prickleypear * | 5 |
| | Prairie Rose * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1400 to 1600 |
| Average | 1100 to 1300 |
| Unfavorable | 800 to 1000 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.38 to 0.50 |
| Good | 0.25 to 0.38 |
| Fair | 0.13 to 0.25 |
| Poor | 0.10 to 0.13 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Silty Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 25 |
| | Blue Grama | 15 |
| | Needleandthread | 15 |
| | Green Needlegrass | 10 |
| | Prairie Junegrass | 5 |
| | Other Perennial Grasses | 5 |
| | Bearded Wheatgrass * | |
| | Porcupinegrass * | 5 |
| | Red Threeawn * | |
| | Sandberg Bluegrass * | |
| | Needleleaf Sedge * | |
| | Penn Sedge * | 5 |
| | Threadleaf Sedge * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Green Sagewort * | |
| | Heath Aster * | |
| | Hoods Phlox * | 10 |
| | Prairie Coneflower * | |
| | Purple Prairieclover * | |
| | Scarlet Globemallow * | |
| Shrubs and Trees (5% to 15% of Total) | Prairie Rose * | |
| | Silver Sagbrush * | 5 |
| | Western Snowberry * | |
| | Winterfat * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2000 to 2250 |
| Average | 1700 to 1950 |
| Unfavorable | 1400 to 1650 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.53 to 0.70 |
| Good | 0.35 to 0.53 |
| Fair | 0.18 to 0.35 |
| Poor | 0.10 to 0.18 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Subirrigated Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Big Bluestem | 40 |
| | Switchgrass | 15 |
| | Prairie Cordgrass | 5 |
| | Little Bluestem | 5 |
| | Indiangrass * | |
| | Northern Reedgrass * | 5 |
| | Slender Wheatgrass * | |
| | Mat Muhly * | 5 |
| | Western Wheatgrass * | |
| | Fowl Bluegrass * | |
| | Mat Muhly * | 5 |
| | Other Perennial Grasses * | |
| | Baltic Rush * | |
| | Common Spikerush * | |
| | Fescue Sedge * | 10 |
| | Slim Sedge * | |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Cinquefoil * | |
| | Field Mint * | |
| | Maximillian Sunflower * | |
| | Rydberg's Sunflower * | 10 |
| | Tall Goldenrod * | |
| | Tall White Aster * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 3850 to 4250 |
| Average | 3425 to 3825 |
| Unfavorable | 3000 to 3400 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.13 to 1.50 |
| Good | 0.75 to 1.13 |
| Fair | 0.38 to 0.75 |
| Poor | 0.10 to 0.38 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Thin Claypan Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Blue Grama | | 30 |
| | Western Wheatgrass | | 30 |
| | Prairie Junegrass | | 5 |
| | Sandberg Bluegrass | | 5 |
| | Other Perennial Grasses | | 5 |
| | Buffalograss | * | |
| | Inland Saltgrass | * | |
| | Needleandthread | * | 5 |
| | Other Wheatgrasses | * | |
| | Tumblegrass | * | |
| | Needleleaf Sedge | * | 5 |
| | Penn Sedge | * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort | 5 | |
| | Mouseear Chickweed | * | |
| | Rush Skeletonplant | * | 5 |
| | Scarlet Globemallow | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Ball Cactus | * | |
| | Broom Snakeweed | * | 5 |
| | Sagebrush Species | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 700 to 850 |
| Average | 500 to 650 |
| Unfavorable | 300 to 450 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.19 to 0.25 |
| Good | 0.13 to 0.19 |
| Fair | 0.06 to 0.13 |
| Poor | 0.05 to 0.06 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Thin Sands Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 25 |
| | Prairie Sandreed | 20 |
| | Blue Grama | 5 |
| | Prairie Junegrass | 5 |
| | Sand Dropseed | 5 |
| | Other Perennial Grasses | 5 |
| | Canada Wildrye * | |
| | Hairy Grama * | 10 |
| | Sand Bluestem * | |
| | Western Wheatgrass * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Hairy Goldaster * | |
| | Lemon Scurfpea * | 10 |
| | Prairie Spiderwort * | |
| | Stiff Goldenrod * | |
| Shrubs and Trees (5% to 15% of Total) | Creeping Juniper * | |
| | Leadplant Amorpha * | |
| | Prairie Rose * | 5 |
| | Silver Sagebrush * | |
| | Western Snowberry * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1600 to 1700 |
| Average | 1400 to 1500 |
| Unfavorable | 1200 to 1300 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.45 to 0.60 |
| Good | 0.30 to 0.45 |
| Fair | 0.15 to 0.30 |
| Poor | 0.10 to 0.15 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Thin Upland Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Little Bluestem | 25 |
| | Needleandthread | 10 |
| | Green Needlegrass | 5 |
| | Bearded Wheatgrass | 5 |
| | Plains Muhly | 5 |
| | Porcupinegrass | 5 |
| | Prairie Dropseed | 5 |
| | Sideoats Grama | 5 |
| | Western Wheatgrass | 5 |
| | Other Perennial Grasses | 5 |
| | Blue Grama * | |
| | Prairie Junegrass * | Trace |
| | Prairie Sandreed * | |
| | Red Threeawn * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Dotted Gayfeather * | |
| | Fringed Sagewort * | |
| | Missouri Golderod * | |
| | Pasqueflower * | 10 |
| | Purple Coneflower * | |
| | Purple Prairieclover * | |
| | Stiff Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Silverberry * | |
| | Western Snowberry * | 5 |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1600 to 1700 |
| Average | 1400 to 1500 |
| Unfavorable | 1200 to 1300 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.45 to 0.60 |
| Good | 0.30 to 0.45 |
| Fair | 0.15 to 0.30 |
| Poor | 0.10 to 0.15 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Very Shallow Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 20 |
| | Blue Grama | 15 |
| | Little Bluestem | 15 |
| | Western Wheatgrass | 5 |
| | Plains Muhly | 5 |
| | Prairie Junegrass | 5 |
| | Red Threeawn | 5 |
| | Other Wheatgrasses * | |
| | Sandberg Bluegrass * | |
| | Sand Dropseed * | 5 |
| | Sideoats Grama * | |
| | Other Perennial Grasses * | |
| | Needleleaf Sedge * | |
| | Penn Sedge * | 10 |
| | Threadleaf Sedge * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Fringed Sagewort * | |
| | Prairie Coneflower * | 10 |
| | Purple Prairieclover * | |
| | Western Yarrow * | |
| | Yellow Eriogonum * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed * | |
| | Creeping Juniper * | 5 |
| | Skunbush Sumac * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 700 to 850 |
| Average | 500 to 650 |
| Unfavorable | 300 to 450 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.19 to 0.25 |
| Good | 0.13 to 0.19 |
| Fair | 0.06 to 0.13 |
| Poor | 0.05 to 0.06 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Wet Meadow Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Prairie Cordgrass | 25 |
| | Fescue Sedge | 10 |
| | Northern Reedgrass | 10 |
| | Baltic Rush | 5 |
| | Fowl Bluegrass | 5 |
| | Other Perennial Grasses | 5 |
| | Other Sedges/Rushes | 5 |
| | Switchgrass | 5 |
| | Mat Muhly | Trace |
| | Common Spikerush | Trace |
| | Sartwell's Sedge * | |
| | Slim Sedge * | 25 |
| | Woolly Sedge * | |
| Forbs (5% to 15% of Total) | Field Mint * | |
| | Maximillian Sunflower * | |
| | Rydberg's Sunflower * | 5 |
| | Spreading Dogbane * | |
| | Tall Goldenrod * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 4100 to 4500 |
| Average | 3600 to 4000 |
| Unfavorable | 3100 to 3500 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.20 to 1.60 |
| Good | 0.80 to 1.20 |
| Fair | 0.40 to 0.80 |
| Poor | 0.10 to 0.40 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 54)--Continued

Wetland Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Prairie Cordgrass | 20 |
| | Rivergrass | 20 |
| | Common Spikerush | 10 |
| | Baltic Rush | 5 |
| | Northern Reedgrass | 5 |
| | Other Perennial Grasses | Trace |
| | American Mannagrass * | |
| | American Sloughgrass * | 5 |
| | Reed Canarygrass * | |
| | Burreed * | |
| | River Bulrush * | 5 |
| | Other Sedged/Rushes * | |
| | Beaked Sedge * | |
| | Slough Sedge * | 15 |
| | Smooth-Cone Sedge * | |
| | Water Sedge * | |
| | Sartwell's Sedge * | |
| | Slim Sedge * | 10 |
| | Woolly Sedge * | |
| Forbs (5% to 15% of Total) | Curly Dock * | |
| | False Aster * | |
| | Longroot Smartweed * | 5 |
| | Rydberg's Smartweed * | |
| | Tall White Aster * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 5300 to 5700 |
| Average | 4800 to 5200 |
| Unfavorable | 4300 to 4700 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.50 to 2.00 |
| Good | 1.00 to 1.50 |
| Fair | 0.50 to 1.00 |
| Poor | 0.10 to 0.50 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)

Clayey Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Green Needlegrass | | 20 |
| | Western Wheatgrass | | 35 |
| | Other Perennial Grasses | | 10 |
| | Bearded Wheatgrass | | 5 |
| | Porcupinegrass | | 5 |
| | Blue Grama | | 5 |
| | Needleandthread | * | |
| | Plains Reedgrass | * | 10 |
| | Prairie Dropseed | * | |
| | Prairie Junegrass | * | |
| | Needleleaf Sedge | * | |
| | Penn Sedge | * | Trace |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort | * | |
| | Fringed Sagewort | * | |
| | Goatsbeard | * | |
| | Prairie Coneflower | * | 10 |
| | Scarlet Globemallow | * | |
| | Silverleaf Scurfpea | * | |
| | Western Yarrow | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Prairie Rose | * | |
| | Western Snowberry | * | 5 |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2600 to 2900 |
| Average | 2250 to 2550 |
| Unfavorable | 1900 to 2200 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.75 to 1.00 |
| Good | 0.50 to 0.75 |
| Fair | 0.25 to 0.50 |
| Poor | 0.10 to 0.25 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Claypan Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | 25 |
| | Blue Grama | 15 |
| | Green Needlegrass | 10 |
| | Needleandthread | 10 |
| | Prairie Junegrass | 5 |
| | Bearded Wheatgrass | 5 |
| | Inland Saltgrass * | |
| | Porcupinegrass * | 5 |
| | Tumblegrass * | |
| | Other Perennial Grasses * | |
| | Needleleaf Sedge * | |
| | Penn Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Mousear Chickweed * | |
| | Rush Skeletonplant * | |
| | Scarlet Globemallow * | 10 |
| | Silverleaf Scurfpea * | |
| | Western Yarrow * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed * | |
| | Prairie Rose * | 5 |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2000 to 2250 |
| Average | 1700 to 1950 |
| Unfavorable | 1450 to 1650 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.53 to 0.70 |
| Good | 0.35 to 0.53 |
| Fair | 0.18 to 0.35 |
| Poor | 0.10 to 0.18 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Limy Subirrigated Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Little Bluestem | 45 |
| | Big Bluestem | 15 |
| | Indiangrass * | 10 |
| | Switchgrass * | |
| | Green Needlegrass * | |
| | Needleandthread * | |
| | Slender Wheatgrass * | 10 |
| | Western Wheatgrass * | |
| | Other Perennial Grasses * | |
| | Rushes * | 10 |
| | Sedge Species * | |
| Forbs (5% to 15% of Total) | American Licorice * | |
| | Goldenrod Species * | |
| | Maximilian Sunflower * | 10 |
| | Stiff Sunflower * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (0% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 4300 to 4800 |
| Average | 3700 to 4200 |
| Unfavorable | 3100 to 3600 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.20 to 1.60 |
| Good | 0.80 to 1.20 |
| Fair | 0.40 to 0.80 |
| Poor | 0.10 to 0.40 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Overflow Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Big Bluestem | 30 |
| | Bearded Wheatgrass | 5 |
| | Green Needlegrass | 5 |
| | Porcupinegrass | 5 |
| | Prairie Cordgrass | 5 |
| | Prairie Dropseed | 5 |
| | Switchgrass | 5 |
| | Western Wheatgrass | 5 |
| | Canada Wildrye * | |
| | Needleandthread * | 5 |
| | Northern Reedgrass * | |
| | Indiangrass * | |
| | Mat Muhly * | 5 |
| | Tall Dropseed * | |
| | Blue Grama * | 5 |
| | Other Perennial Grasses * | |
| | Fescue Sedge * | |
| | Penn Sedge * | 5 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Fringed Sagewort * | |
| | Heath Aster * | |
| | Maximilian Sunflower * | |
| | Silverleaf Scurfpea * | 10 |
| | Wild Blue Lettuce * | |
| | Wooly Goldenrod * | |
| | Other Sedges/Rushes * | |
| Shrubs and Trees (5% to 15% of Total) | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 3600 to 4000 |
| Average | 3175 to 3575 |
| Unfavorable | 2750 to 3150 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.05 to 1.40 |
| Good | 0.70 to 1.05 |
| Fair | 0.35 to 0.70 |
| Poor | 0.10 to 0.35 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Saline Lowland Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | | 45 |
| | Slender Wheatgrass | | 15 |
| | Inland Saltgrass | | 10 |
| | Nuttall Alkaligrass | | 5 |
| | Alkali Cordgrass | * | |
| | Foxtail Cordgrass | * | |
| | Mat Muhly | * | 10 |
| | Plains Bluegrass | * | |
| | Other Perennial Grasses | * | |
| | Prairie Bulrush | * | 5 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Alkali Plantain | * | |
| | Silverweed | * | 10 |
| | Western Dock | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (0% of Total) | | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 3200 to 3500 |
| Average | 2850 to 3150 |
| Unfavorable | 2500 to 2800 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.90 to 1.20 |
| Good | 0.60 to 0.90 |
| Fair | 0.30 to 0.60 |
| Poor | 0.10 to 0.30 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Sands Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Prairie Sandreed | | 25 |
| | Needleandthread | | 10 |
| | Blue Grama | | 5 |
| | Porcupinegrass | | 5 |
| | Sand Bluestem | | 5 |
| | Western Wheatgrass | | 5 |
| | Bearded Wheatgrass | * | |
| | Canada Wildrye | * | 15 |
| | Little Bluestem | * | |
| | Sand Dropseed | * | |
| | Green Needlegrass | * | |
| | Prairie Junegrass | * | 10 |
| | Other Perennial Grasses | * | |
| | Penn Sedge | * | |
| | Threadleaf Sedge | * | 10 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort | * | |
| | Green Sagewort | * | |
| | Hairy Goldaster | * | |
| | Purple Coneflower | * | 15 |
| | Purple Prairieclover | * | |
| | Stiff Goldenrod | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Leadplant Amorpha | * | |
| | Prairie Rose | * | 5 |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2950 to 3300 |
| Average | 2575 to 2925 |
| Unfavorable | 2200 to 2550 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.83 to 1.10 |
| Good | 0.55 to 0.83 |
| Fair | 0.28 to 0.55 |
| Poor | 0.10 to 0.28 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Sandy Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Prairie Sandreed | 25 |
| | Needleandthread | 15 |
| | Blue Grama | 5 |
| | Green Needlegrass | 5 |
| | Porcupinegrass | 5 |
| | Western Wheatgrass | 5 |
| | Bearded Wheatgrass * | |
| | Prairie Dropseed * | |
| | Prairie Junegrass * | 10 |
| | Little Bluestem * | |
| | Sand Dropseed * | |
| | Other Perennial Grasses * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort * | |
| | Fringed Sagewort * | |
| | Goatsbeard * | |
| | Green Sagewort * | |
| | Heath Aster * | 15 |
| | Western Ragweed * | |
| | Western Yarrow * | |
| | Wooly Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Leadplant Amorpha * | |
| | Prairie Rose * | 5 |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2850 to 3200 |
| Average | 2475 to 2825 |
| Unfavorable | 2100 to 2450 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.83 to 1.10 |
| Good | 0.55 to 0.83 |
| Fair | 0.28 to 0.55 |
| Poor | 0.10 to 0.28 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Sandy Claypan Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | | 35 |
| | Needleandthread | | 20 |
| | Blue Grama | | 15 |
| | Green Needlegrass | | 5 |
| | Prairie Junegrass | | 5 |
| | Inland Saltgrass | | 5 |
| | Other Perennial Grasses | | 5 |
| | Sun Sedge | * | 5 |
| | Threadleaf Sedge | * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort | * | |
| | Rush Skeletonplant | * | |
| | Scarlet Globemallow | * | 5 |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (0% to 5% of Total) | | | Trace |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2700 to 3200 |
| Average | 1800 to 2300 |
| Unfavorable | 800 to 1500 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.60 to 0.80 |
| Good | 0.40 to 0.60 |
| Fair | 0.20 to 0.40 |
| Poor | 0.10 to 0.20 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Shallow to Gravel Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | 25 |
| | Western Wheatgrass | 20 |
| | Blue Grama | 10 |
| | Green Needlegrass | 10 |
| | Bearded Wheatgrass | 5 |
| | Plains Muhly * | |
| | Porcupinegrass * | 5 |
| | Prairie Junegrass * | |
| | Red Threeawn * | |
| | Other Perennial Grasses * | |
| | Penn Sedge * | |
| | Threadleaf Sedge * | 10 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Dotted Gayfeather * | |
| | Fringed Sagewort * | |
| | Hoods Phlox * | |
| | Rush Skeletonplant * | 10 |
| | Scarlet Globemallow * | |
| | Wooly Goldenrod * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Prairie Rose * | |
| | Western Snowberry * | 5 |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1900 to 2100 |
| Average | 1650 to 1850 |
| Unfavorable | 1400 to 1600 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.53 to 0.70 |
| Good | 0.35 to 0.53 |
| Fair | 0.18 to 0.35 |
| Poor | 0.10 to 0.18 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Silty Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | | 20 |
| | Green Needlegrass | | 10 |
| | Needleandthread | | 10 |
| | Other Perennial Grasses | | 10 |
| | Blue Grama | | 5 |
| | Porcupinegrass | | 5 |
| | Bearded Wheatgrass | | 5 |
| | Big Bluestem | * | |
| | Prairie Dropseed | * | 5 |
| | Prairie Junegrass | * | |
| | Sideoats Grama | * | |
| | Needleleaf Sedge | * | |
| | Penn Sedge | * | 10 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Cudweed Sagewort | * | |
| | Dotted Gayfeather | * | |
| | Fringed Sagewort | * | |
| | Heath Aster | * | 15 |
| | Silverleaf Scurfpea | * | |
| | Stiff Sunflower | * | |
| | Western Yarrow | * | |
| | Wooly Goldenrod | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Prairie Rose | * | |
| | Western Snowberry | * | 5 |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2800 to 3150 |
| Average | 2400 to 2750 |
| Unfavorable | 2000 to 2350 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.83 to 1.10 |
| Good | 0.55 to 0.83 |
| Fair | 0.28 to 0.55 |
| Poor | 0.10 to 0.28 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Subirrigated Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Big Bluestem | | 40 |
| | Switchgrass | | 20 |
| | Prairie Cordgrass | | 5 |
| | Little Bluestem | | 5 |
| | Indiangrass | * | |
| | Northern Reedgrass | * | 5 |
| | Slender Wheatgrass | * | |
| | Western Wheatgrass | * | |
| | Canada Wildrye | * | |
| | Tall Dropseed | * | 5 |
| | Other Perennial Grasses | * | |
| | Fescue Sedge | * | |
| | Slim Sedge | * | 5 |
| | Wooly Sedge | * | |
| | Baltic Rush | * | |
| | Common Spikerush | * | 5 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Cinquefoil | * | |
| | Field Mint | * | |
| | Heath Aster | * | |
| | Maximilian Sunflower | * | 10 |
| | Tall Goldenrod | * | |
| | Tall White Aster | * | |
| | Other Sedges/Rushes | * | |
| Shrubs and Trees (0% of Total) | | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 4350 to 4750 |
| Average | 3925 to 4325 |
| Unfavorable | 3500 to 3900 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.28 to 1.70 |
| Good | 0.85 to 1.28 |
| Fair | 0.43 to 0.85 |
| Poor | 0.10 to 0.43 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Subirrigated Sands Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Switchgrass | 20 |
| | Big Bluestem | 15 |
| | Porcupinegrass | 5 |
| | Prairie Cordgrass | 5 |
| | Bluejoint Reedgrass * | |
| | Mat Muhly * | 5 |
| | Other Perennial Grasses * | |
| | Sedge Species * | 25 |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Maximilian Sunflower * | |
| | Cudweed Sagewort * | 10 |
| | Western Ragweed * | |
| Shrubs and Trees (5% to 15% of Total) | Western Snowberry * | |
| | Willow Species * | 10 |
| | Spirea * | |
| | Prairie Rose * | |
| | Quaking Aspen | 5 |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 3200 to 3700 |
| Average | 2600 to 3100 |
| Unfavorable | 2000 to 2500 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.83 to 1.10 |
| Good | 0.55 to 0.83 |
| Fair | 0.28 to 0.55 |
| Poor | 0.10 to 0.28 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Thin Claypan Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Western Wheatgrass | | 50 |
| | Blue Grama | | 15 |
| | Nuttall Alkaligrass | | 5 |
| | Prairie Junegrass | | 5 |
| | Alkali Muhly | * | |
| | Green Needlegrass | * | |
| | Inland Saltgrass | * | 5 |
| | Needleandthread | * | |
| | Sandberg Bluegrass | * | |
| | Other Perennial Grasses | * | |
| | Needleleaf Sedge | * | |
| | Penn Sedge | * | 5 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Bladderpod | * | |
| | Fringed Sagewort | * | |
| | Lemon Scurfpea | * | |
| | Rush Skeletonplant | * | 10 |
| | Scarlet Globemallow | * | |
| | Western Yarrow | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed | * | 5 |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1200 to 1300 |
| Average | 1000 to 1100 |
| Unfavorable | 800 to 900 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.30 to 0.40 |
| Good | 0.20 to 0.30 |
| Fair | 0.10 to 0.20 |
| Poor | 0.05 to 0.10 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Thin Sands Range Site

| Plant Community | | |
|---|---|---|
| Characteristic Vegetation | Common Name | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Prairie Sandreed | 25 |
| | Little Bluestem | 15 |
| | Sideoats Grama | 10 |
| | Canada Wildrye | 5 |
| | Sand Bluestem | 5 |
| | Other Perennial Grasses | 5 |
| | Blue Grama * | |
| | Green Needlegrass * | |
| | Needleandthread * | 5 |
| | Prairie Junegrass * | |
| | Sand Dropseed * | |
| | Western Wheatgrass * | |
| | Needleleaf Sedge * | 10 |
| | Penn Sedge * | |
| | Other Sedges/Rushes * | |
| Forbs (5% to 15% of Total) | Fringed Sagewort * | |
| | Green Sagewort * | |
| | Groundcherry * | |
| | Hairy Goldaster * | 15 |
| | Lemon Scurfpea * | |
| | Missouri Golderod * | |
| | Prairie Spiderwort * | |
| | Rush Skeletonplant * | |
| | Other Perennial Forbs * | |
| Shrubs and Trees (5% to 15% of Total) | Leadplant Amorpha * | |
| | Sand Cherry * | 10 |
| | Woods Rose * | |
| | Other Perennial Shrubs * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2200 to 2400 |
| Average | 1900 to 2100 |
| Unfavorable | 1700 to 1800 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.60 to 0.80 |
| Good | 0.40 to 0.60 |
| Fair | 0.20 to 0.40 |
| Poor | 0.10 to 0.20 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Thin Upland Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Little Blustem | | 25 |
| | Needleandthread | | 5 |
| | Green Needlegrass | | 5 |
| | Plains Muhly | | 5 |
| | Porcupinegrass | | 5 |
| | Prairie Dropseed | | 5 |
| | Sideoats Grama | | 5 |
| | Western Wheatgrass | | 5 |
| | Other Perennial Grasses | | 5 |
| | Blue Grama | * | |
| | Prairie Junegrass | * | Trace |
| | Prairie Sandreed | * | |
| | Red Threeawn | * | |
| | Penn Sedge | * | |
| | Threadleaf Sedge | * | 10 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Dotted Gayfeather | * | |
| | Fringed Sagewort | * | |
| | Missouri Golderod | * | |
| | Pasqueflower | * | 10 |
| | Purple Coneflower | * | |
| | Purple Prairieclover | * | |
| | Stiff Goldenrod | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Silverberry | * | |
| | Western Snowberry | * | 5 |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 2500 to 2800 |
| Average | 2150 to 2450 |
| Unfavorable | 1800 to 2100 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.68 to 0.90 |
| Good | 0.45 to 0.68 |
| Fair | 0.23 to 0.45 |
| Poor | 0.10 to 0.23 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Very Shallow Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Needleandthread | | 30 |
| | Western Wheatgrass | | 10 |
| | Blue Grama | | 10 |
| | Bearded Wheatgrass | | 5 |
| | Prairie Dropseed | | 5 |
| | Prairie Junegrass | | 5 |
| | Red Threeawn | | 5 |
| | Plains Muhly | * | |
| | Red Threeawn | * | 5 |
| | Sand Dropseed | * | |
| | Other Perennial Grasses | * | |
| | Penn Sedge | * | |
| | Threadleaf Sedge | * | 15 |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Dotted Gayfeather | * | |
| | Fringed Sagewort | * | |
| | Green Sagewort | * | |
| | Purple Prairieclover | * | 10 |
| | Rush Skeletonplant | * | |
| | Western Yarrow | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Broom Snakeweed | * | |
| | Prairie Rose | * | 5 |
| | Other Perennial Shrubs | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 1100 to 1200 |
| Average | 900 to 1000 |
| Unfavorable | 800 to 900 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 0.30 to 0.40 |
| Good | 0.20 to 0.30 |
| Fair | 0.10 to 0.20 |
| Poor | 0.05 to 0.10 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Wet Meadow Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | Northern Reedgrass | | 5 |
| | Prairie Cordgrass | | 5 |
| | Fowl Bluegrass | * | |
| | Mat Muhly | * | 5 |
| | Switchgrass | * | |
| | Other Perennial Grasses | * | |
| | Slim Sedge | * | 70 |
| | Wooly Sedge | * | |
| | Baltic Rush | * | |
| | Common Spikerush | * | 5 |
| | Fescue Sedge | * | |
| | Other Sedges/Rushes | * | |
| Forbs (5% to 15% of Total) | Field Mint | * | |
| | Indian Hemp | * | |
| | Rydberg's Sunflower | * | 10 |
| | Tall Goldenrod | * | |
| | Tall White Aster | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (0% of Total) | | | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 4500 to 4800 |
| Average | 4100 to 4400 |
| Unfavorable | 3700 to 4000 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.35 to 1.80 |
| Good | 0.90 to 1.35 |
| Fair | 0.45 to 0.90 |
| Poor | 0.10 to 0.45 |

*Indicates the composition for species group
**Animal units per month

Table 12.— Range Site Descriptions (MLRA 55B)--Continued

Wetland Range Site

| Plant Community | | | |
|---|---|---|---|
| Characteristic Vegetation | Common Name | | Composition By Weight (percent) |
| Grasses and Grasslikes (70% to 90% of Total) | American Mannagrass | * | |
| | American Sloughgrass | * | |
| | Northern Reedgrass | * | 5 |
| | Prairie Cordgrass | * | |
| | Other Perennial Grasses | * | 5 |
| | Baltic Rush | * | |
| | Burreed | * | 5 |
| | Common Spikerush | * | |
| | Other Sedged/Rushes | * | |
| | Beaked Sedge | * | |
| | Slough Sedge | * | 50 |
| | Smooth-Cone Sedge | * | |
| | Water Sedge | * | |
| | Slim Sedge | * | 5 |
| | Wooly Sedge | * | |
| Forbs (5% to 15% of Total) | Longroot Smartweed | * | |
| | Mexican Dock | * | |
| | Waterparsnip | * | 5 |
| | Waterplaintain | * | |
| | Other Perennial Forbs | * | |
| Shrubs and Trees (5% to 15% of Total) | Sandbar Willow | * | Trace |
| | Willow Species | * | |

| Total Annual Production | (Excellent Condition) |
|---|---|
| Climatic Condition | Pounds Per Acre (dry) |
| Favorable | 6600 to 7000 |
| Average | 6100 to 6500 |
| Unfavorable | 5600 to 6000 |

| Stocking Rates | |
|---|---|
| Condition Class | **AUM Per Acre Per Year |
| Excellent | 1.95 to 2.60 |
| Good | 1.30 to 1.95 |
| Fair | 0.65 to 1.30 |
| Poor | 0.10 to 0.65 |

*Indicates the composition for species group
**Animal units per month

# Recreation

**Playgrounds**

**Paths and trails**

**Golf fairways**

**Camp areas**

**slight, moderate, severe.**
**Slight**

**Picnic areas**

**Moderate**

**Severe**

Table 13.-Recreational Development

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

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 30: | | | | | |
| Amor | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: area reclaim slope thin layer |
| Arnegard | Slight | Slight | Moderate: slope | Slight | Slight |
| 40: | | | | | |
| Amor | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: area reclaim slope thin layer |
| Werner | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Slight | Severe: area reclaim thin layer |
| Farnuf | Slight | Slight | Slight | Slight | Slight |
| 41: | | | | | |
| Amor | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: area reclaim slope thin layer |
| Werner | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Slight | Severe: area reclaim thin layer |
| 76: | | | | | |
| Arvilla | Slight | Slight | Moderate: slope | Slight | Moderate: droughty |
| 118: | | | | | |
| Barnes | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| Buse | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| 156: | | | | | |
| Barnes | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| Svea | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| 313: | | | | | |
| Buse | Slight | Slight | Moderate: slope small stones | Slight | Slight |

Table 13.-Recreational Development--Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 313:(cont.) | | | | | |
| Barnes | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| 314: | | | | | |
| Buse | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| Barnes | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| 319: | | | | | |
| Buse | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| Barnes | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| 450: | | | | | |
| Colvin | Severe: wetness | Severe: wetness | Severe: wetness | Severe: wetness | Severe: wetness |
| 511: | | | | | |
| Divide | Slight | Slight | Slight | Slight | Slight |
| 674: | | | | | |
| Farnuf | Slight | Slight | Slight | Slight | Slight |
| 712: | | | | | |
| Flaxton | Slight | Slight | Moderate: slope | Slight | Slight |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| 714: | | | | | |
| Flaxton | Slight | Slight | Moderate: slope | Slight | Slight |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| 727: | | | | | |
| Fordville | Slight | Slight | Slight | Slight | Slight |
| 863: | | | | | |
| Hamerly | Moderate: percs slowly wetness | Moderate: percs slowly wetness | Moderate: percs slowly wetness | Moderate: wetness | Moderate: wetness |
| 883: | | | | | |
| Hamerly | Moderate: percs slowly wetness | Moderate: percs slowly wetness | Moderate: percs slowly wetness | Moderate: wetness | Moderate: wetness |
| Tonka | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding |

Table 13.-Recreational Development--Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 883:(cont.) | | | | | |
| Parnell | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding |
| 1011: | | | | | |
| Karlsruhe | Moderate: wetness | Moderate: wetness | Moderate: wetness | Moderate: wetness | Moderate: wetness droughty |
| 1181: | | | | | |
| Lohnes | Moderate: too sandy | Moderate: too sandy | Moderate: slope | Moderate: too sandy | Moderate: droughty |
| 1202: | | | | | |
| Maddock | Moderate: too sandy | Moderate: too sandy | Moderate: slope too sandy | Moderate: too sandy | Moderate: droughty |
| 1249: | | | | | |
| Appam | Slight | Slight | Moderate: slope small stones | Slight | Moderate: droughty |
| 1267: | | | | | |
| Marysland | Severe: wetness | Severe: wetness | Severe: wetness | Severe: wetness | Severe: wetness |
| 1372: | | | | | |
| Noonan | Severe: excess sodium | Severe: excess sodium | Severe: excess sodium | Slight | Severe: excess sodium |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| 1374: | | | | | |
| Nutley | Moderate: too clayey | Moderate: too clayey | Moderate: too clayey | Moderate: too clayey | Severe: too clayey |
| 1375: | | | | | |
| Nutley | Moderate: too clayey | Moderate: too clayey | Moderate: too clayey | Moderate: too clayey | Severe: too clayey |
| 1427: | | | | | |
| Parnell | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding |
| 1437: | | | | | |
| Parshall | Slight | Slight | Moderate: slope | Slight | Slight |
| 1466: | | | | | |
| Pits, gravel and sand | Severe: slope small stones | Severe: slope too sandy | Severe: slope small stones | Severe: slope too sandy | Severe: slope small stones droughty |
| 1676: | | | | | |
| Wildrose | Moderate: too clayey | Moderate: too clayey | Moderate: too clayey | Moderate: too clayey | Severe: too clayey |

Table 13.-Recreational Development--Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 1697: | | | | | |
| Sioux | Slight | Slight | Moderate: slope small stones | Slight | Moderate: droughty |
| Arvilla | Slight | Slight | Moderate: slope | Slight | Moderate: droughty |
| 1710: | | | | | |
| Southam | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding |
| 1762: | | | | | |
| Svea | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| Barnes | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| 1805: | | | | | |
| Telfer | Moderate: too sandy | Moderate: too sandy | Moderate: slope too sandy | Moderate: too sandy | Moderate: droughty |
| 1886: | | | | | |
| Hamerly, saline | Severe: excess salt | Severe: excess salt | Severe: excess salt | Moderate: wetness | Severe: excess salt |
| Vallers, saline | Severe: wetness | Moderate: percs slowly wetness | Severe: wetness | Moderate: wetness | Moderate: wetness |
| 1898: | | | | | |
| Vebar | Slight | Slight | Moderate: area reclaim slope thin layer | Slight | Moderate: area reclaim thin layer |
| 1978: | | | | | |
| Water | --- | --- | --- | --- | --- |
| 2006: | | | | | |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| 2014: | | | | | |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| Bowbells | Slight | Slight | Slight | Slight | Slight |
| 2015: | | | | | |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| Bowbells | Slight | Slight | Slight | Slight | Slight |

Table 13.-Recreational Development--Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 2031: | | | | | |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| Zahl | Slight | Slight | Moderate: slope | Slight | Slight |
| 2037: | | | | | |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| Zahl | Slight | Slight | Moderate: slope | Slight | Slight |
| Parnell | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding |
| 2073: | | | | | |
| Zahl | Slight | Slight | Moderate: slope | Slight | Slight |
| Max | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope |
| 2081: | | | | | |
| Zahl | Slight | Slight | Moderate: slope | Slight | Slight |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| 2175: | | | | | |
| Zahl | Slight | Slight | Moderate: slope | Slight | Slight |
| Williams | Slight | Slight | Severe: slope | Slight | Slight |
| 2188: | | | | | |
| Wabek | Slight | Slight | Moderate: slope | Slight | Severe |
| Lehr | Slight | Slight | Moderate: slope | Slight | Moderate: droughty |
| 2234: | | | | | |
| Amor | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: area reclaim slope thin layer |
| Werner | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Slight | Severe: area reclaim thin layer |
| 2235: | | | | | |
| Arnegard | Slight | Slight | Moderate: slope | Slight | Slight |
| 2240: | | | | | |
| Bowdle | Slight | Slight | Slight | Slight | Slight |

Table 13.-Recreational Development--Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 2240:(cont.) | | | | | |
| Lehr | Slight | Slight | Moderate: slope | Slight | Moderate: droughty |
| 2241: | | | | | |
| Bryant | Slight | Slight | Moderate: slope | Slight | Slight |
| 2242: | | | | | |
| Cohagen | Severe: depth to rock | Severe: depth to rock | Severe: slope depth to rock | Slight | Severe: depth to rock |
| Vebar | Slight | Slight | Moderate: area reclaim slope thin layer | Slight | Moderate: area reclaim thin layer |
| Parshall | Slight | Slight | Moderate: slope | Slight | Slight |
| 2243: | | | | | |
| Vebar | Slight | Slight | Moderate: area reclaim slope thin layer | Slight | Moderate: area reclaim thin layer |
| Flasher | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Severe: area reclaim slope thin layer | Slight | Severe: area reclaim thin layer |
| 2244: | | | | | |
| Daglum | Severe: excess sodium | Severe: excess sodium | Severe: excess sodium | Slight | Severe: excess sodium |
| Belfield | Severe: excess sodium | Severe: excess sodium | Severe: excess sodium | Severe: erodes easily | Severe: excess sodium |
| 2246: | | | | | |
| Grail | Slight | Slight | Slight | Severe: erodes easily | Slight |
| 2248: | | | | | |
| Lehr | Slight | Slight | Moderate: slope | Slight | Moderate: droughty |
| Bowdle | Slight | Slight | Slight | Slight | Slight |
| 2249: | | | | | |
| Makoti | Slight | Slight | Slight | Slight | Slight |
| 2250: | | | | | |
| Makoti | Slight | Slight | Slight | Slight | Slight |
| Rusklyn | Slight | Slight | Moderate: slope | Slight | Slight |
| 2252: | | | | | |
| Max | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope |

Table 13.-Recreational Development--Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 2252:(cont.) | | | | | |
| Zahl | Slight | Slight | Moderate: slope | Slight | Slight |
| Arnegard | Slight | Slight | Moderate: slope | Slight | Slight |
| 2253: | | | | | |
| Mondamin | Slight | Slight | Moderate: slope | Slight | Moderate: droughty |
| 2254: | | | | | |
| Overly | Slight | Slight | Slight | Slight | Slight |
| 2255: | | | | | |
| Overly | Slight | Slight | Slight | Slight | Slight |
| Rusklyn | Slight | Slight | Moderate: slope | Slight | Slight |
| 2257: | | | | | |
| Reeder | Slight | Slight | Slight | Slight | Moderate: area reclaim thin layer |
| Arnegard | Slight | Slight | Moderate: slope | Slight | Slight |
| 2258: | | | | | |
| Regent | Slight | Slight | Moderate: slope | Severe: erodes easily | Moderate: thin layer |
| Savage | Slight | Slight | Moderate: slope | Severe: erodes easily | Slight |
| 2259: | | | | | |
| Rhoades | Severe: excess sodium | Severe: excess sodium | Severe: excess sodium | Slight | Severe: excess sodium |
| Daglum | Severe: excess sodium | Severe: excess sodium | Severe: excess sodium | Slight | Severe: excess sodium |
| 2260: | | | | | |
| Rusklyn | Slight | Slight | Moderate: slope | Slight | Slight |
| 2261: | | | | | |
| Schaller | Slight | Slight | Moderate: slope | Slight | Severe: droughty |
| 2262: | | | | | |
| Schaller | Slight | Slight | Moderate: slope | Slight | Severe: droughty |
| 2263: | | | | | |
| Sinai | Severe: too clayey | Severe: too clayey | Severe: too clayey | Severe: too clayey | Severe: too clayey |
| 2264: | | | | | |
| Vebar | Slight | Slight | Moderate: area reclaim slope thin layer | Slight | Moderate: area reclaim thin layer |

Table 13.-Recreational Development--Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 2264:(cont.) | | | | | |
| Cohagen | Severe: depth to rock | Severe: depth to rock | Severe: slope depth to rock | Slight | Severe: depth to rock |
| 2265: | | | | | |
| Wabek | Slight | Slight | Moderate: slope | Slight | Severe |
| Appam | Slight | Slight | Moderate: slope small stones | Slight | Moderate: droughty |
| 2266: | | | | | |
| Wabek | Slight | Slight | Moderate: slope | Slight | Severe |
| Appam | Slight | Slight | Moderate: slope small stones | Slight | Moderate: droughty |
| 2267: | | | | | |
| Werner | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Severe: area reclaim thin layer | Slight | Severe: area reclaim thin layer |
| Amor | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: area reclaim slope thin layer |
| Arnegard | Slight | Slight | Moderate: slope | Slight | Slight |
| 2269: | | | | | |
| Cavour | Severe: excess sodium | Severe: excess sodium | Severe: excess sodium | Slight | Severe: excess sodium |
| Barnes | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| 2270: | | | | | |
| Harriet | Severe: flooding percs slowly wetness | Severe: excess sodium percs slowly wetness | Severe: percs slowly wetness | Severe: wetness | Severe: excess sodium wetness |
| Stirum | Severe: excess sodium flooding wetness | Severe: excess sodium | Severe: excess sodium wetness | Moderate: wetness | Severe: excess sodium |
| 2271: | | | | | |
| Lohnes | Moderate: too sandy | Moderate: too sandy | Moderate: slope | Moderate: too sandy | Moderate: droughty |
| 2272: | | | | | |
| Sioux | Slight | Slight | Moderate: slope small stones | Slight | Moderate: droughty |

Table 13.-Recreational Development--Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 2272:(cont.) | | | | | |
| Arvilla | Slight | Slight | Moderate: slope | Slight | Moderate: droughty |
| 2273: | | | | | |
| Svea | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| Buse | Slight | Slight | Moderate: slope small stones | Slight | Slight |
| Parnell | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding | Severe: ponding |
| 2274: | | | | | |
| Towner | Moderate: too sandy | Moderate: too sandy | Moderate: slope too sandy | Moderate: too sandy | Moderate: droughty |
| Maddock | Moderate: too sandy | Moderate: too sandy | Moderate: slope too sandy | Moderate: too sandy | Moderate: droughty |
| 2275: | | | | | |
| Towner | Moderate: too sandy | Moderate: too sandy | Moderate: slope too sandy | Moderate: too sandy | Moderate: droughty |
| Maddock | Moderate: too sandy | Moderate: too sandy | Moderate: slope too sandy | Moderate: too sandy | Moderate: droughty |
| Buse | Slight | Slight | Moderate: slope small stones | Slight | Slight |

# Wildlife Habitat

Wild herbaceous plants

Hardwood trees

Coniferous plants

good fair poor, very poor good

fair

Shrubs

poor

very poor

Wetland plants

Grain and seed crops

Shallow water areas

Grasses and legumes

**Habitat for woodland wildlife**

**Habitat for wetland wildlife**

**Habitat for openland wildlife**

**Habitat for rangeland wildlife**

Table 14.-Wildlife Habitat

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," or "poor." Dashes (--) indicate the map unit component was not rated.) The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.

| Map symbol and soil name | Potential for habitat elements | | | | | | | | Potential as habitat for-- | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Shrubs | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife | Rangeland wildlife |
| 30: | | | | | | | | | | | | |
| Amor | Good | Good | Fair | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Arnegard | Good | Good | Good | --- | --- | Good | Poor | Very poor | Good | --- | Very poor | Good |
| 40: | | | | | | | | | | | | |
| Amor | Good | Good | Fair | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Werner | Poor | Fair | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| Farnuf | Good | Good | Good | Good | Very poor | Fair | Very poor | Very poor | Good | --- | Very poor | Fair |
| 41: | | | | | | | | | | | | |
| Amor | Good | Good | Fair | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Werner | Poor | Fair | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| 76: | | | | | | | | | | | | |
| Arvilla | Fair | Good | Fair | Fair | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor | Poor |
| 118: | | | | | | | | | | | | |
| Barnes | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Buse | Fair | Good | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| 156: | | | | | | | | | | | | |
| Barnes | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Svea | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 313: | | | | | | | | | | | | |
| Buse | Fair | Good | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| Barnes | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 314: | | | | | | | | | | | | |
| Buse | Fair | Good | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| Barnes | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |

Table 14.-Wildlife Habitat--Continued

| Map symbol and soil name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Shrubs | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife | Rangeland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 319: | | | | | | | | | | | | |
| Buse | Fair | Good | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| Barnes | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 450: | | | | | | | | | | | | |
| Colvin | Poor | Fair | Fair | Fair | Fair | Fair | Good | Good | Poor | Fair | Good | Fair |
| 511: | | | | | | | | | | | | |
| Divide | Fair | Fair | Good | Good | Good | Fair | Fair | Very poor | Fair | Good | Poor | Fair |
| 674: | | | | | | | | | | | | |
| Farnuf | Good | Good | Good | Good | Very poor | Fair | Very poor | Very poor | Good | --- | Very poor | Fair |
| 712: | | | | | | | | | | | | |
| Flaxton | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 714: | | | | | | | | | | | | |
| Flaxton | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 727: | | | | | | | | | | | | |
| Fordville | Good | Good | Good | --- | --- | Fair | Very poor | Very poor | Good | --- | Very poor | Fair |
| 863: | | | | | | | | | | | | |
| Hamerly | Good | Good | Good | Good | Good | Fair | Fair | Fair | Good | Good | Fair | Fair |
| 883: | | | | | | | | | | | | |
| Hamerly | Good | Good | Good | Good | Good | Fair | Fair | Fair | Good | Good | Fair | Fair |
| Tonka | Poor | Poor | Fair | Fair | Fair | Poor | Good | Good | Poor | Fair | Good | Poor |
| Parnell | Very poor | Poor | Poor | Very poor | Very poor | Poor | Good | Good | Poor | Very poor | Good | Poor |
| 1011: | | | | | | | | | | | | |
| Karlsruhe | Fair | Good | Good | Fair | Fair | Fair | Fair | Very poor | Good | Fair | Poor | Fair |
| 1181: | | | | | | | | | | | | |
| Lohnes | Fair | Good | Good | Poor | Poor | Fair | Poor | Very poor | Good | Poor | Very poor | Fair |
| 1202: | | | | | | | | | | | | |
| Maddock | Fair | Good | Good | Fair | Fair | Fair | Poor | Very poor | Fair | Fair | Very poor | Fair |

Table 14.-Wildlife Habitat--Continued

| Map symbol and soil name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Shrubs | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife | Rangeland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1249: | | | | | | | | | | | | |
| Appam | Fair | Good | Fair | --- | --- | Poor | Very poor | Very poor | Fair | --- | Very poor | Poor |
| 1267: | | | | | | | | | | | | |
| Marysland | Poor | Fair | Fair | --- | --- | Fair | Good | Good | Fair | --- | Good | Fair |
| 1372: | | | | | | | | | | | | |
| Noonan | Poor | Poor | Very poor | Poor | Poor | Very poor | Poor | Very poor | Poor | Poor | Very poor | Very poor |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 1374: | | | | | | | | | | | | |
| Nutley | Good | Good | Fair | --- | --- | Poor | Poor | Poor | Good | --- | Poor | Poor |
| 1375: | | | | | | | | | | | | |
| Nutley | Good | Good | Fair | --- | --- | Poor | Poor | Poor | Good | --- | Poor | Poor |
| 1427: | | | | | | | | | | | | |
| Parnell | Very poor | Poor | Poor | Very poor | Very poor | Poor | Good | Good | Poor | Very poor | Good | Poor |
| 1437: | | | | | | | | | | | | |
| Parshall | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| 1466: | | | | | | | | | | | | |
| Pits, gravel and sand | Very poor | Very poor | Very poor | Very poor | Very poor | Very poor | Very poor | Very poor | Very poor | Very poor | Very poor | Very poor |
| 1676: | | | | | | | | | | | | |
| Wildrose | Good | Good | Fair | --- | --- | Poor | Poor | Poor | Good | --- | Poor | Poor |
| 1697: | | | | | | | | | | | | |
| Sioux | Very poor | Very poor | Poor | Poor | Very poor | Poor | Very poor | Very poor | Very poor | Very poor | Very poor | Poor |
| Arvilla | Fair | Good | Fair | Fair | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor | Poor |
| 1710: | | | | | | | | | | | | |
| Southam | Very poor | Very poor | Very poor | --- | --- | Very poor | Good | Good | Very poor | --- | Good | Very poor |
| 1762: | | | | | | | | | | | | |
| Svea | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Barnes | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 1805: | | | | | | | | | | | | |
| Telfer | Fair | Good | Good | --- | --- | Fair | Very poor | Very poor | Good | --- | Very poor | Fair |

Table 14.-Wildlife Habitat--Continued

| Map symbol and soil name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Shrubs | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife | Rangeland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1886: | | | | | | | | | | | | |
| Hamerly, saline | Fair | Fair | Poor | Poor | Poor | Fair | Fair | Fair | Fair | Poor | Fair | Fair |
| Vallers, saline | Poor | Fair | Fair | --- | --- | Fair | Good | Good | Fair | --- | Good | Fair |
| 1898: | | | | | | | | | | | | |
| Vebar | Fair | Good | Good | Very poor | Very poor | Very poor | Poor | Very poor | Good | --- | Very poor | Good |
| 1978: | | | | | | | | | | | | |
| Water | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2006: | | | | | | | | | | | | |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 2014: | | | | | | | | | | | | |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Bowbells | Good | Good | Good | --- | --- | Good | Poor | Poor | Good | --- | Poor | Good |
| 2015: | | | | | | | | | | | | |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Bowbells | Good | Good | Good | --- | --- | Good | Poor | Poor | Good | --- | Poor | Good |
| 2031: | | | | | | | | | | | | |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Zahl | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| 2037: | | | | | | | | | | | | |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Zahl | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Parnell | Very poor | Poor | Poor | Very poor | Very poor | Poor | Good | Good | Poor | Very poor | Good | Poor |
| 2073: | | | | | | | | | | | | |
| Zahl | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Max | Very poor | Very poor | Good | --- | --- | Fair | Very poor | Very poor | Poor | --- | Very poor | Fair |
| 2081: | | | | | | | | | | | | |
| Zahl | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |

Table 14.-Wildlife Habitat--Continued

| Map symbol and soil name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Shrubs | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife | Rangeland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2175: | | | | | | | | | | | | |
| Zahl | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Williams | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| 2188: | | | | | | | | | | | | |
| Wabek | Very poor | Poor | Poor | Very poor | Very poor | Poor | Very poor | Very poor | Poor | Very poor | Very poor | Poor |
| Lehr | Fair | Good | Fair | Fair | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor | Fair |
| 2234: | | | | | | | | | | | | |
| Amor | Good | Good | Fair | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Werner | Poor | Fair | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| 2235: | | | | | | | | | | | | |
| Arnegard | Good | Good | Good | --- | --- | Good | Poor | Very poor | Good | --- | Very poor | Good |
| 2240: | | | | | | | | | | | | |
| Bowdle | Fair | Fair | Good | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| Lehr | Fair | Good | Fair | Fair | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor | Fair |
| 2241: | | | | | | | | | | | | |
| Bryant | Good | Good | Good | Good | Very poor | --- | Very poor | Very poor | Good | Very poor | Very poor | Good |
| 2242: | | | | | | | | | | | | |
| Cohagen | Poor | Fair | Fair | --- | --- | Poor | Very poor | Very poor | Fair | --- | Very poor | Poor |
| Vebar | Fair | Good | Good | Very poor | Very poor | Very poor | Poor | Very poor | Good | --- | Very poor | Good |
| Parshall | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| 2243: | | | | | | | | | | | | |
| Vebar | Fair | Good | Good | Very poor | Very poor | Very poor | Poor | Very poor | Good | --- | Very poor | Good |
| Flasher | Poor | Fair | Fair | --- | --- | Poor | Very poor | Very poor | Fair | --- | Very poor | Poor |
| 2244: | | | | | | | | | | | | |
| Daglum | Poor | Poor | Very poor | --- | --- | Very poor | Poor | Very poor | Poor | --- | Very poor | Very poor |
| Belfield | Fair | Good | Fair | --- | --- | Poor | Poor | Very poor | Fair | --- | Very poor | Fair |

Table 14.-Wildlife Habitat--Continued

| Map symbol and soil name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Shrubs | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife | Rangeland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2246: | | | | | | | | | | | | |
| Grail | Good | Good | Fair | Good | Poor | Good | Very poor | Very poor | Good | Poor | Very poor | Fair |
| 2248: | | | | | | | | | | | | |
| Lehr | Fair | Good | Fair | Fair | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor | Fair |
| Bowdle | Fair | Fair | Good | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| 2249: | | | | | | | | | | | | |
| Makoti | Good | Good | Fair | --- | --- | Fair | Very poor | Very poor | Good | --- | Very poor | Fair |
| 2250: | | | | | | | | | | | | |
| Makoti | Good | Good | Fair | --- | --- | Fair | Very poor | Very poor | Good | --- | Very poor | Fair |
| Rusklyn | Fair | Fair | Fair | Poor | --- | --- | Very poor | Very poor | Fair | Very poor | Very poor | Fair |
| 2252: | | | | | | | | | | | | |
| Max | Very poor | Very poor | Good | --- | --- | Fair | Very poor | Very poor | Poor | --- | Very poor | Fair |
| Zahl | Fair | Good | Good | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Arnegard | Good | Good | Good | --- | --- | Good | Poor | Very poor | Good | --- | Very poor | Good |
| 2253: | | | | | | | | | | | | |
| Mondamin | Good | Good | Fair | --- | --- | Poor | Very poor | Very poor | Good | --- | Very poor | Poor |
| 2254: | | | | | | | | | | | | |
| Overly | Good | Good | Good | Good | Good | Fair | Poor | Poor | Good | Good | Poor | Fair |
| 2255: | | | | | | | | | | | | |
| Overly | Good | Good | Good | Good | Good | Fair | Poor | Poor | Good | Good | Poor | Fair |
| Rusklyn | Fair | Fair | Fair | Poor | --- | --- | Very poor | Very poor | Fair | Very poor | Very poor | Fair |
| 2257: | | | | | | | | | | | | |
| Reeder | Good | Good | Fair | --- | --- | Fair | Very poor | Very poor | Good | --- | Very poor | Fair |
| Arnegard | Good | Good | Good | --- | --- | Good | Poor | Very poor | Good | --- | Very poor | Good |
| 2258: | | | | | | | | | | | | |
| Regent | Fair | Good | Fair | --- | --- | Poor | Poor | Very poor | Fair | --- | Very poor | Poor |
| Savage | Good | Good | Fair | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |

Table 14.-Wildlife Habitat--Continued

| Map symbol and soil name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Shrubs | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife | Rangeland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2259: | | | | | | | | | | | | |
| Rhoades | Poor | Poor | Poor | --- | --- | Very poor | Poor | Poor | Poor | --- | Poor | Very poor |
| Daglum | Poor | Poor | Very poor | --- | --- | Very poor | Poor | Very poor | Poor | --- | Very poor | Very poor |
| 2260: | | | | | | | | | | | | |
| Rusklyn | Fair | Fair | Fair | Poor | --- | --- | Very poor | Very poor | Fair | Very poor | Very poor | Fair |
| 2261: | | | | | | | | | | | | |
| Schaller | Poor | Fair | Fair | --- | --- | Good | Very poor | Very poor | Fair | --- | Very poor | Fair |
| 2262: | | | | | | | | | | | | |
| Schaller | Poor | Fair | Fair | --- | --- | Good | Very poor | Very poor | Fair | --- | Very poor | Fair |
| 2263: | | | | | | | | | | | | |
| Sinai | Good | Good | Fair | --- | --- | Poor | Poor | Poor | Good | --- | Poor | Poor |
| 2264: | | | | | | | | | | | | |
| Vebar | Fair | Good | Good | Very poor | Very poor | Very poor | Poor | Very poor | Good | --- | Very poor | Good |
| Cohagen | Poor | Fair | Fair | --- | --- | Poor | Very poor | Very poor | Fair | --- | Very poor | Poor |
| 2265: | | | | | | | | | | | | |
| Wabek | Very poor | Poor | Poor | Very poor | Very poor | Poor | Very poor | Very poor | Poor | Very poor | Very poor | Poor |
| Appam | Fair | Good | Fair | --- | --- | Poor | Very poor | Very poor | Fair | --- | Very poor | Poor |
| 2266: | | | | | | | | | | | | |
| Wabek | Very poor | Poor | Poor | Very poor | Very poor | Poor | Very poor | Very poor | Poor | Very poor | Very poor | Poor |
| Appam | Fair | Good | Fair | --- | --- | Poor | Very poor | Very poor | Fair | --- | Very poor | Poor |
| 2267: | | | | | | | | | | | | |
| Werner | Poor | Fair | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| Amor | Good | Good | Fair | --- | --- | Fair | Poor | Very poor | Good | --- | Very poor | Fair |
| Arnegard | Good | Good | Good | --- | --- | Good | Poor | Very poor | Good | --- | Very poor | Good |
| 2269: | | | | | | | | | | | | |
| Cavour | Poor | Poor | Poor | Poor | Very poor | Very poor | Very poor | Very poor | Poor | Very poor | Very poor | Poor |
| Barnes | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |

Table 14.-Wildlife Habitat--Continued

| Map symbol and soil name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Shrubs | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife | Rangeland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2270: | | | | | | | | | | | | |
| Harriet | Poor | Poor | Fair | Poor | Poor | Very poor | Good | Good | Poor | Poor | Good | Poor |
| Stirum | Very poor | Very poor | Very poor | Poor | Poor | Fair | Good | Fair | Very poor | Poor | Fair | Poor |
| 2271: | | | | | | | | | | | | |
| Lohnes | Fair | Good | Good | Poor | Poor | Fair | Poor | Very poor | Good | Poor | Very poor | Fair |
| 2272: | | | | | | | | | | | | |
| Sioux | Very poor | Very poor | Poor | Poor | Very poor | Poor | Very poor | Very poor | Very poor | Very poor | Very poor | Poor |
| Arvilla | Fair | Good | Fair | Fair | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor | Poor |
| 2273: | | | | | | | | | | | | |
| Svea | Good | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Buse | Fair | Good | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |
| Parnell | Very poor | Poor | Poor | Very poor | Very poor | Poor | Good | Good | Poor | Very poor | Good | Poor |
| 2274: | | | | | | | | | | | | |
| Towner | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Maddock | Fair | Good | Good | Fair | Fair | Fair | Poor | Very poor | Fair | Fair | Very poor | Fair |
| 2275: | | | | | | | | | | | | |
| Towner | Fair | Good | Good | Good | Good | Fair | Poor | Very poor | Good | Good | Very poor | Fair |
| Maddock | Fair | Good | Good | Fair | Fair | Fair | Poor | Very poor | Fair | Fair | Very poor | Fair |
| Buse | Fair | Good | Fair | --- | --- | Fair | Very poor | Very poor | Fair | --- | Very poor | Fair |

# Engineering

**Building Site Development**

**slight**

**moderate**

**severe**

**Shallow excavations**

slight moderate severe

Dwellings and small commercial buildings

good

fair poor

slight good

moderate fair

severe poor

Septic tank absorption fields

Local roads and streets

Lawns and landscaping

Sewage lagoons

## Sanitary Facilities

Daily cover for landfill

Trench sanitary landfill

## Waste Management

Area sanitary landfill

## Construction Materials

| | good | fair | poor |
|---|---|---|---|
| probable | | | |
| improbable | | | |

Roadfill

Aquifer-fed excavated ponds

## Water Management

slight

Drainage

moderate

severe

Pond reservoir areas

Irrigation

Embankments, dikes, and levees

Terraces and diversions

## Grassed waterways

Table 15.-Building Site Development

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

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 30: | | | | | | |
| Amor | Moderate: slope | Moderate: shrink-swell slope | Moderate: shrink-swell slope | Severe: slope | Severe: low strength | Moderate: area reclaim slope thin layer |
| Arnegard | Slight | Moderate: shrink-swell | Slight | Moderate: shrink-swell | Severe: low strength | Slight |
| 40: | | | | | | |
| Amor | Moderate: slope | Moderate: shrink-swell slope | Moderate: shrink-swell slope | Severe: slope | Severe: low strength | Moderate: area reclaim slope thin layer |
| Werner | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Severe: area reclaim thin layer |
| Farnuf | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| 41: | | | | | | |
| Amor | Moderate: slope | Moderate: shrink-swell slope | Moderate: shrink-swell slope | Severe: slope | Severe: low strength | Moderate: area reclaim slope thin layer |
| Werner | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Severe: area reclaim thin layer |
| 76: | | | | | | |
| Arvilla | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 118: | | | | | | |
| Barnes | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Buse | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 156: | | | | | | |
| Barnes | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Svea | Moderate: wetness | Moderate: shrink-swell | Moderate: shrink-swell wetness | Moderate: shrink-swell | Severe: low strength | Slight |
| 313: | | | | | | |
| Buse | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 313:(cont.) | | | | | | |
| Barnes | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 314: | | | | | | |
| Buse | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Barnes | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 319: | | | | | | |
| Buse | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Barnes | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 450: | | | | | | |
| Colvin | Severe: wetness | Severe: wetness | Severe: wetness | Severe: wetness | Severe: frost action low strength wetness | Severe: wetness |
| 511: | | | | | | |
| Divide | Severe: cutbanks cave | Slight | Moderate: wetness | Slight | Moderate: frost action | Slight |
| 674: | | | | | | |
| Farnuf | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| 712: | | | | | | |
| Flaxton | Severe: cutbanks cave | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 714: | | | | | | |
| Flaxton | Severe: cutbanks cave | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 727: | | | | | | |
| Fordville | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Slight |
| 863: | | | | | | |
| Hamerly | Severe: wetness | Moderate: shrink-swell wetness | Severe: wetness | Moderate: shrink-swell wetness | Severe: frost action | Moderate: wetness |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 883: | | | | | | |
| Hamerly | Severe: wetness | Moderate: shrink-swell wetness | Severe: wetness | Moderate: shrink-swell wetness | Severe: frost action | Moderate: wetness |
| Tonka | Severe: ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: low strength shrink-swell ponding | Severe: ponding |
| Parnell | Severe: excess humus ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: low strength shrink-swell ponding | Severe: ponding |
| 1011: | | | | | | |
| Karlsruhe | Severe: wetness cutbanks cave | Moderate: wetness | Severe: wetness | Moderate: wetness | Moderate: frost action wetness | Moderate: wetness droughty |
| 1181: | | | | | | |
| Lohnes | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 1202: | | | | | | |
| Maddock | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 1249: | | | | | | |
| Appam | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 1267: | | | | | | |
| Marysland | Severe: wetness cutbanks cave | Severe: wetness | Severe: wetness | Severe: wetness | Severe: frost action wetness | Severe: wetness |
| 1372: | | | | | | |
| Noonan | Moderate: wetness | Moderate: shrink-swell | Moderate: shrink-swell wetness | Moderate: shrink-swell | Severe: low strength | Severe: excess sodium |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 1374: | | | | | | |
| Nutley | Moderate: too clayey | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Severe: too clayey |
| 1375: | | | | | | |
| Nutley | Moderate: too clayey | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Severe: too clayey |
| 1427: | | | | | | |
| Parnell | Severe: excess humus ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: low strength shrink-swell ponding | Severe: ponding |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 1437: | | | | | | |
| Parshall | Severe: cutbanks cave | Slight | Slight | Slight | Moderate: frost action | Slight |
| 1466: | | | | | | |
| Pits, gravel and sand | Severe: slope cutbanks cave | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope small stones droughty |
| 1676: | | | | | | |
| Wildrose | Severe: cutbanks cave | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Severe: too clayey |
| 1697: | | | | | | |
| Sioux | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| Arvilla | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 1710: | | | | | | |
| Southam | Severe: ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: low strength shrink-swell ponding | Severe: ponding |
| 1762: | | | | | | |
| Svea | Moderate: wetness | Moderate: shrink-swell | Moderate: shrink-swell wetness | Moderate: shrink-swell | Severe: low strength | Slight |
| Barnes | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 1805: | | | | | | |
| Telfer | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 1886: | | | | | | |
| Hamerly, saline | Severe: wetness | Moderate: shrink-swell wetness | Severe: wetness | Moderate: shrink-swell wetness | Severe: frost action low strength | Severe: excess salt |
| Vallers, saline | Severe: wetness | Severe: wetness | Severe: wetness | Severe: wetness | Severe: frost action | Moderate: wetness |
| 1898: | | | | | | |
| Vebar | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: area reclaim thin layer |
| 1978: | | | | | | |
| Water | --- | --- | --- | --- | --- | --- |
| 2006: | | | | | | |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 2014: | | | | | | |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Bowbells | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| 2015: | | | | | | |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Bowbells | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| 2031: | | | | | | |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Zahl | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 2037: | | | | | | |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Zahl | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Parnell | Severe: excess humus ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: shrink-swell ponding | Severe: low strength shrink-swell ponding | Severe: ponding |
| 2073: | | | | | | |
| Zahl | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Max | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope |
| 2081: | | | | | | |
| Zahl | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 2175: | | | | | | |
| Zahl | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 2175:(cont.) | | | | | | |
| Williams | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| 2188: | | | | | | |
| Wabek | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Severe |
| Lehr | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 2234: | | | | | | |
| Amor | Moderate: slope | Moderate: shrink-swell slope | Moderate: shrink-swell slope | Severe: slope | Severe: low strength | Moderate: area reclaim slope thin layer |
| Werner | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Severe: area reclaim thin layer |
| 2235: | | | | | | |
| Arnegard | Slight | Moderate: shrink-swell | Slight | Moderate: shrink-swell | Severe: low strength | Slight |
| 2240: | | | | | | |
| Bowdle | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Slight |
| Lehr | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 2241: | | | | | | |
| Bryant | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| 2242: | | | | | | |
| Cohagen | Severe: depth to rock | Moderate: depth to rock | Severe: depth to rock | Moderate: slope depth to rock | Moderate: frost action depth to rock | Severe: depth to rock |
| Vebar | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: area reclaim thin layer |
| Parshall | Severe: cutbanks cave | Slight | Slight | Slight | Moderate: frost action | Slight |
| 2243: | | | | | | |
| Vebar | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: area reclaim thin layer |
| Flasher | Moderate: slope | Moderate: slope | Moderate: slope | Severe: slope | Moderate: slope | Severe: area reclaim thin layer |
| 2244: | | | | | | |
| Daglum | Moderate: too clayey | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Severe: excess sodium |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 2244:(cont.) | | | | | | |
| Belfield | Moderate: too clayey wetness | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Severe: excess sodium |
| 2246: | | | | | | |
| Grail | Moderate: too clayey | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| 2248: | | | | | | |
| Lehr | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| Bowdle | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Slight |
| 2249: | | | | | | |
| Makoti | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| 2250: | | | | | | |
| Makoti | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: low strength | Slight |
| Rusklyn | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: frost action low strength | Slight |
| 2252: | | | | | | |
| Max | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope |
| Zahl | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |
| Arnegard | Slight | Moderate: shrink-swell | Slight | Moderate: shrink-swell | Severe: low strength | Slight |
| 2253: | | | | | | |
| Mondamin | Moderate: too clayey | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Moderate: droughty |
| 2254: | | | | | | |
| Overly | Moderate: too clayey | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: frost action low strength | Slight |
| 2255: | | | | | | |
| Overly | Moderate: too clayey | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Severe: frost action low strength | Slight |
| Rusklyn | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: frost action low strength | Slight |
| 2257: | | | | | | |
| Reeder | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: low strength shrink-swell | Moderate: area reclaim thin layer |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 2257:(cont.) | | | | | | |
| Arnegard | Slight | Moderate: shrink-swell | Slight | Moderate: shrink-swell | Severe: low strength | Slight |
| 2258: | | | | | | |
| Regent | Moderate: too clayey | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Moderate: thin layer |
| Savage | Moderate: too clayey | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Slight |
| 2259: | | | | | | |
| Rhoades | Moderate: too clayey | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Severe: excess sodium |
| Daglum | Moderate: too clayey | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Severe: excess sodium |
| 2260: | | | | | | |
| Rusklyn | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: frost action low strength | Slight |
| 2261: | | | | | | |
| Schaller | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Severe: droughty |
| 2262: | | | | | | |
| Schaller | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Severe: droughty |
| 2263: | | | | | | |
| Sinai | Severe: cutbanks cave | Severe: shrink-swell | Severe: shrink-swell | Severe: shrink-swell | Severe: low strength shrink-swell | Severe: too clayey |
| 2264: | | | | | | |
| Vebar | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: area reclaim thin layer |
| Cohagen | Severe: depth to rock | Moderate: depth to rock | Severe: depth to rock | Moderate: slope depth to rock | Moderate: frost action depth to rock | Severe: depth to rock |
| 2265: | | | | | | |
| Wabek | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Severe |
| Appam | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 2266: | | | | | | |
| Wabek | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Severe |
| Appam | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 2267: | | | | | | |
| Werner | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Severe: area reclaim thin layer |
| Amor | Moderate: slope | Moderate: shrink-swell c | Moderate: shrink-swell | Severe: slope | Severe: | Moderate: thin layer c |
| Amor | | | | | | |
| Amor | M Moeragard | Moderate: | Moderate: | Severe: | Modera: | |
| 2267: | | | | | | |
| Werner | Slight | MCavoute: | Moderate: -0.0648 Tc T* ( | | | Moderate:)Tj T* ( |
| 2267: | | 70 | | | | |

Table 15.-Building Site Development--Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 2274:(cont.) | | | | | | |
| Maddock | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| 2275: | | | | | | |
| Towner | Severe: cutbanks cave | Slight | Moderate: shrink-swell wetness | Slight | Moderate: frost action | Moderate: droughty |
| Maddock | Severe: cutbanks cave | Slight | Slight | Slight | Slight | Moderate: droughty |
| Buse | Slight | Moderate: shrink-swell | Moderate: shrink-swell | Moderate: shrink-swell slope | Severe: low strength | Slight |

Table 16.-Sanitary Facilities

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

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 30: | | | | | |
| Amor | Severe: seepage thin layer | Severe: seepage slope | Severe: seepage | Moderate: seepage slope | Poor: area reclaim thin layer |
| Arnegard | Moderate: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 40: | | | | | |
| Amor | Severe: seepage thin layer | Severe: seepage slope | Severe: seepage | Moderate: seepage slope | Poor: area reclaim thin layer |
| Werner | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Severe: seepage | Poor: area reclaim thin layer |
| Farnuf | Moderate: percs slowly | Moderate: seepage | Moderate: too clayey | Slight | Poor: hard to pack |
| 41: | | | | | |
| Amor | Severe: seepage thin layer | Severe: seepage slope | Severe: seepage | Moderate: seepage slope | Poor: area reclaim thin layer |
| Werner | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Severe: seepage | Poor: area reclaim thin layer |
| 76: | | | | | |
| Arvilla | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 118: | | | | | |
| Barnes | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| Buse | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 156: | | | | | |
| Barnes | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| Svea | Severe: percs slowly wetness | Severe: wetness | Severe: wetness | Severe: wetness | Fair: too clayey wetness |
| 313: | | | | | |
| Buse | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 313:(cont.) | | | | | |
| Barnes | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 314: | | | | | |
| Buse | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| Barnes | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 319: | | | | | |
| Buse | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| Barnes | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 450: | | | | | |
| Colvin | Severe: percs slowly wetness | Severe: wetness | Severe: wetness | Severe: wetness | Poor: wetness |
| 511: | | | | | |
| Divide | Severe: wetness poor filter | Severe: seepage wetness | Severe: seepage wetness | Severe: seepage wetness | Poor: seepage small stones too sandy |
| 674: | | | | | |
| Farnuf | Moderate: percs slowly | Moderate: seepage | Moderate: too clayey | Slight | Poor: hard to pack |
| 712: | | | | | |
| Flaxton | Severe: percs slowly | Severe: seepage | Moderate: too clayey | Severe: seepage | Fair: too clayey |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| 714: | | | | | |
| Flaxton | Severe: percs slowly | Severe: seepage | Moderate: too clayey | Severe: seepage | Fair: too clayey |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| 727: | | | | | |
| Fordville | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 863: | | | | | |
| Hamerly | Severe: percs slowly wetness | Severe: wetness | Severe: wetness | Severe: wetness | Fair: too clayey wetness |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 883: | | | | | |
| Hamerly | Severe: percs slowly wetness | Severe: wetness | Severe: wetness | Severe: wetness | Fair: too clayey wetness |
| Tonka | Severe: percs slowly ponding | Severe: ponding | Severe: too clayey ponding | Severe: ponding | Poor: hard to pack too clayey ponding |
| Parnell | Severe: percs slowly ponding | Severe: ponding | Severe: too clayey ponding | Severe: ponding | Poor: hard to pack too clayey ponding |
| 1011: | | | | | |
| Karlsruhe | Severe: wetness poor filter | Severe: seepage wetness | Severe: seepage too sandy wetness | Severe: seepage wetness | Poor: seepage too sandy |
| 1181: | | | | | |
| Lohnes | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage too sandy |
| 1202: | | | | | |
| Maddock | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage too sandy |
| 1249: | | | | | |
| Appam | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 1267: | | | | | |
| Marysland | Severe: percs slowly wetness | Severe: seepage wetness | Severe: seepage wetness | Severe: seepage wetness | Poor: seepage small stones too sandy |
| 1372: | | | | | |
| Noonan | Severe: percs slowly wetness | Moderate: slope | Severe: excess sodium wetness | Moderate: wetness | Poor: excess sodium |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| 1374: | | | | | |
| Nutley | Severe: percs slowly | Slight | Severe: too clayey | Slight | Poor: hard to pack too clayey |
| 1375: | | | | | |
| Nutley | Severe: percs slowly | Slight | Severe: too clayey | Slight | Poor: hard to pack too clayey |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 1427: | | | | | |
| Parnell | Severe: percs slowly ponding | Severe: ponding | Severe: too clayey ponding | Severe: ponding | Poor: hard to pack too clayey ponding |
| 1437: | | | | | |
| Parshall | Slight | Severe: seepage | Severe: seepage | Severe: seepage | Fair: too sandy |
| 1466: | | | | | |
| Pits, gravel and sand | Severe: slope poor filter | Severe: seepage slope | Severe: seepage slope too sandy | Severe: seepage slope | Poor: seepage small stones too sandy |
| 1676: | | | | | |
| Wildrose | Severe: percs slowly | Slight | Severe: too clayey | Slight | Poor: hard to pack too clayey |
| 1697: | | | | | |
| Sioux | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| Arvilla | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 1710: | | | | | |
| Southam | Severe: percs slowly ponding | Severe: ponding | Severe: too clayey ponding | Severe: ponding | Poor: hard to pack too clayey ponding |
| 1762: | | | | | |
| Svea | Severe: percs slowly wetness | Severe: wetness | Severe: wetness | Severe: wetness | Fair: too clayey wetness |
| Barnes | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 1805: | | | | | |
| Telfer | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: too sandy |
| 1886: | | | | | |
| Hamerly, saline | Severe: percs slowly wetness | Severe: wetness | Severe: wetness | Severe: wetness | Fair: too clayey wetness |
| Vallers, saline | Severe: percs slowly wetness | Severe: wetness | Severe: wetness | Severe: wetness | Poor: wetness |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 1898: | | | | | |
| Vebar | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Moderate: seepage | Poor: area reclaim thin layer |
| 1978: | | | | | |
| Water | --- | --- | --- | --- | --- |
| 2006: | | | | | |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2014: | | | | | |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| Bowbells | Severe: percs slowly | Moderate: seepage | Moderate: too clayey | Slight | Fair: too clayey |
| 2015: | | | | | |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| Bowbells | Severe: percs slowly | Moderate: seepage | Moderate: too clayey | Slight | Fair: too clayey |
| 2031: | | | | | |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| Zahl | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2037: | | | | | |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| Zahl | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| Parnell | Severe: percs slowly ponding | Severe: ponding | Severe: too clayey ponding | Severe: ponding | Poor: hard to pack too clayey ponding |
| 2073: | | | | | |
| Zahl | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| Max | Severe: percs slowly slope | Severe: slope | Severe: slope | Severe: slope | Poor: slope |
| 2081: | | | | | |
| Zahl | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 2081:(cont.) | | | | | |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2175: | | | | | |
| Zahl | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| Williams | Severe: percs slowly | Severe: slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2188: | | | | | |
| Wabek | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| Lehr | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 2234: | | | | | |
| Amor | Severe: seepage thin layer | Severe: seepage slope | Severe: seepage | Moderate: seepage slope | Poor: area reclaim thin layer |
| Werner | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Severe: seepage | Poor: area reclaim thin layer |
| 2235: | | | | | |
| Arnegard | Moderate: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2240: | | | | | |
| Bowdle | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| Lehr | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 2241: | | | | | |
| Bryant | Moderate: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2242: | | | | | |
| Cohagen | Severe: depth to rock | Severe: seepage slope depth to rock | Severe: seepage depth to rock | Severe: depth to rock | Poor: depth to rock |
| Vebar | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Moderate: seepage | Poor: area reclaim thin layer |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 2242:(cont.) | | | | | |
| Parshall | Slight | Severe: seepage | Severe: seepage | Severe: seepage | Fair: too sandy |
| 2243: | | | | | |
| Vebar | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Moderate: seepage | Poor: area reclaim thin layer |
| Flasher | Severe: seepage thin layer | Severe: seepage slope | Severe: seepage | Severe: seepage | Poor: area reclaim thin layer |
| 2244: | | | | | |
| Daglum | Severe: percs slowly | Moderate: slope | Severe: excess sodium too clayey | Slight | Poor: excess sodium too clayey |
| Belfield | Severe: percs slowly | Slight | Severe: excess sodium too clayey wetness | Moderate: wetness | Poor: excess sodium hard to pack too clayey |
| 2246: | | | | | |
| Grail | Severe: percs slowly | Slight | Severe: too clayey | Slight | Poor: hard to pack too clayey |
| 2248: | | | | | |
| Lehr | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| Bowdle | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 2249: | | | | | |
| Makoti | Severe: percs slowly | Slight | Moderate: too clayey | Slight | Fair: too clayey |
| 2250: | | | | | |
| Makoti | Severe: percs slowly | Slight | Moderate: too clayey | Slight | Fair: too clayey |
| Rusklyn | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2252: | | | | | |
| Max | Severe: percs slowly slope | Severe: slope | Severe: slope | Severe: slope | Poor: slope |
| Zahl | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 2252:(cont.) | | | | | |
| Arnegard | Moderate: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2253: | | | | | |
| Mondamin | Severe: percs slowly | Moderate: slope | Severe: too clayey | Slight | Poor: hard to pack too clayey |
| 2254: | | | | | |
| Overly | Severe: percs slowly | Slight | Moderate: too clayey | Slight | Poor: thin layer |
| 2255: | | | | | |
| Overly | Severe: percs slowly | Slight | Moderate: too clayey | Slight | Poor: thin layer |
| Rusklyn | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2257: | | | | | |
| Reeder | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Moderate: seepage | Poor: area reclaim thin layer |
| Arnegard | Moderate: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2258: | | | | | |
| Regent | Severe: seepage percs slowly thin layer | Severe: seepage | Severe: seepage too clayey | Moderate: seepage | Poor: area reclaim hard to pack too clayey |
| Savage | Severe: percs slowly | Moderate: slope | Severe: too clayey | Slight | Poor: hard to pack too clayey |
| 2259: | | | | | |
| Rhoades | Severe: percs slowly | Moderate: slope | Severe: excess sodium too clayey | Slight | Poor: hard to pack too clayey |
| Daglum | Severe: percs slowly | Moderate: slope | Severe: excess sodium too clayey | Slight | Poor: excess sodium too clayey |
| 2260: | | | | | |
| Rusklyn | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2261: | | | | | |
| Schaller | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 2262: | | | | | |
| Schaller | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 2263: | | | | | |
| Sinai | Severe: percs slowly | Slight | Severe: too clayey | Slight | Poor: hard to pack too clayey |
| 2264: | | | | | |
| Vebar | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Moderate: seepage | Poor: area reclaim thin layer |
| Cohagen | Severe: depth to rock | Severe: seepage slope depth to rock | Severe: seepage depth to rock | Severe: depth to rock | Poor: depth to rock |
| 2265: | | | | | |
| Wabek | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| Appam | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 2266: | | | | | |
| Wabek | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| Appam | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 2267: | | | | | |
| Werner | Severe: seepage thin layer | Severe: seepage | Severe: seepage | Severe: seepage | Poor: area reclaim thin layer |
| Amor | Severe: seepage thin layer | Severe: seepage slope | Severe: seepage | Moderate: seepage slope | Poor: area reclaim thin layer |
| Arnegard | Moderate: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2269: | | | | | |
| Cavour | Severe: percs slowly wetness | Moderate: slope | Severe: excess sodium wetness | Moderate: wetness | Poor: excess sodium hard to pack |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 2269:(cont.) | | | | | |
| Barnes | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| 2270: | | | | | |
| Harriet | Severe: flooding percs slowly wetness | Severe: flooding | Severe: flooding too clayey wetness | Severe: flooding wetness | Poor: hard to pack too clayey wetness |
| Stirum | Severe: flooding wetness poor filter | Severe: flooding seepage wetness | Severe: flooding seepage wetness | Severe: flooding seepage wetness | Poor: excess sodium wetness |
| 2271: | | | | | |
| Lohnes | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage too sandy |
| 2272: | | | | | |
| Sioux | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| Arvilla | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage small stones too sandy |
| 2273: | | | | | |
| Svea | Severe: percs slowly wetness | Severe: wetness | Severe: wetness | Severe: wetness | Fair: too clayey wetness |
| Buse | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |
| Parnell | Severe: percs slowly ponding | Severe: ponding | Severe: too clayey ponding | Severe: ponding | Poor: hard to pack too clayey ponding |
| 2274: | | | | | |
| Towner | Severe: percs slowly wetness poor filter | Severe: seepage wetness | Moderate: too clayey wetness | Severe: seepage | Fair: too clayey wetness |
| Maddock | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage too sandy |

Table 16.-Sanitary Facilities--Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 2275: | | | | | |
| Towner | Severe: percs slowly wetness poor filter | Severe: seepage wetness | Moderate: too clayey wetness | Severe: seepage | Fair: too clayey wetness |
| Maddock | Severe: poor filter | Severe: seepage | Severe: seepage too sandy | Severe: seepage | Poor: seepage too sandy |
| Buse | Severe: percs slowly | Moderate: seepage slope | Moderate: too clayey | Slight | Fair: too clayey |

Table 17.-Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," or other terms. Dashes (--) indicate the map unit component was not rated.) The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 30: | | | | |
| Amor | Poor: area reclaim, low strength | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim, slope, thin layer |
| Arnegard | Good | Improbable: excess fines | Improbable: excess fines | Good |
| 40: | | | | |
| Amor | Poor: area reclaim, low strength | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim, slope, thin layer |
| Werner | Poor: area reclaim, low strength, thin layer | Improbable: excess fines | Improbable: excess fines | Poor: area reclaim, thin layer |
| Farnuf | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: too clayey |
| 41: | | | | |
| Amor | Poor: area reclaim, low strength | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim, slope, thin layer |
| Werner | Poor: area reclaim, low strength, thin layer | Improbable: excess fines | Improbable: excess fines | Poor: area reclaim, thin layer |
| 76: | | | | |
| Arvilla | Good | Probable | Probable | Poor: area reclaim, small stones, too sandy |
| 118: | | | | |
| Barnes | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| Buse | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones, too clayey |
| 156: | | | | |
| Barnes | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| Svea | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| 313: | | | | |
| Buse | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones, too clayey |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 313:(cont.) | | | | |
| Barnes | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| 314: | | | | |
| Buse | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Barnes | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| 319: | | | | |
| Buse | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Barnes | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| 450: | | | | |
| Colvin | Poor: low strength wetness | Improbable: excess fines | Improbable: excess fines | Poor: wetness |
| 511: | | | | |
| Divide | Fair: wetness | Probable | Probable | Poor: area reclaim small stones too sandy |
| 674: | | | | |
| Farnuf | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: too clayey |
| 712: | | | | |
| Flaxton | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| 714: | | | | |
| Flaxton | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| 727: | | | | |
| Fordville | Good | Probable | Probable | Poor: area reclaim small stones too sandy |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 863: | | | | |
| Hamerly | Fair: low strength, shrink-swell, wetness | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| 883: | | | | |
| Hamerly | Fair: low strength, shrink-swell, wetness | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| Tonka | Poor: low strength, wetness | Improbable: excess fines | Improbable: excess fines | Poor: too clayey, wetness |
| Parnell | Poor: low strength, shrink-swell, wetness | Improbable: excess fines | Improbable: excess fines | Poor: wetness |
| 1011: | | | | |
| Karlsruhe | Fair: wetness | Probable | Improbable: too sandy | Poor: too sandy |
| 1181: | | | | |
| Lohnes | Good | Probable | Improbable: too sandy | Fair: too sandy |
| 1202: | | | | |
| Maddock | Good | Probable | Improbable: too sandy | Poor: too sandy |
| 1249: | | | | |
| Appam | Good | Probable | Probable | Poor: area reclaim, small stones, too sandy |
| 1267: | | | | |
| Marysland | Poor: wetness | Probable | Probable | Poor: area reclaim, small stones, wetness |
| 1372: | | | | |
| Noonan | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Poor: excess sodium |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones, too clayey |
| 1374: | | | | |
| Nutley | Poor: low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: too clayey |
| 1375: | | | | |
| Nutley | Poor: low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: too clayey |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 1427: | | | | |
| Parnell | Poor: low strength shrink-swell wetness | Improbable: excess fines | Improbable: excess fines | Poor: wetness |
| 1437: | | | | |
| Parshall | Good | Improbable: excess fines | Improbable: excess fines | Good |
| 1466: | | | | |
| Pits, gravel and sand | Poor: slope | Probable | Probable | Poor: area reclaim small stones too sandy |
| 1676: | | | | |
| Wildrose | Poor: low strength shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: too clayey |
| 1697: | | | | |
| Sioux | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| Arvilla | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| 1710: | | | | |
| Southam | Poor: low strength shrink-swell wetness | Improbable: excess fines | Improbable: excess fines | Poor: too clayey wetness |
| 1762: | | | | |
| Svea | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| Barnes | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| 1805: | | | | |
| Telfer | Good | Improbable: excess fines | Improbable: excess fines | Poor: too sandy |
| 1886: | | | | |
| Hamerly, saline | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Poor: excess salt |
| Vallers, saline | Fair: low strength wetness | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| 1898: | | | | |
| Vebar | Poor: area reclaim | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim small stones thin layer |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 1978: | | | | |
| Water | --- | --- | --- | --- |
| 2006: | | | | |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| 2014: | | | | |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| Bowbells | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| 2015: | | | | |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| Bowbells | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| 2031: | | | | |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| Zahl | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| 2037: | | | | |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| Zahl | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Parnell | Poor: low strength shrink-swell wetness | Improbable: excess fines | Improbable: excess fines | Poor: wetness |
| 2073: | | | | |
| Zahl | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Max | Poor: slope | Improbable: excess fines | Improbable: excess fines | Poor: slope |
| 2081: | | | | |
| Zahl | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 2081:(cont.) | | | | |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| 2175: | | | | |
| Zahl | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Williams | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: large stones too clayey |
| 2188: | | | | |
| Wabek | Good | Probable | Probable | Poor: area reclaim small stones |
| Lehr | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| 2234: | | | | |
| Amor | Poor: area reclaim low strength | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim slope thin layer |
| Werner | Poor: area reclaim low strength thin layer | Improbable: excess fines | Improbable: excess fines | Poor: area reclaim thin layer |
| 2235: | | | | |
| Arnegard | Good | Improbable: excess fines | Improbable: excess fines | Good |
| 2240: | | | | |
| Bowdle | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| Lehr | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| 2241: | | | | |
| Bryant | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: too clayey |
| 2242: | | | | |
| Cohagen | Poor: depth to rock | Improbable: excess fines | Improbable: excess fines | Poor: depth to rock |
| Vebar | Poor: area reclaim | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim small stones thin layer |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 2242:(cont.) | | | | |
| Parshall | Good | Improbable: excess fines | Improbable: excess fines | Good |
| 2243: | | | | |
| Vebar | Poor: area reclaim | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim small stones thin layer |
| Flasher | Poor: area reclaim thin layer | Improbable: excess fines | Improbable: excess fines | Poor: area reclaim thin layer |
| 2244: | | | | |
| Daglum | Poor: low strength shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: excess sodium excess salt too clayey |
| Belfield | Poor: low strength shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: excess sodium excess salt too clayey |
| 2246: | | | | |
| Grail | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Poor: too clayey |
| 2248: | | | | |
| Lehr | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| Bowdle | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| 2249: | | | | |
| Makoti | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Good |
| 2250: | | | | |
| Makoti | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Good |
| Rusklyn | Fair: low strength shrink-swell | Improbable: excess fines | Improbable: excess fines | Fair: too clayey |
| 2252: | | | | |
| Max | Poor: slope | Improbable: excess fines | Improbable: excess fines | Poor: slope |
| Zahl | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Arnegard | Good | Improbable: excess fines | Improbable: excess fines | Good |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 2253: | | | | |
| Mondamin | Poor: low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: too clayey |
| 2254: | | | | |
| Overly | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: thin layer |
| 2255: | | | | |
| Overly | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: thin layer |
| Rusklyn | Fair: low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Fair: too clayey |
| 2257: | | | | |
| Reeder | Poor: area reclaim, low strength | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim, thin layer |
| Arnegard | Good | Improbable: excess fines | Improbable: excess fines | Good |
| 2258: | | | | |
| Regent | Poor: area reclaim, low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: thin layer |
| Savage | Poor: low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: too clayey |
| 2259: | | | | |
| Rhoades | Poor: low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: excess sodium, excess salt, too clayey |
| Daglum | Poor: low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: excess sodium, excess salt, too clayey |
| 2260: | | | | |
| Rusklyn | Fair: low strength, shrink-swell | Improbable: excess fines | Improbable: excess fines | Fair: too clayey |
| 2261: | | | | |
| Schaller | Good | Probable | Probable | Poor: area reclaim, small stones, too sandy |
| 2262: | | | | |
| Schaller | Good | Probable | Probable | Poor: area reclaim, small stones, too sandy |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 2263: | | | | |
| Sinai | Poor: low strength shrink-swell | Improbable: excess fines | Improbable: excess fines | Poor: too clayey |
| 2264: | | | | |
| Vebar | Poor: area reclaim | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim small stones thin layer |
| Cohagen | Poor: depth to rock | Improbable: excess fines | Improbable: excess fines | Poor: depth to rock |
| 2265: | | | | |
| Wabek | Good | Probable | Probable | Poor: area reclaim small stones |
| Appam | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| 2266: | | | | |
| Wabek | Good | Probable | Probable | Poor: area reclaim small stones |
| Appam | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| 2267: | | | | |
| Werner | Poor: area reclaim low strength thin layer | Improbable: excess fines | Improbable: excess fines | Poor: area reclaim thin layer |
| Amor | Poor: area reclaim low strength | Improbable: excess fines | Improbable: excess fines | Fair: area reclaim slope thin layer |
| Arnegard | Good | Improbable: excess fines | Improbable: excess fines | Good |
| 2269: | | | | |
| Cavour | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Poor: excess sodium excess salt too clayey |
| Barnes | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| 2270: | | | | |
| Harriet | Poor: low strength wetness | Improbable: excess fines | Improbable: excess fines | Poor: excess salt too clayey wetness |

Table 17.-Construction Materials--Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 2270:(cont.) | | | | |
| Stirum | Fair: wetness | Improbable: excess fines | Improbable: excess fines | Poor: excess sodium excess salt |
| 2271: | | | | |
| Lohnes | Good | Probable | Improbable: too sandy | Fair: too sandy |
| 2272: | | | | |
| Sioux | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| Arvilla | Good | Probable | Probable | Poor: area reclaim small stones too sandy |
| 2273: | | | | |
| Svea | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones |
| Buse | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |
| Parnell | Poor: low strength shrink-swell wetness | Improbable: excess fines | Improbable: excess fines | Poor: wetness |
| 2274: | | | | |
| Towner | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Poor: too sandy |
| Maddock | Good | Probable | Improbable: too sandy | Poor: too sandy |
| 2275: | | | | |
| Towner | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Poor: too sandy |
| Maddock | Good | Probable | Improbable: too sandy | Poor: too sandy |
| Buse | Poor: low strength | Improbable: excess fines | Improbable: excess fines | Fair: small stones too clayey |

Table 18.-Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of “slight,” “moderate,” and “severe.” Dashes (—) indicate that the map unit component was not evaluated.) The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 30: | | | | | | | |
| Amor | Severe: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim slope | Limitation: area reclaim slope |
| Arnegard | Moderate: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Favorable | Favorable |
| 40: | | | | | | | |
| Amor | Severe: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim slope | Limitation: area reclaim slope |
| Werner | Severe: seepage | Severe: piping thin layer | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim | Limitation: area reclaim |
| Farnuf | Moderate: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Favorable | Favorable |
| 41: | | | | | | | |
| Amor | Severe: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim slope | Limitation: area reclaim slope |
| Werner | Severe: seepage | Severe: piping thin layer | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim | Limitation: area reclaim |
| 76: | | | | | | | |
| Arvilla | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 118: | | | | | | | |
| Barnes | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Buse | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 156: | | | | | | | |
| Barnes | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Svea | Moderate: seepage slope | Severe: piping | Severe: slow refill | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 313: | | | | | | | |
| Buse | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 313:(cont.) | | | | | | | |
| Barnes | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 314: | | | | | | | |
| Buse | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Barnes | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 319: | | | | | | | |
| Buse | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Barnes | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 450: | | | | | | | |
| Colvin | Moderate: seepage | Severe: piping wetness | Severe: slow refill | Limitation: frost action | Limitation: wetness | Limitation: erodes easily wetness | Limitation: erodes easily wetness |
| 511: | | | | | | | |
| Divide | Severe: seepage | Severe: seepage piping | Severe: cutbanks cave | Limitation: cutbanks cave | Limitation: wetness | Limitation: too sandy wetness | Favorable |
| 674: | | | | | | | |
| Farnuf | Moderate: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Favorable | Favorable |
| 712: | | | | | | | |
| Flaxton | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing | Limitation: erodes easily soil blowing | Limitation: erodes easily |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 714: | | | | | | | |
| Flaxton | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing | Limitation: erodes easily soil blowing | Limitation: erodes easily |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 727: | | | | | | | |
| Fordville | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: rooting depth | Limitation: too sandy | Limitation: rooting depth |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 863: | | | | | | | |
| Hamerly | Moderate: seepage | Severe: piping wetness | Severe: slow refill | Limitation: frost action | Limitation: wetness | Limitation: erodes easily wetness | Limitation: erodes easily |
| 883: | | | | | | | |
| Hamerly | Moderate: seepage | Severe: piping wetness | Severe: slow refill | Limitation: frost action | Limitation: wetness | Limitation: erodes easily wetness | Limitation: erodes easily |
| Tonka | Slight | Severe: ponding | Severe: slow refill | Limitation: frost action percs slowly ponding | Limitation: erodes easily percs slowly ponding | Limitation: erodes easily percs slowly ponding | Limitation: erodes easily percs slowly wetness |
| Parnell | Slight | Severe: hard to pack ponding | Severe: slow refill | Limitation: frost action percs slowly ponding | Limitation: percs slowly ponding | Limitation: erodes easily percs slowly ponding | Limitation: erodes easily percs slowly wetness |
| 1011: | | | | | | | |
| Karlsruhe | Severe: seepage | Severe: seepage piping wetness | Severe: cutbanks cave | Limitation: cutbanks cave | Limitation: wetness droughty | Limitation: too sandy wetness soil blowing | Limitation: droughty |
| 1181: | | | | | | | |
| Lohnes | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 1202: | | | | | | | |
| Maddock | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 1249: | | | | | | | |
| Appam | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 1267: | | | | | | | |
| Marysland | Severe: seepage | Severe: seepage wetness | Severe: slow refill cutbanks cave | Limitation: frost action cutbanks cave | Limitation: wetness | Limitation: too sandy wetness | Limitation: wetness |
| 1372: | | | | | | | |
| Noonan | Moderate: slope | Severe: excess sodium piping | Severe: slow refill | Limitation: deep to water | Limitation: percs slowly slope | Limitation: erodes easily percs slowly | Limitation: erodes easily excess sodium percs slowly |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 1374: | | | | | | | |
| Nutley | Slight | Moderate: hard to pack | Severe: no water | Limitation: deep to water | Limitation: slow intake droughty | Limitation: percs slowly | Limitation: percs slowly droughty |
| 1375: | | | | | | | |
| Nutley | Slight | Moderate: hard to pack | Severe: no water | Limitation: deep to water | Limitation: slow intake droughty | Limitation: percs slowly | Limitation: percs slowly droughty |
| 1427: | | | | | | | |
| Parnell | Slight | Severe: hard to pack ponding | Severe: slow refill | Limitation: frost action percs slowly ponding | Limitation: percs slowly ponding | Limitation: erodes easily percs slowly ponding | Limitation: erodes easily percs slowly wetness |
| 1437: | | | | | | | |
| Parshall | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing | Limitation: too sandy soil blowing | Favorable |
| 1466: | | | | | | | |
| Pits, gravel and sand | Severe: seepage slope | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: slope too sandy | Limitation: slope droughty |
| 1676: | | | | | | | |
| Wildrose | Slight | Moderate: hard to pack | Severe: no water | Limitation: deep to water | Limitation: percs slowly droughty | Limitation: percs slowly | Limitation: percs slowly droughty |
| 1697: | | | | | | | |
| Sioux | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: too sandy | Limitation: droughty |
| Arvilla | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 1710: | | | | | | | |
| Southam | Slight | Severe: thin layer ponding | Severe: slow refill | Limitation: frost action percs slowly ponding | Limitation: percs slowly ponding | Limitation: erodes easily percs slowly ponding | Limitation: erodes easily excess salt wetness |
| 1762: | | | | | | | |
| Svea | Moderate: seepage slope | Severe: piping | Severe: slow refill | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Barnes | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 1805: | | | | | | | |
| Telfer | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 1886: | | | | | | | |
| Hamerly, saline | Moderate: seepage | Severe: piping wetness | Severe: slow refill | Limitation: excess salt frost action | Limitation: excess salt wetness | Limitation: erodes easily wetness | Limitation: erodes easily excess salt |
| Vallers, saline | Slight | Severe: piping wetness | Severe: slow refill | Limitation: frost action | Limitation: wetness | Limitation: wetness | Limitation: wetness |
| 1898: | | | | | | | |
| Vebar | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer soil blowing | Limitation: area reclaim soil blowing | Limitation: area reclaim |
| 1978: | | | | | | | |
| Water | — | — | — | — | — | — | — |
| 2006: | | | | | | | |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 2014: | | | | | | | |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Bowbells | Moderate: seepage | Moderate: piping | Severe: no water | Limitation: deep to water | Favorable | Limitation: erodes easily | Limitation: erodes easily |
| 2015: | | | | | | | |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Bowbells | Moderate: seepage | Moderate: piping | Severe: no water | Limitation: deep to water | Favorable | Limitation: erodes easily | Limitation: erodes easily |
| 2031: | | | | | | | |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Zahl | Moderate: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 2037: | | | | | | | |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Zahl | Moderate: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Parnell | Slight | Severe: hard to pack ponding | Severe: slow refill | Limitation: frost action percs slowly ponding | Limitation: percs slowly ponding | Limitation: erodes easily percs slowly ponding | Limitation: erodes easily percs slowly wetness |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 2073: | | | | | | | |
| Zahl | Moderate: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Max | Severe: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily slope | Limitation: erodes easily slope |
| 2081: | | | | | | | |
| Zahl | Moderate: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 2175: | | | | | | | |
| Zahl | Moderate: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Williams | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 2188: | | | | | | | |
| Wabek | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| Lehr | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: too sandy | Limitation: droughty |
| 2234: | | | | | | | |
| Amor | Severe: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim slope | Limitation: area reclaim slope |
| Werner | Severe: seepage | Severe: piping thin layer | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim | Limitation: area reclaim |
| 2235: | | | | | | | |
| Arnegard | Moderate: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Favorable | Favorable |
| 2240: | | | | | | | |
| Bowdle | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: rooting depth | Limitation: too sandy | Limitation: rooting depth |
| Lehr | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: too sandy | Limitation: droughty |
| 2241: | | | | | | | |
| Bryant | Moderate: seepage slope | Moderate: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Favorable | Favorable |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 2242: | | | | | | | |
| Cohagen | Severe: depth to rock | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing depth to rock | Limitation: soil blowing depth to rock | Limitation: depth to rock |
| Vebar | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer soil blowing | Limitation: area reclaim soil blowing | Limitation: area reclaim |
| Parshall | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing | Limitation: too sandy soil blowing | Favorable |
| 2243: | | | | | | | |
| Vebar | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer soil blowing | Limitation: area reclaim soil blowing | Limitation: area reclaim |
| Flasher | Severe: seepage slope | Severe: thin layer | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: area reclaim slope soil blowing | Limitation: area reclaim slope droughty |
| 2244: | | | | | | | |
| Daglum | Moderate: slope | Severe: excess sodium | Severe: no water | Limitation: deep to water | Limitation: percs slowly slope | Limitation: percs slowly | Limitation: excess sodium percs slowly |
| Belfield | Slight | Severe: excess sodium | Severe: slow refill | Limitation: deep to water | Limitation: erodes easily percs slowly | Limitation: erodes easily percs slowly | Limitation: erodes easily excess sodium |
| 2246: | | | | | | | |
| Grail | Slight | Moderate: hard to pack piping | Severe: no water | Limitation: deep to water | Limitation: erodes easily percs slowly | Limitation: erodes easily percs slowly | Limitation: erodes easily percs slowly |
| 2248: | | | | | | | |
| Lehr | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: too sandy | Limitation: droughty |
| Bowdle | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: rooting depth | Limitation: too sandy | Limitation: rooting depth |
| 2249: | | | | | | | |
| Makoti | Slight | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Limitation: erodes easily | Limitation: erodes easily |
| 2250: | | | | | | | |
| Makoti | Slight | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Limitation: erodes easily | Limitation: erodes easily |
| Rusklyn | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Favorable | Favorable |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 2252: | | | | | | | |
| Max | Severe: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily slope | Limitation: erodes easily slope |
| Zahl | Moderate: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Arnegard | Moderate: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Favorable | Favorable |
| 2253: | | | | | | | |
| Mondamin | Moderate: slope | Moderate: hard to pack | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: percs slowly | Limitation: percs slowly droughty |
| 2254: | | | | | | | |
| Overly | Slight | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: percs slowly | Favorable | Limitation: percs slowly |
| 2255: | | | | | | | |
| Overly | Slight | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: percs slowly | Favorable | Limitation: percs slowly |
| Rusklyn | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Favorable | Favorable |
| 2257: | | | | | | | |
| Reeder | Moderate: seepage | Slight | Severe: no water | Limitation: deep to water | Limitation: thin layer | Limitation: area reclaim | Limitation: area reclaim |
| Arnegard | Moderate: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Favorable | Favorable |
| 2258: | | | | | | | |
| Regent | Moderate: seepage slope | Severe: hard to pack | Severe: no water | Limitation: deep to water | Limitation: percs slowly slope thin layer | Limitation: area reclaim percs slowly | Limitation: area reclaim percs slowly |
| Savage | Moderate: slope | Severe: hard to pack | Severe: no water | Limitation: deep to water | Limitation: erodes easily percs slowly slope | Limitation: erodes easily percs slowly | Limitation: erodes easily percs slowly |
| 2259: | | | | | | | |
| Rhoades | Moderate: slope | Severe: excess sodium | Severe: no water | Limitation: deep to water | Limitation: percs slowly slope | Limitation: percs slowly | Limitation: excess sodium percs slowly |
| Daglum | Moderate: slope | Severe: excess sodium | Severe: no water | Limitation: deep to water | Limitation: percs slowly slope | Limitation: percs slowly | Limitation: excess sodium percs slowly |
| 2260: | | | | | | | |
| Rusklyn | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Favorable | Favorable |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 2261: | | | | | | | |
| Schaller | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 2262: | | | | | | | |
| Schaller | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 2263: | | | | | | | |
| Sinai | Slight | Moderate: hard to pack | Severe: no water | Limitation: deep to water | Limitation: percs slowly slow intake | Limitation: erodes easily percs slowly | Limitation: erodes easily percs slowly |
| 2264: | | | | | | | |
| Vebar | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer soil blowing | Limitation: area reclaim soil blowing | Limitation: area reclaim |
| Cohagen | Severe: depth to rock | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing depth to rock | Limitation: soil blowing depth to rock | Limitation: depth to rock |
| 2265: | | | | | | | |
| Wabek | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| Appam | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 2266: | | | | | | | |
| Wabek | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| Appam | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 2267: | | | | | | | |
| Werner | Severe: seepage | Severe: piping thin layer | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim | Limitation: area reclaim |
| Amor | Severe: slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope thin layer | Limitation: area reclaim slope | Limitation: area reclaim slope |
| Arnegard | Moderate: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Favorable | Favorable | Favorable |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 2269: | | | | | | | |
| Cavour | Moderate: slope | Severe: excess sodium | Severe: slow refill | Limitation: deep to water | Limitation: percs slowly rooting depth slope | Limitation: erodes easily percs slowly | Limitation: erodes easily excess sodium rooting depth |
| Barnes | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| 2270: | | | | | | | |
| Harriet | Moderate: seepage | Severe: excess sodium piping wetness | Severe: slow refill | Limitation: flooding frost action percs slowly | Limitation: percs slowly wetness | Limitation: erodes easily wetness | Limitation: erodes easily excess sodium wetness |
| Stirum | Severe: seepage | Severe: seepage piping wetness | Severe: slow refill cutbanks cave | Limitation: excess salt flooding cutbanks cave | Limitation: wetness droughty | Limitation: too sandy wetness soil blowing | Limitation: excess sodium excess salt wetness |
| 2271: | | | | | | | |
| Lohnes | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 2272: | | | | | | | |
| Sioux | Severe: seepage | Severe: seepage | Severe: no water | Limitation: deep to water | Limitation: slope droughty | Limitation: too sandy | Limitation: droughty |
| Arvilla | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: slope soil blowing droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| 2273: | | | | | | | |
| Svea | Moderate: seepage slope | Severe: piping | Severe: slow refill | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Buse | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |
| Parnell | Slight | Severe: hard to pack ponding | Severe: slow refill | Limitation: frost action percs slowly ponding | Limitation: percs slowly ponding | Limitation: erodes easily percs slowly ponding | Limitation: erodes easily percs slowly wetness |
| 2274: | | | | | | | |
| Towner | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: erodes easily soil blowing | Limitation: erodes easily droughty |
| Maddock | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |

Table 18.-Water Management--Continued

| Map symbol and soil name | Limitations for— Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Features affecting— Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|---|
| 2275: | | | | | | | |
| Towner | Severe: seepage | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: erodes easily soil blowing | Limitation: erodes easily droughty |
| Maddock | Severe: seepage | Severe: seepage piping | Severe: no water | Limitation: deep to water | Limitation: fast intake slope droughty | Limitation: too sandy soil blowing | Limitation: droughty |
| Buse | Moderate: seepage slope | Severe: piping | Severe: no water | Limitation: deep to water | Limitation: slope | Limitation: erodes easily | Limitation: erodes easily |

# Soil Properties

Classification

## Engineering Index Properties

Depth

Rock fragments

Texture

Percentage (of soil particles) passing designated sieves

Liquid limit and plasticity index

Ksat (permeability/saturated hydraulic conductivity)

Available water capacity

## Physical Properties

Depth

Shrink-swell potential

Clay

Moist bulk density

low

moderate

high

Very high

**Organic matter**

**Erosion factor Kw**

**Erosion factor Kf**

**Soil-loss tolerance factor T**

**Wind erodibility index (I)**

## Chemical Properties

**Wind erodibility groups (WEG)**

**Depth**

**Clay**

## Water Features

**Cation-exchange capacity**

**Hydrologic soil groups**

**Soil reaction**

**Calcium carbonate equivalent**

**Gypsum**

**Salinity**

**Sodium adsorption ratio (SAR)**

**Water table**

**duration**

**frequency**

48 ho1 T.776 0 Td ( (2 to (2 days) ) Tj 15.7 a -0.0052 Ts 1 n T 00.00

**upper limit** **lower limit**

**Ponding**

**Surface water depth**

**Ponding duration**

**very brief** **brief** **long**

**very long**

**Ponding frequency**

**none**

**rare**

**occasional**

**frequent**

**Flooding**

low

moderate

high

Risk of corrosion

uncoated steel

low moderate high

concrete

low moderate high

## Hydric Soils

Table 19.-Engineering Index Properties

(The symbol < means less than; > means greater than. Dashes (--) indicate that an assignment has not been made.)

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 30: | | | | | | | | | | | | |
| Amor---------- | 0-8 | Loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 85-90 | 60-70 | 25-40 | 3-18 |
| | 8-19 | Loam, clay loam | CL, CL-ML | A-6, A-4 | 0 | 0 | 100 | 95-100 | 90-100 | 65-85 | 20-45 | 5-25 |
| | 19-31 | Loam, clay loam, fine sandy loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 75-100 | 50-80 | 20-45 | 2-25 |
| | 31-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Arnegard-------- | 0-13 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 100 | 85-95 | 60-85 | 20-35 | 5-20 |
| | 13-36 | Loam, silt loam, clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 50-85 | 20-35 | 12-25 |
| | 36-60 | Loam, clay loam, fine sandy loam | CL, ML, SC, SM | A-4, A-6 | 0 | 0 | 100 | 100 | 70-100 | 40-80 | 15-40 | NP-15 |
| 40: | | | | | | | | | | | | |
| Amor---------- | 0-8 | Loam, silt loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 85-90 | 60-70 | 25-40 | 3-18 |
| | 8-19 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 90-100 | 65-85 | 20-45 | 5-25 |
| | 19-31 | Clay loam, loam, fine sandy loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 75-100 | 50-80 | 20-45 | 2-25 |
| | 31-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Werner---------- | 0-6 | Loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 35-90 | 25-40 | 5-20 |
| | 6-17 | Loam, very fine sandy loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 50-90 | 25-50 | 5-25 |
| | 17-60 | Bedrock | | | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 50-90 | --- | --- |
| Farnuf---------- | 0-9 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 100 | 90-95 | 70-80 | 25-40 | 5-20 |
| | 9-23 | Loam, clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 80-95 | 55-85 | 30-50 | 15-25 |
| | 23-34 | Loam, clay loam, silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 80-95 | 70-95 | 35-50 | 15-25 |
| | 34-60 | Stratified fine sandy loam to silty clay loam | CH, CL, CL-ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 75-100 | 70-100 | 25-55 | 5-30 |
| 41: | | | | | | | | | | | | |
| Amor---------- | 0-8 | Loam, silt loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 85-90 | 60-70 | 25-40 | 3-18 |
| | 8-19 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 90-100 | 65-85 | 20-45 | 5-25 |
| | 19-31 | Clay loam, loam, fine sandy loam | CL, CL-ML, ML | A-7, A-4, A-6 | 0 | 0 | 100 | 95-100 | 75-100 | 50-80 | 20-45 | 2-25 |
| | 31-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Werner---------- | 0-6 | Loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 35-90 | 25-40 | 5-20 |
| | 6-17 | Loam, very fine sandy loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 50-90 | 25-50 | 5-25 |
| | 17-60 | Bedrock | | | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 50-90 | --- | --- |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 76: | | | | | | | | | | | | |
| Arvilla--------- | 0-10 | Sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 95-100 | 90-100 | 50-80 | 20-45 | 15-30 | NP-15 |
| | 10-16 | Sandy loam, loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 90-100 | 85-100 | 50-80 | 20-45 | 15-40 | NP-15 |
| | 16-31 | Gravelly coarse sand, coarse sand, very gravelly coarse sand | GM, GP-GM, SP, SP-SM | A-3, A-2, A-1 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-25 | NP-5 |
| | 31-60 | Gravelly coarse sand, coarse sand, very gravelly coarse sand | GM, GP-GM, SP, SP-SM | A-1, A-2, A-3 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-25 | NP-5 |
| 118: | | | | | | | | | | | | |
| Barnes---------- | 0-7 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-100 | 60-80 | 25-35 | 10-20 |
| | 7-19 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 19-37 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 37-60 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| Buse---------- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 90-100 | 85-95 | 60-75 | 25-35 | 10-15 |
| | 8-40 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 40-60 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 70-90 | 55-85 | 25-45 | 10-25 |
| 156: | | | | | | | | | | | | |
| Barnes---------- | 0-7 | Loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-100 | 60-80 | 25-35 | 10-20 |
| | 7-19 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 19-37 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 37-60 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| Svea---------- | 0-10 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 85-100 | 80-95 | 60-90 | 25-40 | 10-20 |
| | 10-21 | Loam, silt loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 85-100 | 80-100 | 60-90 | 25-45 | 10-25 |
| | 21-36 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 36-60 | Loam, silt loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 85-100 | 80-100 | 60-85 | 25-45 | 10-25 |
| 313: | | | | | | | | | | | | |
| Buse---------- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 90-100 | 85-95 | 60-75 | 25-35 | 10-15 |
| | 8-40 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 40-60 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 70-90 | 55-85 | 25-45 | 10-25 |
| Barnes---------- | 0-7 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-100 | 60-80 | 25-35 | 10-20 |
| | 7-19 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 19-37 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 37-60 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| 314: | | | | | | | | | | | | |
| Buse---------- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 90-100 | 85-95 | 60-75 | 25-35 | 10-15 |
| | 8-40 | Loam, clay loam | CL, CL-ML | A-6, A-4 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 40-60 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 70-90 | 55-85 | 25-45 | 10-25 |
| Barnes---------- | 0-7 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-100 | 60-80 | 25-35 | 10-20 |
| | 7-19 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 19-37 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 37-60 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 319: | | | | | | | | | | | | |
| Buse---------- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 90-100 | 85-95 | 60-75 | 25-35 | 10-15 |
| | 8-40 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 40-60 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 70-90 | 55-85 | 25-45 | 10-25 |
| Barnes---------- | 0-7 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-100 | 60-80 | 25-35 | 10-20 |
| | 7-19 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 19-37 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 37-60 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| 450: | | | | | | | | | | | | |
| Colvin---------- | 0-10 | Silt loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 30-35 | 10-15 |
| | 10-30 | Silt loam, silty clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 30-45 | 10-20 |
| | 30-60 | Loam, silt loam, silty clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-95 | 30-45 | 10-20 |
| 511: | | | | | | | | | | | | |
| Divide---------- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | --- | 0 | 95-100 | 95-100 | 85-95 | 60-85 | 25-40 | 5-20 |
| | 8-12 | Loam, clay loam, gravelly loam | CL, CL-ML, SC, SC-SM | A-4, A-6, A-7 | --- | 0-3 | 95-100 | 75-100 | 55-90 | 35-80 | 20-45 | 5-20 |
| | 12-22 | Loam, clay loam, gravelly loam | CL, CL-ML, SC, SC-SM | A-4, A-6, A-7 | --- | 0-3 | 95-100 | 75-100 | 55-90 | 35-80 | 20-45 | 5-20 |
| | 22-26 | Gravelly loamy coarse sand, stratified sand to gravelly sand | GM, GP-GM, SM, SP-SM | A-1, A-3 | --- | 0-5 | 25-100 | 15-100 | 10-70 | 5-25 | 0-30 | NP-5 |
| | 26-60 | Very gravelly coarse sand, stratified sand to gravelly sand | GM, GP-GM, SM, SP-SM | A-1, A-3 | --- | 0-5 | 25-100 | 15-100 | 10-70 | 5-25 | 0-30 | NP-5 |
| 674: | | | | | | | | | | | | |
| Farnuf---------- | 0-9 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 100 | 90-95 | 70-80 | 25-40 | 5-20 |
| | 9-23 | Loam, clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 80-95 | 55-85 | 30-50 | 15-25 |
| | 23-34 | Loam, clay loam, silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 80-95 | 70-95 | 35-50 | 15-25 |
| | 34-60 | Stratified fine sandy loam to silty clay loam | CH, CL, CL-ML | A-6, A-7, A-4 | 0 | 0 | 100 | 100 | 75-100 | 70-100 | 25-55 | 5-30 |
| 712: | | | | | | | | | | | | |
| Flaxton---------- | 0-15 | Fine sandy loam | ML, SM | A-4 | 0 | 0 | 100 | 100 | 70-85 | 40-55 | 0-30 | NP-5 |
| | 15-22 | Fine sandy loam, loamy fine sand | SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-95 | 25-45 | 0-30 | NP-5 |
| | 22-25 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| | 25-30 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| | 30-35 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| | 35-42 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| | 42-60 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 712:(cont.) | | | | | | | | | | | | |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| 714: | | | | | | | | | | | | |
| Flaxton--------- | 0-15 | Fine sandy loam | ML, SM | A-4 | 0 | 0 | 100 | 100 | 70-85 | 40-55 | 0-30 | NP-5 |
| | 15-22 | Fine sandy loam, loamy fine sand | SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-95 | 25-45 | 0-30 | NP-5 |
| | 22-25 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| | 25-30 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| | 30-35 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| | 35-42 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| | 42-60 | Clay loam, loam | CL, CL-ML | A-7, A-4, A-6 | 0 | 0-5 | 85-100 | 80-100 | 75-95 | 60-80 | 25-45 | 5-25 |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| 727: | | | | | | | | | | | | |
| Fordville------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 70-85 | 55-75 | 30-45 | 5-20 |
| | 6-12 | Loam, silt loam, clay loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 70-95 | 55-80 | 30-45 | 5-20 |
| | 12-24 | Loam, silt loam, clay loam | CL, ML | A-7, A-4, A-6 | 0 | 0 | 100 | 95-100 | 70-95 | 55-80 | 30-45 | 5-20 |
| | 24-60 | Loamy sand, gravelly loam, very gravelly sand, gravelly coarse sand | SM, SW, SW-SM | A-1 | 0 | 0 | 65-95 | 45-90 | 15-45 | 0-15 | 0-25 | NP-5 |
| 863: | | | | | | | | | | | | |
| Hamerly--------- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-90 | 20-40 | 5-20 |
| | 8-35 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-75 | 20-45 | 5-25 |
| | 35-60 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 75-95 | 55-75 | 20-45 | 5-25 |
| 883: | | | | | | | | | | | | |
| Hamerly--------- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-90 | 20-40 | 5-20 |
| | 8-35 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-75 | 20-45 | 5-25 |
| | 35-60 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 75-95 | 55-75 | 20-45 | 5-25 |
| Tonka---------- | 0-13 | Silt loam | CL-ML, CL | A-4, A-6 | 0-1 | 0-2 | 100 | 95-100 | 90-100 | 70-90 | 20-35 | 5-15 |
| | 13-19 | Loam, silt loam | CL, CL-ML | A-4, A-6 | 0-1 | 0-2 | 100 | 95-100 | 90-100 | 70-90 | 20-35 | 5-15 |
| | 19-34 | Silty clay loam, clay loam, clay | CH, CL | A-6, A-7 | 0-1 | 0-2 | 100 | 95-100 | 90-100 | 75-95 | 35-55 | 15-35 |
| | 34-50 | Silty clay loam, clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0-1 | 0-3 | 90-100 | 85-100 | 60-100 | 50-90 | 25-50 | 5-30 |
| | 50-60 | Silty clay loam, clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0-1 | 0-3 | 90-100 | 85-100 | 60-100 | 50-90 | 25-50 | 5-30 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 883:(cont.) | | | | | | | | | | | | |
| Parnell--------- | 0-15 | Silty clay loam | CH, CL, OL | A-7 | 0 | 0-1 | 100 | 100 | 95-100 | 85-100 | 40-55 | 20-35 |
| | 15-22 | Silt loam, silty clay loam | CH, CL, OL | A-7 | 0 | 0-1 | 100 | 100 | 95-100 | 85-100 | 40-55 | 20-35 |
| | 22-32 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 100 | 95-100 | 90-100 | 70-100 | 44-75 | 30-50 |
| | 32-55 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 100 | 95-100 | 90-100 | 70-100 | 44-75 | 30-50 |
| | 55-60 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 95-100 | 90-100 | 80-95 | 70-95 | 44-60 | 30-40 |
| 1011: | | | | | | | | | | | | |
| Karlsruhe------- | 0-5 | Coarse sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 60-75 | 30-40 | 0-35 | NP-15 |
| | 5-11 | Coarse sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 60-75 | 30-40 | 0-35 | NP-15 |
| | 11-15 | Coarse sandy loam, loamy coarse sand, loamy sand | SC, SC-SM, SM | A-1, A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 45-75 | 10-40 | 0-35 | NP-15 |
| | 15-30 | Coarse sandy loam, loamy coarse sand, loamy sand | SC, SC-SM, SM | A-1, A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 45-75 | 10-40 | 0-35 | NP-15 |
| | 30-60 | Loamy coarse sand, coarse sand, sand | SM, SP, SP-SM | A-1, A-2, A-3 | 0 | 0 | 95-100 | 90-100 | 40-80 | 2-20 | 0-14 | NP |
| 1181: | | | | | | | | | | | | |
| Lohnes---------- | 0-16 | Loamy coarse sand | SM, SP-SM | A-1, A-2 | 0 | 0 | 100 | 100 | 45-65 | 10-25 | 0-14 | NP |
| | 16-30 | Coarse sand, loamy coarse sand, loamy sand | SM, SP, SP-SM | A-1, A-2, A-3 | 0 | 0 | 95-100 | 95-100 | 35-60 | 2-20 | 0-14 | NP |
| | 30-60 | Coarse sand, loamy coarse sand, loamy sand | SM, SP, SP-SM | A-1, A-2, A-3 | 0 | 0 | 95-100 | 95-100 | 35-60 | 2-20 | 0-14 | NP |
| 1202: | | | | | | | | | | | | |
| Maddock--------- | 0-10 | Loamy fine sand | SC-SM, SM | A-2 | 0 | 0 | 100 | 95-100 | 50-80 | 15-35 | 15-20 | NP-5 |
| | 10-14 | Loamy sand, loamy fine sand, fine sand | SC-SM, SM, SP-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 60-100 | 5-35 | 15-20 | NP-3 |
| | 14-60 | Loamy sand, loamy fine sand, fine sand | SC-SM, SM, SP-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 60-100 | 5-35 | 15-20 | NP-3 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 1249: | | | | | | | | | | | | |
| Appam---------- | 0-6 | Sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 6-15 | Sandy loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 15-19 | Sandy loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 19-60 | Gravelly coarse sand, coarse sand, loamy coarse sand, very gravelly coarse sand | GM, GP, GP-GM, SP-SM | A-1, A-2, A-3 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-14 | NP |
| 1267: | | | | | | | | | | | | |
| Marysland------- | 0-9 | Loam | CL | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 95-100 | 85-95 | 50-80 | 25-50 | 10-25 |
| | 9-12 | Loam | CL | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 95-100 | 85-95 | 50-80 | 25-50 | 10-25 |
| | 12-15 | Loam, clay loam, sandy clay loam | CL, SC | A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 45-80 | 20-45 | 10-20 |
| | 15-20 | Loam, clay loam, sandy clay loam | CL, SC | A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 45-80 | 20-45 | 10-20 |
| | 20-27 | Loam, clay loam, sandy clay loam | CL, SC | A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 45-80 | 20-45 | 10-20 |
| | 27-40 | Stratified fine sand to gravelly coarse sand | GP-GM, SM, SP-SM | A-1, A-2, A-3 | 0 | 0-5 | 50-95 | 35-90 | 35-70 | 5-20 | 0-15 | NP-5 |
| | 40-60 | Stratified fine sand to gravelly coarse sand | GP-GM, SM, SP-SM | A-1, A-2, A-3 | 0 | 0-5 | 50-95 | 35-90 | 35-70 | 5-20 | 0-15 | NP-5 |
| 1372: | | | | | | | | | | | | |
| Noonan---------- | 0-6 | Loam, silt loam | CL, CL-ML | A-4, A-6 | 0-1 | 0-1 | 95-100 | 95-100 | 80-95 | 55-75 | 20-38 | 5-20 |
| | 6-9 | Clay loam | CH, CL | A-6, A-7 | 0-1 | 0-1 | 95-100 | 95-100 | 85-95 | 65-85 | 25-60 | 10-35 |
| | 9-12 | Clay loam | CH, CL | A-6, A-7 | 0-1 | 0-1 | 95-100 | 95-100 | 85-95 | 65-85 | 25-60 | 10-35 |
| | 12-20 | Clay loam | CH, CL | A-6, A-7 | 0-1 | 0-1 | 95-100 | 95-100 | 85-95 | 65-85 | 25-60 | 10-35 |
| | 20-28 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0-1 | 0-1 | 90-100 | 85-100 | 75-95 | 60-85 | 25-50 | 5-30 |
| | 28-60 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0-1 | 0-1 | 90-100 | 85-100 | 75-95 | 60-85 | 25-50 | 5-30 |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-7, A-6 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| 1374: | | | | | | | | | | | | |
| Nutley---------- | 0-7 | Silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 7-20 | Clay, silty clay, silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 20-60 | Clay, silty clay, silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 1375: | | | | | | | | | | | | |
| Nutley---------- | 0-7 | Silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 7-20 | Clay, silty clay, silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 20-60 | Clay, silty clay, silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| 1427: | | | | | | | | | | | | |
| Parnell--------- | 0-15 | Silty clay loam | CH, CL, OL | A-7 | 0 | 0-1 | 100 | 100 | 95-100 | 85-100 | 40-55 | 20-35 |
| | 15-22 | Silt loam, silty clay loam | CH, CL, OL | A-7 | 0 | 0-1 | 100 | 100 | 95-100 | 85-100 | 40-55 | 20-35 |
| | 22-32 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 100 | 95-100 | 90-100 | 70-100 | 50-75 | 30-50 |
| | 32-55 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 100 | 95-100 | 90-100 | 70-100 | 50-75 | 30-50 |
| | 55-60 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 95-100 | 90-100 | 80-95 | 70-95 | 50-60 | 30-40 |
| 1437: | | | | | | | | | | | | |
| Parshall-------- | 0-12 | Fine sandy loam, sandy loam | CL-ML, ML, SC, SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-85 | 30-55 | 15-25 | NP-10 |
| | 12-29 | Fine sandy loam | CL-ML, ML, SC, SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-85 | 30-55 | 15-25 | NP-10 |
| | 29-48 | Fine sandy loam, sandy loam, loamy sand | CL-ML, ML, SC, SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-85 | 25-55 | 15-25 | NP-10 |
| | 48-60 | Loamy fine sand, fine sandy loam, sandy loam, loamy sand | SC, SM, CL-ML, ML | A-2, A-4 | 0 | 0 | 100 | 100 | 60-85 | 25-55 | 15-25 | NP-10 |
| 1466: | | | | | | | | | | | | |
| Pits, gravel and sand---------- | 0-6 | Extremely gravelly sand | GW-GM, SW-SM | A-1, A-3 | 0 | 0-5 | 25-90 | 10-65 | 5-35 | 0-25 | 0-15 | NP-5 |
| | 6-60 | Extremely gravelly sand, extremely gravelly coarse sand, gravelly coarse sandy loam | GW-GM, SW-SM | A-1, A-3 | 0 | 0-10 | 25-90 | 10-65 | 5-35 | 0-25 | 0-15 | NP-5 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 1676: | | | | | | | | | | | | |
| Wildrose-------- | 0-6 | Silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 80-100 | 50-70 | 25-40 |
| | 6-14 | Clay, silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 80-100 | 50-70 | 25-40 |
| | 14-21 | Clay, silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 21-31 | Clay, silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 31-38 | Clay, silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 38-44 | Clay, silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 44-58 | Clay, silty clay, silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| | 58-60 | Clay, silty clay, silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 50-70 | 25-40 |
| 1697: | | | | | | | | | | | | |
| Sioux---------- | 0-5 | Loam | CL, ML | A-4, A-6 | 0 | 0-5 | 95-100 | 85-100 | 70-90 | 55-75 | 30-40 | 5-15 |
| | 5-8 | Gravelly loam, gravelly sandy loam, gravelly loamy sand | GM, SM | A-1, A-2, A-4 | 0 | 0-5 | 60-90 | 50-80 | 45-70 | 15-50 | 20-35 | NP-7 |
| | 8-60 | Extremely gravelly sand, very gravelly loamy sand, very gravelly sand | GM, GP, SM, SP | A-1 | 0 | 0-5 | 25-75 | 20-60 | 5-35 | 0-25 | 0-25 | NP-5 |
| Arvilla--------- | 0-10 | Sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 95-100 | 90-100 | 50-80 | 20-45 | 15-30 | NP-15 |
| | 10-16 | Sandy loam, loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 90-100 | 85-100 | 50-80 | 20-45 | 15-40 | NP-15 |
| | 16-31 | Gravelly coarse sand, coarse sand, very gravelly coarse sand | GM, GP-GM, SP, SP-SM | A-3, A-2, A-1 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-25 | NP-5 |
| | 31-60 | Gravelly coarse sand, coarse sand, very gravelly coarse sand | GM, GP-GM, SP, SP-SM | A-1, A-2, A-3 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-25 | NP-5 |
| 1710: | | | | | | | | | | | | |
| Southam--------- | 0-16 | Silty clay loam | CH, CL, OL | A-7 | 0 | 0 | 100 | 95-100 | 90-100 | 80-100 | 40-55 | 20-35 |
| | 16-40 | Silty clay, clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 95-100 | 90-100 | 85-100 | 50-65 | 30-40 |
| | 40-60 | Silty clay, silty clay loam, loam | CH, CL, CL-ML | A-6, A-7 | 0 | 0-1 | 100 | 95-100 | 85-100 | 60-100 | 35-65 | 15-40 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 1762: | | | | | | | | | | | | |
| Svea---------- | 0-10 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 85-100 | 80-95 | 60-90 | 25-40 | 10-20 |
| | 10-21 | Loam, silt loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 85-100 | 80-100 | 60-90 | 25-45 | 10-25 |
| | 21-36 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 36-60 | Loam, silt loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 85-100 | 80-100 | 60-85 | 25-45 | 10-25 |
| Barnes---------- | 0-7 | Loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-100 | 60-80 | 25-35 | 10-20 |
| | 7-19 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 19-37 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 37-60 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| 1805: | | | | | | | | | | | | |
| Telfer---------- | 0-6 | Loamy fine sand | SM | A-2 | 0 | 0 | 100 | 100 | 50-80 | 15-35 | --- | NP |
| | 6-14 | Fine sand, loamy fine sand, loamy sand | SM | A-2 | 0 | 0 | 100 | 100 | 50-80 | 15-35 | --- | NP |
| | 14-60 | Fine sand, loamy fine sand, loamy sand | SM | A-2 | 0 | 0 | 100 | 100 | 50-80 | 15-35 | --- | NP |
| 1886: | | | | | | | | | | | | |
| Hamerly, saline- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-90 | 25-40 | 10-20 |
| | 8-35 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-75 | 25-45 | 10-25 |
| | 35-60 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-75 | 25-45 | 10-25 |
| Vallers, saline- | 0-12 | Silt loam, loam | CL-ML, ML | A-4 | 0-1 | 0-5 | 95-100 | 90-100 | 80-90 | 50-80 | 30-40 | 4-10 |
| | 12-32 | Clay loam, silty clay loam, loam | CL | A-6 | 0-1 | 0-5 | 95-100 | 90-100 | 80-95 | 50-80 | 30-40 | 11-20 |
| | 32-60 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 95-100 | 90-100 | 85-95 | 60-85 | 20-40 | 5-20 |
| 1898: | | | | | | | | | | | | |
| Vebar---------- | 0-5 | Fine sandy loam, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 5-26 | Fine sandy loam, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 26-32 | Fine sandy loam, loamy fine sand, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 32-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| 1978: | | | | | | | | | | | | |
| Water---------- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2006: | | | | | | | | | | | | |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2014: | | | | | | | | | | | | |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| Bowbells-------- | 0-6 | Loam | CL | A-4, A-6 | 0 | 0-5 | 95-100 | 90-100 | 85-95 | 60-90 | 28-37 | 9-16 |
| | 6-14 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-80 | 20-45 | 10-25 |
| | 14-23 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-80 | 20-45 | 10-25 |
| | 23-36 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-80 | 20-45 | 10-25 |
| | 36-60 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-80 | 20-45 | 10-25 |
| 2015: | | | | | | | | | | | | |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| Bowbells-------- | 0-6 | Loam | CL | A-4, A-6 | 0 | 0-5 | 95-100 | 90-100 | 85-95 | 60-90 | 28-37 | 9-16 |
| | 6-14 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-80 | 20-45 | 10-25 |
| | 14-23 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-80 | 20-45 | 10-25 |
| | 23-36 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-80 | 20-45 | 10-25 |
| | 36-60 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 80-95 | 60-80 | 20-45 | 10-25 |
| 2031: | | | | | | | | | | | | |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| Zahl---------- | 0-5 | Loam | CL | A-6 | 0 | 0-1 | 95-100 | 95-100 | 80-95 | 55-75 | 25-40 | 10-20 |
| | 5-20 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| | 20-60 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| 2037: | | | | | | | | | | | | |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| Zahl---------- | 0-5 | Loam | CL | A-6 | 0 | 0-1 | 95-100 | 95-100 | 80-95 | 55-75 | 25-40 | 10-20 |
| | 5-20 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| | 20-60 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2037:(cont.) | | | | | | | | | | | | |
| Parnell--------- | 0-15 | Silty clay loam | CH, CL, OL | A-7 | 0 | 0-1 | 100 | 100 | 95-100 | 85-100 | 40-55 | 20-35 |
| | 15-22 | Silt loam, silty clay loam | CH, CL, OL | A-7 | 0 | 0-1 | 100 | 100 | 95-100 | 85-100 | 40-55 | 20-35 |
| | 22-32 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 100 | 95-100 | 90-100 | 70-100 | 50-75 | 30-50 |
| | 32-55 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 100 | 95-100 | 90-100 | 70-100 | 50-75 | 30-50 |
| | 55-60 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 95-100 | 90-100 | 80-95 | 70-95 | 50-60 | 30-40 |
| 2073: | | | | | | | | | | | | |
| Zahl---------- | 0-5 | Loam | CL | A-6 | 0 | 0-1 | 95-100 | 95-100 | 80-95 | 55-75 | 25-40 | 10-20 |
| | 5-20 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| | 20-60 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| Max---------- | 0-6 | Loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0-3 | 95-100 | 90-100 | 85-95 | 60-75 | 25-45 | 3-23 |
| | 6-16 | Loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0-3 | 95-100 | 90-100 | 85-95 | 60-75 | 25-45 | 3-23 |
| | 16-37 | Loam, clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0-3 | 95-100 | 90-100 | 85-100 | 60-80 | 25-45 | 3-23 |
| | 37-60 | Loam, clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0-3 | 95-100 | 90-100 | 85-100 | 60-80 | 25-45 | 3-23 |
| 2081: | | | | | | | | | | | | |
| Zahl---------- | 0-5 | Loam | CL | A-6 | 0 | 0-1 | 95-100 | 95-100 | 80-95 | 55-75 | 25-40 | 10-20 |
| | 5-20 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| | 20-60 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| Williams-------- | 0-6 | Loam | ML, CL | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| 2175: | | | | | | | | | | | | |
| Zahl---------- | 0-5 | Loam | CL | A-6 | 0 | 0-1 | 95-100 | 95-100 | 80-95 | 55-75 | 25-40 | 10-20 |
| | 5-20 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| | 20-60 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| Williams-------- | 0-6 | Loam | CL, ML | A-4, A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 85-95 | 60-90 | 25-45 | 3-20 |
| | 6-10 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 10-15 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 15-24 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 24-36 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |
| | 36-60 | Clay loam, loam | CL | A-6, A-7 | 0-2 | 0-5 | 95-100 | 95-100 | 80-100 | 60-80 | 30-50 | 10-30 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2188: | | | | | | | | | | | | |
| Wabek---------- | 0-5 | Loam, sandy loam | SM | A-2, A-4 | 0 | 0-1 | 85-100 | 85-100 | 60-70 | 30-40 | 0-14 | NP |
| | 5-9 | Gravelly sandy loam, gravelly loam, gravelly coarse sandy loam | GM, SM | A-1-b, A-2, A-4 | 0 | 0-1 | 50-80 | 50-80 | 30-60 | 20-40 | 0-14 | NP |
| | 9-60 | Very gravelly coarse sand, sand and gravel | GM, SM, SP, SW | A-1 | 0 | 0-1 | 25-90 | 10-65 | 5-35 | 0-25 | 0-14 | NP |
| Lehr---------- | 0-6 | Loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 95-100 | 95-100 | 85-95 | 60-80 | 20-40 | 3-15 |
| | 6-11 | Loam, clay loam, gravelly loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0-2 | 0-5 | 90-100 | 80-100 | 75-95 | 40-75 | 25-40 | 5-15 |
| | 11-15 | Loam, clay loam, gravelly loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0-2 | 0-5 | 90-100 | 80-100 | 75-95 | 40-75 | 25-40 | 5-15 |
| | 15-22 | Gravelly sandy loam, gravelly coarse sandy loam, gravelly loamy coarse sand | SM, SP-SM | A-1 | 0-2 | 0-5 | 65-90 | 50-75 | 30-50 | 5-15 | 0-14 | NP |
| | 22-60 | Gravelly loamy sand, gravelly sand, very gravelly coarse sand | GM, GP, SM, SP | A-1 | 0-2 | 0-5 | 40-80 | 25-60 | 10-35 | 2-15 | 0-14 | NP |
| 2234: | | | | | | | | | | | | |
| Amor---------- | 0-8 | Loam, silt loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 85-90 | 60-70 | 25-40 | 3-18 |
| | 8-19 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 90-100 | 65-85 | 20-45 | 5-25 |
| | 19-31 | Clay loam, loam, fine sandy loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 75-100 | 50-80 | 20-45 | 2-25 |
| | 31-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Werner---------- | 0-6 | Loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 35-90 | 25-40 | 5-20 |
| | 6-17 | Loam, very fine sandy loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 50-90 | 25-50 | 5-25 |
| | 17-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| 2235: | | | | | | | | | | | | |
| Arnegard-------- | 0-13 | Silt loam, loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 100 | 85-95 | 60-85 | 20-35 | 5-20 |
| | 13-36 | Loam, silt loam, clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 50-85 | 20-35 | 12-25 |
| | 36-60 | Loam, clay loam, fine sandy loam | SM, CL, ML, SC | A-4, A-6 | 0 | 0 | 100 | 100 | 70-100 | 40-80 | 15-40 | NP-15 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2240: | | | | | | | | | | | | |
| Bowdle---------- | 0-8 | Loam | CL, ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 55-80 | 30-40 | 7-15 |
| | 8-16 | Loam, clay loam | CL, ML | A-6, A-4 | 0 | 0 | 95-100 | 90-100 | 70-95 | 50-75 | 30-40 | 8-15 |
| | 16-22 | Loam, clay loam | CL, ML | A-4, A-6 | 0 | 0 | 95-100 | 90-100 | 70-95 | 50-75 | 30-40 | 8-15 |
| | 22-25 | Gravelly loam, loam, clay loam | CL, ML | A-4, A-6 | 0 | 0 | 90-100 | 80-100 | 60-95 | 30-60 | 25-35 | 5-10 |
| | 25-30 | Loamy sand, very gravelly sand, gravelly loamy sand, very gravelly loamy sand | SM, SP-SM, SW-SM | A-1, A-2 | 0-2 | 0-5 | 60-95 | 50-75 | 30-50 | 5-30 | 0-30 | NP-5 |
| | 30-60 | Loamy sand, very gravelly sand, gravelly loamy sand, very gravelly loamy sand | SM, SP-SM, SW-SM | A-1, A-2 | 0-2 | 0-5 | 40-80 | 25-60 | 10-35 | 2-30 | 0-30 | NP-5 |
| Lehr---------- | 0-6 | Loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 95-100 | 95-100 | 85-95 | 60-80 | 20-40 | 3-15 |
| | 6-11 | Loam, clay loam, gravelly loam | SC, SC-SM, CL, CL-ML | A-4, A-6 | 0-2 | 0-5 | 90-100 | 80-100 | 75-95 | 40-75 | 25-40 | 5-15 |
| | 11-15 | Loam, clay loam, gravelly loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0-2 | 0-5 | 90-100 | 80-100 | 75-95 | 40-75 | 25-40 | 5-15 |
| | 15-22 | Gravelly sandy loam, gravelly coarse sandy loam, gravelly loamy coarse sand | SM, SP-SM | A-1 | 0-2 | 0-5 | 65-90 | 50-75 | 30-50 | 5-15 | 0-14 | NP |
| | 22-60 | Gravelly loamy sand, gravelly sand, very gravelly coarse sand | GM, GP, SM, SP | A-1 | 0-2 | 0-5 | 40-80 | 25-60 | 10-35 | 2-15 | 0-14 | NP |
| 2241: | | | | | | | | | | | | |
| Bryant---------- | 0-8 | Loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 85-100 | 70-95 | 30-45 | 10-20 |
| | 8-15 | Clay loam, loam, silt loam, silty clay loam | CL, ML | A-6, A-7 | 0 | 0 | 100 | 100 | 85-100 | 70-100 | 30-49 | 10-20 |
| | 15-19 | Clay loam, loam, silt loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 85-100 | 70-100 | 30-45 | 10-20 |
| | 19-32 | Clay loam, loam, silt loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 85-100 | 70-100 | 30-45 | 10-20 |
| | 32-60 | Clay loam, loam, silt loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 85-100 | 70-100 | 30-45 | 10-20 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2242: | | | | | | | | | | | | |
| Cohagen--------- | 0-3 | Fine sandy loam | SM | A-2, A-4 | 0 | 0 | 100 | 95-100 | 60-85 | 30-50 | --- | NP |
| | 3-17 | Fine sandy loam | SM | A-2, A-4 | 0 | 0 | 100 | 95-100 | 60-85 | 30-50 | --- | NP |
| | 17-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Vebar---------- | 0-5 | Fine sandy loam, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 5-26 | Fine sandy loam, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 26-32 | Fine sandy loam, loamy fine sand, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 32-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Parshall-------- | 0-12 | Fine sandy loam, sandy loam | CL-ML, ML, SC, SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-85 | 30-55 | 15-25 | NP-10 |
| | 12-29 | Fine sandy loam | CL-ML, ML, SC, SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-85 | 30-55 | 15-25 | NP-10 |
| | 29-48 | Fine sandy loam, sandy loam, loamy sand | CL-ML, ML, SC, SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-85 | 25-55 | 15-25 | NP-10 |
| | 48-60 | Loamy fine sand, fine sandy loam, sandy loam, loamy sand | CL-ML, ML, SC, SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-85 | 25-55 | 15-25 | NP-10 |
| 2243: | | | | | | | | | | | | |
| Vebar---------- | 0-5 | Fine sandy loam, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 5-26 | Fine sandy loam, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 26-32 | Fine sandy loam, loamy fine sand, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 32-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Flasher--------- | 0-6 | Loamy fine sand, loamy sand, sandy loam, fine sandy loam | SM | A-2 | 0 | 0-5 | 85-100 | 85-100 | 50-100 | 15-35 | 10-20 | NP |
| | 6-10 | Loamy sand, loamy fine sand, fine sand | SM | A-2 | 0 | 0-5 | 85-100 | 85-100 | 50-100 | 15-35 | 10-20 | NP |
| | 10-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2244: | | | | | | | | | | | | |
| Daglum---------- | 0-7 | Silt loam, loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 60-90 | 20-40 | 10-25 |
| | 7-8 | Silt loam, loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 60-90 | 20-40 | 10-25 |
| | 8-18 | Clay, silty clay, silty clay loam, clay loam | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-95 | 35-75 | 15-45 |
| | 18-32 | Clay loam, silty clay, clay | CH, CL | A-7, A-6 | 0 | 0 | 100 | 100 | 90-100 | 70-95 | 35-75 | 15-45 |
| | 32-60 | Clay, clay loam, silty clay loam, silty clay | CL, CH | A-6, A-7 | 0 | 0 | 100 | 100 | 85-100 | 65-95 | 35-60 | 15-40 |
| Belfield-------- | 0-9 | Loam, silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-100 | 30-50 | 10-30 |
| | 9-12 | Silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-100 | 30-50 | 10-30 |
| | 12-17 | Silty clay, silty clay loam, clay loam | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-100 | 35-65 | 15-40 |
| | 17-24 | Silty clay, silty clay loam, clay loam | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-100 | 35-65 | 15-40 |
| | 24-43 | Silty clay, silty clay loam, clay loam | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-100 | 30-55 | 10-30 |
| | 43-60 | Silty clay, silty clay loam, clay loam | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-100 | 30-55 | 10-30 |
| 2246: | | | | | | | | | | | | |
| Grail---------- | 0-10 | Silt loam, clay loam, silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-95 | 30-50 | 10-30 |
| | 10-24 | Silty clay, silty clay loam, clay | CH, CL, MH | A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 70-95 | 35-60 | 10-35 |
| | 24-52 | Silty clay loam | MH, CL, CH | A-6, A-7 | 0 | 0 | 100 | 95-100 | 90-100 | 65-95 | 30-55 | 10-35 |
| | 52-60 | Loam, silty clay loam, clay | CL, CH | A-6, A-7 | 0 | 0 | 100 | 95-100 | 85-100 | 60-95 | 30-55 | 10-35 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2248: | | | | | | | | | | | | |
| Lehr---------- | 0-6 | Loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 95-100 | 95-100 | 85-95 | 60-80 | 20-40 | 3-15 |
| | 6-11 | Loam, clay loam, gravelly loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0-2 | 0-5 | 90-100 | 80-100 | 75-95 | 40-75 | 25-40 | 5-15 |
| | 11-15 | Loam, clay loam, gravelly loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0-2 | 0-5 | 90-100 | 80-100 | 75-95 | 40-75 | 25-40 | 5-15 |
| | 15-22 | Gravelly sandy loam, gravelly coarse sandy loam, gravelly loamy coarse sand | SM, SP-SM | A-1 | 0-2 | 0-5 | 65-90 | 50-75 | 30-50 | 5-15 | 0-14 | NP |
| | 22-60 | Gravelly loamy sand, gravelly sand, very gravelly coarse sand | SM, SP, GM, GP | A-1 | 0-2 | 0-5 | 40-80 | 25-60 | 10-35 | 2-15 | 0-14 | NP |
| Bowdle---------- | 0-8 | Loam | CL, ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 55-80 | 30-40 | 7-15 |
| | 8-16 | Loam, clay loam | CL, ML | A-6, A-4 | 0 | 0 | 95-100 | 90-100 | 70-95 | 50-75 | 30-40 | 8-15 |
| | 16-22 | Loam, clay loam | CL, ML | A-4, A-6 | 0 | 0 | 95-100 | 90-100 | 70-95 | 50-75 | 30-40 | 8-15 |
| | 22-25 | Gravelly loam, loam, clay loam | CL, ML | A-4, A-6 | 0 | 0 | 90-100 | 80-100 | 60-95 | 30-60 | 25-35 | 5-10 |
| | 25-30 | Loamy sand, very gravelly sand, gravelly loamy sand, very gravelly loamy sand | SM, SP-SM, SW-SM | A-1, A-2 | 0-2 | 0-5 | 60-95 | 50-75 | 30-50 | 5-30 | 0-30 | NP-5 |
| | 30-60 | Loamy sand, very gravelly sand, gravelly loamy sand, very gravelly loamy sand | SM, SP-SM, SW-SM | A-1, A-2 | 0-2 | 0-5 | 40-80 | 25-60 | 10-35 | 2-30 | 0-30 | NP-5 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2249: | | | | | | | | | | | | |
| Makoti---------- | 0-6 | Silty clay loam | CL | A-6, A-7 | --- | 0 | 100 | 100 | 95-100 | 85-95 | 30-45 | 10-25 |
| | 6-14 | Silt loam, silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 90-100 | 60-95 | 20-45 | 3-28 |
| | 14-19 | Silt loam, silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 90-100 | 60-95 | 20-45 | 3-28 |
| | 19-26 | Silt loam, silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 90-100 | 60-95 | 20-45 | 3-28 |
| | 26-34 | Silt loam, silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 90-100 | 60-95 | 20-45 | 3-28 |
| | 34-46 | Silt loam, very fine sandy loam, silty clay loam, stratified very fine sandy loam to silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 85-100 | 60-95 | 20-45 | 3-28 |
| | 46-60 | Silt loam, very fine sandy loam, silty clay loam, stratified very fine sandy loam to silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 85-100 | 60-95 | 20-45 | 3-28 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2250: | | | | | | | | | | | | |
| Makoti---------- | 0-6 | Silty clay loam | CL | A-6, A-7 | --- | 0 | 100 | 100 | 95-100 | 85-95 | 30-45 | 10-25 |
| | 6-14 | Silt loam, silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 90-100 | 60-95 | 20-45 | 3-28 |
| | 14-19 | Silt loam, silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 90-100 | 60-95 | 20-45 | 3-28 |
| | 19-26 | Silt loam, silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 90-100 | 60-95 | 20-45 | 3-28 |
| | 26-34 | Silt loam, silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 90-100 | 60-95 | 20-45 | 3-28 |
| | 34-46 | Silt loam, very fine sandy loam, silty clay loam, stratified very fine sandy loam to silty clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 85-100 | 60-95 | 20-45 | 3-28 |
| | 46-60 | Silt loam, very fine sandy loam, silty clay loam, stratified very fine sandy loam to silty clay loam | CL-ML, ML, CL | A-4, A-6, A-7 | --- | 0 | 100 | 100 | 85-100 | 60-95 | 20-45 | 3-28 |
| Rusklyn--------- | 0-9 | Silty clay loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 9-19 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 19-28 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 28-53 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 53-60 | Clay loam, loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| 2252: | | | | | | | | | | | | |
| Max---------- | 0-6 | Loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0-3 | 95-100 | 90-100 | 85-95 | 60-75 | 25-45 | 3-23 |
| | 6-16 | Loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0-3 | 95-100 | 90-100 | 85-95 | 60-75 | 25-45 | 3-23 |
| | 16-37 | Loam, clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0-3 | 95-100 | 90-100 | 85-100 | 60-80 | 25-45 | 3-23 |
| | 37-60 | Loam, clay loam | CL, CL-ML, ML | A-4, A-6, A-7 | 0 | 0-3 | 95-100 | 90-100 | 85-100 | 60-80 | 25-45 | 3-23 |
| Zahl---------- | 0-5 | Loam | CL | A-6 | 0 | 0-1 | 95-100 | 95-100 | 80-95 | 55-75 | 25-40 | 10-20 |
| | 5-20 | Loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| | 20-60 | Clay loam, loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-1 | 90-100 | 85-100 | 80-95 | 55-80 | 25-50 | 5-30 |
| Arnegard-------- | 0-13 | Silt loam, loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 100 | 85-95 | 60-85 | 20-35 | 5-20 |
| | 13-36 | Loam, silt loam, clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 50-85 | 20-35 | 12-25 |
| | 36-60 | Loam, clay loam, fine sandy loam | CL, ML, SC, SM | A-4, A-6 | 0 | 0 | 100 | 100 | 70-100 | 40-80 | 15-40 | NP-15 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2253: | | | | | | | | | | | | |
| Mondamin-------- | 0-6 | Silty clay | CH, CL, MH, ML | A-6, A-7 | 0 | 0 | 100 | 100 | 95-100 | 80-100 | 35-55 | 10-30 |
| | 6-13 | Silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 80-100 | 50-70 | 25-40 |
| | 13-21 | Silty clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-60 | 15-35 |
| | 21-35 | Silty clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-60 | 15-35 |
| | 35-43 | Silty clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-60 | 15-35 |
| | 43-55 | Silty clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-70 | 25-40 |
| | 55-60 | Silty clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-70 | 25-40 |
| 2254: | | | | | | | | | | | | |
| Overly---------- | 0-10 | Silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 30-45 | 10-25 |
| | 10-17 | Silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 30-45 | 10-25 |
| | 17-38 | Silty clay loam, silt loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 25-50 | 5-30 |
| | 38-60 | Stratified silt loam to silty clay | CL, CL-ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 25-50 | 5-30 |
| 2255: | | | | | | | | | | | | |
| Overly---------- | 0-10 | Silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 30-45 | 10-25 |
| | 10-17 | Silty clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 30-45 | 10-25 |
| | 17-38 | Silty clay loam, silt loam, clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 25-50 | 5-30 |
| | 38-60 | Stratified silt loam to silty clay | CL, CL-ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 25-50 | 5-30 |
| Rusklyn--------- | 0-9 | Silty clay loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 9-19 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 19-28 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 28-53 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 53-60 | Clay loam, loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2257: | | | | | | | | | | | | |
| Reeder---------- | 0-8 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 90-100 | 85-100 | 85-90 | 60-70 | 20-40 | 5-15 |
| | 8-17 | Clay loam, loam, sandy clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 60-80 | 25-50 | 5-30 |
| | 17-36 | Loam, clay loam, sandy loam | CL-ML, SC-SM | A-4, A-6 | 0 | 0-5 | 85-100 | 80-100 | 65-100 | 45-80 | 25-40 | 5-20 |
| | 36-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Arnegard-------- | 0-13 | Silt loam, loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 100 | 85-95 | 60-85 | 20-35 | 5-20 |
| | 13-36 | Loam, silt loam, clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 50-85 | 20-35 | 12-25 |
| | 36-60 | Loam, clay loam, fine sandy loam | CL, ML, SC, SM | A-4, A-6 | 0 | 0 | 100 | 100 | 70-100 | 40-80 | 15-40 | NP-15 |
| 2258: | | | | | | | | | | | | |
| Regent---------- | 0-10 | Silty clay loam | CH, CL | A-7, A-6 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 40-55 | 20-35 |
| | 10-26 | Silty clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 45-70 | 25-45 |
| | 26-39 | Silty clay loam, silty clay, clay | CL, CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 45-70 | 25-45 |
| | 39-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Savage---------- | 0-6 | Silty clay loam, clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-95 | 30-45 | 15-30 |
| | 6-16 | Silty clay, clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-95 | 40-70 | 20-45 |
| | 16-39 | Silty clay, clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-95 | 40-70 | 20-45 |
| | 39-60 | Silty clay loam, silty clay, clay | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-95 | 40-70 | 20-45 |
| 2259: | | | | | | | | | | | | |
| Rhoades--------- | 0-4 | Silt loam, loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 60-95 | 20-40 | 10-25 |
| | 4-11 | Silty clay, clay loam, clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 40-75 | 20-45 |
| | 11-49 | Silty clay, silty clay loam, clay, clay loam, loam | CH, CL | A-7, A-6 | 0 | 0 | 100 | 100 | 90-100 | 70-95 | 35-70 | 20-40 |
| | 49-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2259:(cont.) | | | | | | | | | | | | |
| Daglum---------- | 0-5 | Silt loam, loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 60-90 | 20-40 | 10-25 |
| | 5-8 | Clay loam, silt loam, loam | CL | A-6 | 0 | 0 | 100 | 100 | 85-100 | 60-90 | 20-40 | 10-25 |
| | 8-18 | Clay, silty clay, silty clay loam, clay loam | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-95 | 35-75 | 15-45 |
| | 18-26 | Clay loam, silty clay, clay | CH, CL | A-7, A-6 | 0 | 0 | 100 | 100 | 90-100 | 70-95 | 35-75 | 15-45 |
| | 26-45 | Clay, clay loam, silty clay loam, silty clay | CL, CH | A-6, A-7 | 0 | 0 | 100 | 100 | 85-100 | 65-95 | 35-60 | 15-40 |
| | 45-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| 2260: | | | | | | | | | | | | |
| Rusklyn--------- | 0-9 | Silty clay loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 9-19 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 19-28 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 28-53 | Silty clay loam, silt loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| | 53-60 | Clay loam, loam | CL, ML | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 85-100 | 30-45 | 5-20 |
| 2261: | | | | | | | | | | | | |
| Schaller-------- | 0-9 | Loamy sand | SM, SP-SM | A-1, A-2 | 0 | 0 | 95-100 | 95-100 | 40-65 | 10-25 | 0-14 | NP |
| | 9-15 | Sand, loamy fine sand, gravelly coarse sandy loam, fine sandy loam | GM, GP-GM, SM, SP-SM | A-2, A-3, A-4, A-1 | 0 | 0-5 | 55-100 | 50-100 | 40-85 | 5-55 | 0-20 | NP-5 |
| | 15-60 | Gravelly sand, gravelly loamy coarse sand, sand | GM, GP-GM, SM, SP-SM | A-1, A-2-4, A-3 | 0 | 0-5 | 55-90 | 50-90 | 40-70 | 5-15 | 0-20 | NP-5 |
| 2262: | | | | | | | | | | | | |
| Schaller-------- | 0-9 | Loamy sand | SM, SP-SM | A-2, A-1 | 0 | 0 | 95-100 | 95-100 | 40-65 | 10-25 | 0-14 | NP |
| | 9-15 | Sand, loamy fine sand, gravelly coarse sandy loam, fine sandy loam | GM, GP-GM, SM, SP-SM | A-1, A-2, A-3, A-4 | 0 | 0-5 | 55-100 | 50-100 | 40-85 | 5-55 | 0-20 | NP-5 |
| | 15-60 | Gravelly sand, gravelly loamy coarse sand, sand | SP-SM, GM, GP-GM, SM | A-1, A-2-4, A-3 | 0 | 0-5 | 55-90 | 50-90 | 40-70 | 5-15 | 0-20 | NP-5 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2263: | | | | | | | | | | | | |
| Sinai---------- | 0-12 | Silty clay | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 45-70 | 20-35 |
| | 12-23 | Silty clay, silty clay loam, clay | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 45-70 | 20-35 |
| | 23-42 | Silty clay, silty clay loam, clay | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 45-70 | 20-35 |
| | 42-60 | Silty clay, silt loam, clay loam | CH, CL | A-7 | 0 | 0 | 95-100 | 95-100 | 95-100 | 80-100 | 40-65 | 15-35 |
| 2264: | | | | | | | | | | | | |
| Vebar---------- | 0-5 | Fine sandy loam, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 5-26 | Fine sandy loam, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 26-32 | Fine sandy loam, loamy fine sand, sandy loam | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 20-30 | NP-10 |
| | 32-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Cohagen--------- | 0-3 | Fine sandy loam | SM | A-2, A-4 | 0 | 0 | 100 | 95-100 | 60-85 | 30-50 | --- | NP |
| | 3-17 | Fine sandy loam | SM | A-2, A-4 | 0 | 0 | 100 | 95-100 | 60-85 | 30-50 | --- | NP |
| | 17-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| 2265: | | | | | | | | | | | | |
| Wabek---------- | 0-5 | Loam, sandy loam | SM | A-2, A-4 | 0 | 0-1 | 85-100 | 85-100 | 60-70 | 30-40 | 0-14 | NP |
| | 5-9 | Gravelly sandy loam, gravelly loam, gravelly coarse sandy loam | GM, SM | A-1-b, A-2, A-4 | 0 | 0-1 | 50-80 | 50-80 | 30-60 | 20-40 | 0-14 | NP |
| | 9-60 | Very gravelly coarse sand, sand and gravel | GM, SM, SP, SW | A-1 | 0 | 0-1 | 25-90 | 10-65 | 5-35 | 0-25 | 0-14 | NP |
| Appam---------- | 0-6 | Sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 6-15 | Sandy loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 15-19 | Sandy loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 19-60 | Gravelly coarse sand, coarse sand, loamy coarse sand, very gravelly coarse sand | GM, GP, GP-GM, SP-SM | A-1, A-2, A-3 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-14 | NP |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2266: | | | | | | | | | | | | |
| Wabek---------- | 0-5 | Loam, sandy loam | SM | A-2, A-4 | 0 | 0-1 | 85-100 | 85-100 | 60-70 | 30-40 | 0-14 | NP |
| | 5-9 | Gravelly sandy loam, gravelly loam, gravelly coarse sandy loam | GM, SM | A-1-b, A-2, A-4 | 0 | 0-1 | 50-80 | 50-80 | 30-60 | 20-40 | 0-14 | NP |
| | 9-60 | Very gravelly coarse sand, sand and gravel | GM, SM, SP, SW | A-1 | 0 | 0-1 | 25-90 | 10-65 | 5-35 | 0-25 | 0-14 | NP |
| Appam---------- | 0-6 | Sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 6-15 | Sandy loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 15-19 | Sandy loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 85-100 | 85-100 | 60-80 | 30-40 | 0-25 | NP-10 |
| | 19-60 | Gravelly coarse sand, coarse sand, loamy coarse sand, very gravelly coarse sand | GM, GP, GP-GM, SP-SM | A-2, A-3, A-1 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-14 | NP |
| 2267: | | | | | | | | | | | | |
| Werner---------- | 0-6 | Loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 35-90 | 25-40 | 5-20 |
| | 6-17 | Loam, very fine sandy loam, clay loam | CL, CL-ML | A-7, A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-95 | 50-90 | 25-50 | 5-25 |
| | 17-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| Amor---------- | 0-8 | Loam, silt loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 85-90 | 60-70 | 25-40 | 3-18 |
| | 8-19 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 90-100 | 65-85 | 1u4\|2 | \|2p1d--- ,1u4\|2 ------ |
| Appam-- | | | | | | | | 95 | 50-90 | 25-50 | 31 | |
| | 17-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | | | gard\| | | 13 | Amor----, \| 8 |
| 2268: | 0-25 | Werner-- | CL, CL-ML | A-4, A-6 | 0 | 0 | 90-100 | 85-100 | 80-95 | 50-90 | 25-50 | 5-25 |
| Appam-- | 25-40 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 90-100 | 85-100 | 80-95 | 50-90 | 25-50 | 5-25 |
| | 40-60 | Bedrock | | | --- | --- | --- | --- | --- | --- | --- | --- |

Amor----rner--\|-- (

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2270: | | | | | | | | | | | | |
| Harriet--------- | 0-2 | Silt loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 100 | 90-100 | 70-90 | 25-40 | 5-20 |
| | 2-18 | Clay, clay loam, silty clay loam, silty clay | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-100 | 35-70 | 20-40 |
| | 18-28 | Loam, silty clay loam, clay loam | CH, CL | A-6 | 0 | 0 | 100 | 100 | 90-100 | 60-100 | 25-55 | 10-30 |
| | 28-38 | Very fine sandy loam | CL | A-4 | 0 | 0 | 100 | 100 | 85-95 | 50-65 | 25-34 | 9-15 |
| | 38-40 | Clay loam | CL | A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 70-80 | 40-50 | 20-30 |
| | 40-60 | Stratified very fine sandy loam to silty clay | CL, CL-ML, CH | A-4, A-6, A-7 | 0 | 0 | 100 | 100 | 90-100 | 60-100 | 20-65 | 5-40 |
| Stirum---------- | 0-7 | Fine sandy loam | CL-ML, ML, SC-SM, SM | A-2, A-4 | 0 | 0 | 100 | 100 | 60-95 | 30-60 | 15-25 | NP-5 |
| | 7-15 | Loam, fine sandy loam, sandy loam | CL, ML, SC, SM | A-4, A-2 | 0 | 0 | 100 | 100 | 60-95 | 30-75 | 15-30 | NP-10 |
| | 15-26 | Loam, stratified fine sand to loamy sand to fine sandy loam to silty clay loam | CL, ML, SC, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 50-100 | 15-90 | 0-30 | NP-15 |
| | 26-34 | Very fine sandy loam, stratified fine sand to loamy sand to fine sandy loam to silty clay loam | CL, ML, SC, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 50-100 | 15-90 | 0-30 | NP-15 |
| | 34-44 | Silt loam, stratified fine sand to loamy sand to fine sandy loam to silty clay loam | CL, ML, SC, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 50-100 | 15-90 | 0-30 | NP-15 |
| | 44-60 | Loamy fine sand, stratified fine sand to loamy sand to fine sandy loam to silty clay loam | CL, ML, SC, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 50-100 | 15-90 | 0-30 | NP-15 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2271: | | | | | | | | | | | | |
| Lohnes---------- | 0-16 | Loamy coarse sand | SM, SP-SM | A-1, A-2 | 0 | 0 | 100 | 100 | 45-65 | 10-25 | 0-14 | NP |
| | 16-30 | Coarse sand, loamy coarse sand, loamy sand | SM, SP, SP-SM | A-1, A-2, A-3 | 0 | 0 | 95-100 | 95-100 | 35-60 | 2-20 | 0-14 | NP |
| | 30-60 | Coarse sand, loamy coarse sand, loamy sand | SM, SP, SP-SM | A-1, A-2, A-3 | 0 | 0 | 95-100 | 95-100 | 35-60 | 2-20 | 0-14 | NP |
| 2272: | | | | | | | | | | | | |
| Sioux---------- | 0-5 | Loam | CL, ML | A-4, A-6 | 0 | 0-5 | 95-100 | 85-100 | 70-90 | 55-75 | 30-40 | 5-15 |
| | 5-8 | Gravelly loam, gravelly sandy loam, gravelly loamy sand | GM, SM | A-1, A-2, A-4 | 0 | 0-5 | 60-90 | 50-80 | 45-70 | 15-50 | 20-35 | NP-7 |
| | 8-60 | Extremely gravelly sand, very gravelly loamy sand, very gravelly sand | GM, GP, SM, SP | A-1 | 0 | 0-5 | 25-75 | 20-60 | 5-35 | 0-25 | 0-25 | NP-5 |
| Arvilla--------- | 0-10 | Sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 95-100 | 90-100 | 50-80 | 20-45 | 15-30 | NP-15 |
| | 10-16 | Sandy loam, loam, coarse sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 90-100 | 85-100 | 50-80 | 20-45 | 15-40 | NP-15 |
| | 16-31 | Gravelly coarse sand, coarse sand, very gravelly coarse sand | GM, GP-GM, SP, SP-SM | A-3, A-2, A-1 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-25 | NP-5 |
| | 31-60 | Gravelly coarse sand, coarse sand, very gravelly coarse sand | GM, GP-GM, SP, SP-SM | A-1, A-2, A-3 | 0 | 0 | 35-100 | 25-100 | 10-60 | 0-15 | 0-25 | NP-5 |
| 2273: | | | | | | | | | | | | |
| Svea---------- | 0-10 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 85-100 | 80-95 | 60-90 | 25-40 | 10-20 |
| | 10-21 | Loam, silt loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 85-100 | 80-100 | 60-90 | 25-45 | 10-25 |
| | 21-36 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 36-60 | Loam, silt loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 95-100 | 85-100 | 80-100 | 60-85 | 25-45 | 10-25 |
| Buse---------- | 0-8 | Loam | CL | A-6 | 0 | 0-5 | 90-100 | 90-100 | 85-95 | 60-75 | 25-35 | 10-15 |
| | 8-40 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 40-60 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 70-90 | 55-85 | 25-45 | 10-25 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2273:(cont.) | | | | | | | | | | | | |
| Parnell--------- | 0-15 | Silty clay loam | CH, CL, OL | A-7 | 0 | 0-1 | 100 | 100 | 95-100 | 85-100 | 40-55 | 20-35 |
| | 15-22 | Silt loam, silty clay loam | CH, CL, OL | A-7 | 0 | 0-1 | 100 | 100 | 95-100 | 85-100 | 40-55 | 20-35 |
| | 22-32 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 100 | 95-100 | 90-100 | 70-100 | 44-75 | 30-50 |
| | 32-55 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 100 | 95-100 | 90-100 | 70-100 | 44-75 | 30-50 |
| | 55-60 | Clay loam, silty clay loam, silty clay | CH, CL | A-7 | 0 | 0-2 | 95-100 | 90-100 | 80-95 | 70-95 | 44-60 | 30-40 |
| 2274: | | | | | | | | | | | | |
| Towner---------- | 0-20 | Loamy fine sand, sandy loam | SC-SM, SM | A-2 | 0 | 0 | 100 | 100 | 60-85 | 30-45 | 15-25 | NP-5 |
| | 20-29 | Loamy sand, loamy fine sand, fine sand | SC-SM, SM, SW-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 50-100 | 5-35 | 15-25 | NP-5 |
| | 29-36 | Loam, silt loam, silty clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 85-100 | 55-100 | 25-50 | 5-30 |
| | 36-60 | Loam, silt loam, silty clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 85-100 | 55-100 | 25-50 | 5-30 |
| Maddock--------- | 0-10 | Loamy fine sand | SC-SM, SM | A-2 | 0 | 0 | 100 | 95-100 | 50-80 | 15-35 | 15-20 | NP-5 |
| | 10-14 | Loamy sand, loamy fine sand, fine sand | SC-SM, SM, SP-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 60-100 | 5-35 | 15-20 | NP-3 |
| | 14-60 | Loamy sand, loamy fine sand, fine sand | SC-SM, SM, SP-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 60-100 | 5-35 | 15-20 | NP-3 |
| 2275: | | | | | | | | | | | | |
| Towner---------- | 0-20 | Loamy fine sand, sandy loam | SC-SM, SM | A-2 | 0 | 0 | 100 | 100 | 60-85 | 30-45 | 15-25 | NP-5 |
| | 20-29 | Loamy sand, loamy fine sand, fine sand | SC-SM, SM, SW-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 50-100 | 5-35 | 15-25 | NP-5 |
| | 29-36 | Loam, silt loam, silty clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 85-100 | 55-100 | 25-50 | 5-30 |
| | 36-60 | Loam, silt loam, silty clay loam | CL, CL-ML | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 90-100 | 85-100 | 55-100 | 25-50 | 5-30 |

Table 19.-Engineering Index Properties--Continued

| Map symbol and soil name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 2275:(cont.) | | | | | | | | | | | | |
| Maddock--------- | 0-10 | Loamy fine sand | SC-SM, SM | A-2 | 0 | 0 | 100 | 95-100 | 50-80 | 15-35 | 15-20 | NP-5 |
| | 10-14 | Loamy sand, loamy fine sand, fine sand | SC-SM, SM, SP-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 60-100 | 5-35 | 15-20 | NP-3 |
| | 14-60 | Loamy sand, loamy fine sand, fine sand | SC-SM, SM, SP-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 60-100 | 5-35 | 15-20 | NP-3 |
| Buse---------- | 0-8 | Loam | CL | A-6 | 0 | 0-5 | 90-100 | 90-100 | 85-95 | 60-75 | 25-35 | 10-15 |
| | 8-40 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 75-95 | 55-80 | 25-45 | 10-25 |
| | 40-60 | Loam, clay loam | CL | A-6, A-7 | 0 | 0-5 | 90-100 | 85-100 | 70-90 | 55-85 | 25-45 | 10-25 |

Table 20.-Physical Properties of the Soils

(The symbol < means less than; > means greater than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Dashes (--) indicate that data were not available or were not estimated.)

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodibility group | Wind erodibility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 30: | | | | | | | | | | | | |
| Amor | 0-8 | 15-25 | 1.20-1.35 | 0.6-2 | 0.18-0.20 | Low | 2.0-4.0 | .24 | .24 | 3 | 6 | 48 |
| | 8-19 | 18-30 | 1.20-1.40 | 0.6-2 | 0.17-0.19 | Low | 1.0-3.0 | .32 | .32 | | | |
| | 19-31 | 18-30 | 1.20-1.60 | 0.6-2 | 0.17-0.19 | Low | 0.5-1.0 | .32 | .32 | | | |
| | 31-60 | 10-35 | 1.40-1.65 | 0.06-0.6 | 0.04-0.10 | --- | 0.0-0.5 | .43 | .43 | | | |
| Arnegard | 0-13 | 15-25 | 1.00-1.40 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 13-36 | 18-30 | 1.20-1.60 | 0.6-2 | 0.16-0.22 | Low | 1.0-4.0 | .28 | .28 | | | |
| | 36-60 | 15-30 | 1.20-1.60 | 0.6-2 | 0.14-0.18 | Low | 0.0-1.0 | .28 | .28 | | | |
| 40: | | | | | | | | | | | | |
| Amor | 0-8 | 15-25 | 1.20-1.35 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 3 | 6 | 48 |
| | 8-19 | 18-30 | 1.20-1.40 | 0.6-2 | 0.17-0.19 | Moderate | 1.0-3.0 | .32 | .32 | | | |
| | 19-31 | 18-30 | 1.20-1.60 | 0.6-2 | 0.17-0.19 | Moderate | 0.5-1.0 | .32 | .32 | | | |
| | 31-60 | 15-30 | 1.30-1.60 | 0.06-0.6 | 0.04-0.08 | --- | 0.0-0.5 | --- | --- | | | |
| Werner | 0-6 | 14-27 | 1.20-1.40 | 0.6-2 | 0.14-0.22 | Moderate | 2.0-4.0 | .28 | .28 | 2 | 4L | 86 |
| | 6-17 | 14-35 | 1.30-1.50 | 0.6-2 | 0.17-0.22 | Moderate | 0.5-2.0 | .28 | .28 | | | |
| | 17-60 | 5-35 | 1.30-1.60 | 0.06-2 | 0.04-0.08 | --- | 0.0-0.5 | .28 | .28 | | | |
| Farnuf | 0-9 | 20-27 | 1.20-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-4.0 | .28 | .28 | 5 | 6 | 48 |
| | 9-23 | 25-35 | 1.25-1.35 | 0.6-2 | 0.15-0.20 | Moderate | 1.0-2.0 | .28 | .28 | | | |
| | 23-34 | 25-35 | 1.20-1.45 | 0.6-2 | 0.15-0.20 | Moderate | 0.5-1.0 | .32 | .32 | | | |
| | 34-60 | 15-35 | 1.25-1.45 | 0.6-2 | 0.15-0.20 | Moderate | 0.0-0.5 | .32 | .32 | | | |
| 41: | | | | | | | | | | | | |
| Amor | 0-8 | 15-25 | 1.20-1.35 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 3 | 6 | 48 |
| | 8-19 | 18-30 | 1.20-1.40 | 0.6-2 | 0.17-0.19 | Moderate | 1.0-3.0 | .32 | .32 | | | |
| | 19-31 | 18-30 | 1.20-1.60 | 0.6-2 | 0.17-0.19 | Moderate | 0.5-1.0 | .32 | .32 | | | |
| | 31-60 | 15-30 | 1.30-1.60 | 0.06-2 | 0.04-0.08 | --- | 0.0-0.5 | --- | --- | | | |
| Werner | 0-6 | 14-27 | 1.20-1.40 | 0.6-2 | 0.14-0.22 | Moderate | 2.0-4.0 | .28 | .28 | 2 | 4L | 86 |
| | 6-17 | 14-35 | 1.30-1.50 | 0.6-2 | 0.17-0.22 | Moderate | 0.5-2.0 | .28 | .28 | | | |
| | 17-60 | 15-35 | 1.30-1.60 | 0.06-2 | 0.04-0.08 | --- | 0.0-0.5 | .28 | .28 | | | |
| 76: | | | | | | | | | | | | |
| Arvilla | 0-10 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 10-16 | 6-18 | 1.20-1.50 | 2-6 | 0.11-0.14 | Low | 1.0-2.0 | .20 | .20 | | | |
| | 16-31 | 2-10 | 1.20-1.50 | 6-40 | 0.02-0.05 | Low | 0.0-0.5 | .05 | .15 | | | |
| | 31-60 | 0-10 | 1.40-1.60 | 6-40 | 0.02-0.05 | Low | 0.0-0.5 | .05 | .15 | | | |
| 118: | | | | | | | | | | | | |
| Barnes | 0-7 | 18-27 | 1.10-1.50 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-19 | 18-35 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 2.0-5.0 | .28 | .28 | | | |
| | 19-37 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Buse | 0-8 | 18-27 | 1.20-1.35 | 0.6-2 | 0.20-0.24 | Low | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 8-40 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 40-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 156: | | | | | | | | | | | | |
| Barnes | 0-7 | 18-27 | 1.10-1.50 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-19 | 18-35 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 2.0-5.0 | .28 | .28 | | | |
| | 19-37 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 156:(cont.) | | | | | | | | | | | | |
| Svea | 0-10 | 18-27 | 1.10-1.30 | 0.6-2 | 0.20-0.24 | Low | 4.0-7.0 | .28 | .32 | 5 | 6 | 48 |
| | 10-21 | 18-35 | 1.20-1.50 | 0.2-2 | 0.15-0.22 | Moderate | 2.0-5.0 | .28 | .32 | | | |
| | 21-36 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-2.0 | .37 | .37 | | | |
| | 36-60 | 18-35 | 1.30-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| 313: | | | | | | | | | | | | |
| Buse | 0-8 | 18-27 | 1.20-1.35 | 0.6-2 | 0.20-0.24 | Low | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 8-40 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 40-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Barnes | 0-7 | 18-27 | 1.10-1.50 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-19 | 18-35 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 2.0-5.0 | .28 | .28 | | | |
| | 19-37 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| 314: | | | | | | | | | | | | |
| Buse | 0-8 | 18-27 | 1.20-1.35 | 0.6-2 | 0.20-0.24 | Low | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 8-40 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 40-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Barnes | 0-7 | 18-27 | 1.10-1.50 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-19 | 18-35 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 2.0-5.0 | .28 | .28 | | | |
| | 19-37 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| 319: | | | | | | | | | | | | |
| Buse | 0-8 | 18-27 | 1.20-1.35 | 0.6-2 | 0.20-0.24 | Moderate | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 8-40 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 40-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Barnes | 0-7 | 18-27 | 1.10-1.50 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-19 | 18-35 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 2.0-5.0 | .28 | .28 | | | |
| | 19-37 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| 450: | | | | | | | | | | | | |
| Colvin | 0-10 | 18-34 | 1.15-1.30 | 0.6-2 | 0.22-0.24 | Low | 4.0-7.0 | .37 | .37 | 5 | 4L | 86 |
| | 10-30 | 18-34 | 1.20-1.50 | 0.2-2 | 0.16-0.22 | Moderate | 1.0-4.0 | .43 | .43 | | | |
| | 30-60 | 18-34 | 1.30-1.50 | 0.2-2 | 0.16-0.22 | Moderate | 0.5-1.0 | .43 | .43 | | | |
| 511: | | | | | | | | | | | | |
| Divide | 0-8 | 18-27 | 1.10-1.40 | 0.6-2 | 0.18-0.22 | Low | 2.0-8.0 | .28 | .28 | 4 | 4L | 86 |
| | 8-12 | 18-30 | 1.20-1.50 | 0.6-2 | 0.16-0.19 | Low | 1.0-4.0 | .28 | .32 | | | |
| | 12-22 | 18-30 | 1.20-1.50 | 0.6-2 | 0.16-0.19 | Low | 0.0-2.0 | .28 | .32 | | | |
| | 22-26 | 0-10 | 1.30-1.70 | 6-20 | 0.03-0.07 | Low | 0.0-1.0 | .10 | .24 | | | |
| | 26-60 | 0-10 | 1.30-1.70 | 6-20 | 0.03-0.07 | Low | 0.0-1.0 | .10 | .24 | | | |
| 674: | | | | | | | | | | | | |
| Farnuf | 0-9 | 20-27 | 1.20-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-4.0 | .28 | .28 | 5 | 6 | 48 |
| | 9-23 | 25-35 | 1.25-1.35 | 0.6-2 | 0.15-0.20 | Moderate | 1.0-2.0 | .28 | .28 | | | |
| | 23-34 | 25-35 | 1.20-1.45 | 0.6-2 | 0.15-0.20 | Moderate | 0.5-1.0 | .32 | .32 | | | |
| | 34-60 | 15-35 | 1.25-1.45 | 0.6-2 | 0.15-0.20 | Moderate | 0.0-0.5 | .32 | .32 | | | |
| 712: | | | | | | | | | | | | |
| Flaxton | 0-15 | 5-18 | 1.10-1.40 | 2-6 | 0.16-0.18 | Low | 2.0-4.0 | .20 | .20 | 5 | 3 | 86 |
| | 15-22 | 5-18 | 1.20-1.50 | 2-20 | 0.15-0.17 | Low | 1.0-2.0 | .20 | .20 | | | |
| | 22-25 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| | 25-30 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| | 30-35 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| | 35-42 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| | 42-60 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 712:(cont.) | | | | | | | | | | | | |
| Williams---------- | 0-6 | 15-27 | 1.20-1.60 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 714: | | | | | | | | | | | | |
| Flaxton---------- | 0-15 | 5-18 | 1.10-1.40 | 2-6 | 0.16-0.18 | Low | 2.0-4.0 | .20 | .20 | 5 | 3 | 86 |
| | 15-22 | 5-18 | 1.20-1.50 | 2-20 | 0.15-0.17 | Low | 1.0-2.0 | .20 | .20 | | | |
| | 22-25 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| | 25-30 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| | 30-35 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| | 35-42 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| | 42-60 | 18-35 | 1.20-1.70 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| Williams---------- | 0-6 | 15-27 | 1.20-1.60 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 727: | | | | | | | | | | | | |
| Fordville---------- | 0-6 | 18-25 | 1.20-1.30 | 0.6-2 | 0.18-0.20 | Low | 3.0-7.0 | .24 | .24 | 4 | 6 | 48 |
| | 6-12 | 18-30 | 1.25-1.40 | 0.6-2 | 0.18-0.21 | Moderate | 2.0-6.0 | .24 | .24 | | | |
| | 12-24 | 18-30 | 1.25-1.40 | 0.6-2 | 0.18-0.21 | Moderate | 1.0-3.0 | .24 | .24 | | | |
| | 24-60 | 0-8 | 1.60-1.70 | 6-20 | 0.03-0.06 | Low | 0.0-1.0 | .10 | .17 | | | |
| 863: | | | | | | | | | | | | |
| Hamerly---------- | 0-8 | 18-27 | 1.20-1.60 | 0.6-2 | 0.18-0.24 | Moderate | 4.0-7.0 | .24 | .24 | 5 | 4L | 86 |
| | 8-35 | 18-35 | 1.30-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 35-60 | 18-35 | 1.30-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| 883: | | | | | | | | | | | | |
| Hamerly---------- | 0-8 | 18-27 | 1.20-1.60 | 0.6-2 | 0.18-0.24 | Moderate | 4.0-7.0 | .24 | .24 | 5 | 4L | 86 |
| | 8-35 | 18-35 | 1.30-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 35-60 | 18-35 | 1.30-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Tonka---------- | 0-13 | 18-27 | 1.00-1.50 | 0.6-2 | 0.18-0.23 | Low | 5.0-10 | .37 | .37 | 5 | 6 | 48 |
| | 13-19 | 18-27 | 1.00-1.50 | 0.6-2 | 0.18-0.23 | Low | 0.0-1.0 | .37 | .37 | | | |
| | 19-34 | 35-45 | 1.40-1.65 | 0.06-0.2 | 0.14-0.19 | High | 0.0-2.0 | .43 | .43 | | | |
| | 34-50 | 18-39 | 1.40-1.70 | 0.06-0.2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 50-60 | 18-39 | 1.40-1.70 | 0.06-0.2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Parnell---------- | 0-15 | 27-40 | 1.10-1.30 | 0.2-0.6 | 0.18-0.22 | Moderate | 6.0-10 | .37 | .37 | 5 | 7 | 38 |
| | 15-22 | 18-40 | 1.10-1.30 | 0.2-0.6 | 0.18-0.22 | Moderate | 6.0-10 | .28 | .28 | | | |
| | 22-32 | 27-60 | 1.20-1.40 | 0.06-0.2 | 0.13-0.19 | High | 3.0-5.0 | .37 | .37 | | | |
| | 32-55 | 27-60 | 1.20-1.40 | 0.06-0.2 | 0.13-0.19 | High | 3.0-5.0 | .28 | .28 | | | |
| | 55-60 | 35-45 | 1.30-1.50 | 0.06-0.2 | 0.11-0.19 | High | 0.5-1.0 | .37 | .37 | | | |
| 1011: | | | | | | | | | | | | |
| Karlsruhe---------- | 0-5 | 5-15 | 1.50-1.70 | 6-20 | 0.10-0.13 | Low | 4.0-7.0 | .24 | .24 | 5 | 3 | 86 |
| | 5-11 | 5-15 | 1.50-1.70 | 6-20 | 0.10-0.13 | Low | 3.0-7.0 | .24 | .24 | | | |
| | 11-15 | 5-15 | 1.50-1.70 | 6-20 | 0.08-0.13 | Low | 1.0-3.0 | .15 | .15 | | | |
| | 15-30 | 5-15 | 1.50-1.70 | 6-20 | 0.08-0.13 | Low | 1.0-3.0 | .15 | .15 | | | |
| | 30-60 | 2-10 | 1.50-1.70 | 6-20 | 0.03-0.07 | Low | 0.0-1.0 | .15 | .15 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Erosion factors Kf | Erosion factors T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 1181: | | | | | | | | | | | | |
| Lohnes | 0-16 | 5-15 | 1.50-1.70 | 6-20 | 0.08-0.10 | Low | 1.0-3.0 | .15 | .15 | 5 | 2 | 134 |
| | 16-30 | 0-10 | 1.50-1.70 | 6-20 | 0.03-0.07 | Low | 0.2-1.0 | .15 | .15 | | | |
| | 30-60 | 0-10 | 1.50-1.70 | 6-20 | 0.03-0.07 | Low | 0.0-0.5 | .15 | .15 | | | |
| 1202: | | | | | | | | | | | | |
| Maddock | 0-10 | 2-10 | 1.20-1.40 | 6-20 | 0.10-0.12 | Low | 1.0-2.0 | .17 | .17 | 5 | 2 | 134 |
| | 10-14 | 2-8 | 1.30-1.50 | 6-20 | 0.05-0.12 | Low | 0.0-1.0 | .17 | .17 | | | |
| | 14-60 | 2-8 | 1.30-1.50 | 6-20 | 0.05-0.12 | Low | 0.0-0.5 | .17 | .17 | | | |
| 1249: | | | | | | | | | | | | |
| Appam | 0-6 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 6-15 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 15-19 | 6-18 | 1.20-1.50 | 2-6 | 0.12-0.14 | Low | 0.0-0.5 | .20 | .20 | | | |
| | 19-60 | 0-10 | 1.40-1.60 | 6-20 | 0.02-0.10 | Low | 0.0-0.5 | .15 | .17 | | | |
| 1267: | | | | | | | | | | | | |
| Marysland | 0-9 | 18-27 | 1.20-1.30 | 0.6-2 | 0.17-0.24 | Moderate | 5.0-8.0 | .28 | .28 | 4 | 4L | 86 |
| | 9-12 | 18-27 | 1.20-1.30 | 0.6-2 | 0.17-0.24 | Moderate | 5.0-8.0 | .28 | .28 | | | |
| | 12-15 | 18-27 | 1.20-1.35 | 0.2-2 | 0.15-0.19 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 15-20 | 18-27 | 1.20-1.35 | 0.2-2 | 0.15-0.19 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 20-27 | 18-27 | 1.20-1.35 | 0.2-2 | 0.15-0.19 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 27-40 | 1-5 | 1.45-1.65 | 6-20 | 0.02-0.07 | Low | 0.0-0.5 | .10 | .10 | | | |
| | 40-60 | 1-5 | 1.45-1.65 | 6-20 | 0.02-0.07 | Low | 0.0-0.5 | .10 | .10 | | | |
| 1372: | | | | | | | | | | | | |
| Noonan | 0-6 | 18-27 | 1.10-1.40 | 0.6-2 | 0.20-0.22 | Low | 2.0-6.0 | .32 | .32 | 2 | 6 | 48 |
| | 6-9 | 27-35 | 1.20-1.50 | 0.06-0.6 | 0.12-0.14 | High | 0.5-2.0 | .32 | .32 | | | |
| | 9-12 | 27-35 | 1.20-1.50 | 0.001-0.2 | 0.12-0.14 | High | 0.5-2.0 | .32 | .32 | | | |
| | 12-20 | 27-35 | 1.20-1.50 | 0.001-0.2 | 0.12-0.14 | High | 0.5-2.0 | .32 | .32 | | | |
| | 20-28 | 20-30 | 1.20-1.60 | 0.06-0.6 | 0.10-0.14 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| | 28-60 | 20-30 | 1.20-1.60 | 0.06-0.6 | 0.10-0.14 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Williams | 0-6 | 15-27 | 1.10-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 1374: | | | | | | | | | | | | |
| Nutley | 0-7 | 40-60 | 1.15-1.30 | 0.001-0.2 | 0.15-0.21 | High | 4.0-7.0 | .28 | .28 | 5 | 4 | 86 |
| | 7-20 | 35-60 | 1.35-1.50 | 0.001-0.2 | 0.13-0.19 | High | 0.0-4.0 | .28 | .28 | | | |
| | 20-60 | 35-60 | 1.35-1.50 | 0.001-0.2 | 0.07-0.17 | High | 0.0-2.0 | .28 | .28 | | | |
| 1375: | | | | | | | | | | | | |
| Nutley | 0-7 | 40-60 | 1.15-1.30 | 0.001-0.2 | 0.15-0.21 | High | 4.0-7.0 | .28 | .28 | 5 | 4 | 86 |
| | 7-20 | 35-60 | 1.35-1.50 | 0.001-0.2 | 0.13-0.19 | High | 0.0-4.0 | .28 | .28 | | | |
| | 20-60 | 35-60 | 1.35-1.50 | 0.001-0.2 | 0.07-0.17 | High | 0.0-2.0 | .28 | .28 | | | |
| 1427: | | | | | | | | | | | | |
| Parnell | 0-15 | 27-40 | 1.10-1.30 | 0.2-0.6 | 0.18-0.22 | Moderate | 6.0-10 | .37 | .37 | 5 | 7 | 38 |
| | 15-22 | 18-40 | 1.10-1.30 | 0.2-0.6 | 0.18-0.22 | Moderate | 6.0-10 | .28 | .28 | | | |
| | 22-32 | 27-60 | 1.20-1.40 | 0.06-0.2 | 0.13-0.19 | High | 3.0-5.0 | .37 | .37 | | | |
| | 32-55 | 27-60 | 1.20-1.40 | 0.06-0.2 | 0.13-0.19 | High | 3.0-5.0 | .28 | .28 | | | |
| | 55-60 | 35-45 | 1.30-1.50 | 0.06-0.2 | 0.11-0.19 | High | 0.5-1.0 | .37 | .37 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 1437: | | | | | | | | | | | | |
| Parshall---------- | 0-12 | 5-20 | 1.10-1.40 | 2-6 | 0.16-0.18 | Low | 1.0-4.0 | .20 | .20 | 5 | 3 | 86 |
| | 12-29 | 5-20 | 1.20-1.50 | 2-6 | 0.13-0.17 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 29-48 | 5-20 | 1.20-1.60 | 2-6 | 0.12-0.16 | Low | 0.0-1.0 | .24 | .24 | | | |
| | 48-60 | 5-15 | 1.40-1.70 | 6-20 | 0.08-0.12 | Low | 0.0-1.0 | .17 | .17 | | | |
| 1466: | | | | | | | | | | | | |
| Pits, gravel and sand- | 0-6 | 5-15 | 1.20-1.60 | 6-61 | 0.01-0.04 | Low | 0.5-1.0 | .10 | .20 | 5 | 8 | 0 |
| | 6-60 | 0-15 | 1.20-1.60 | 6-61 | 0.01-0.04 | Low | 0.0-0.5 | .10 | .17 | | | |
| 1676: | | | | | | | | | | | | |
| Wildrose---------- | 0-6 | 40-60 | 1.15-1.30 | 0.001-0.2 | 0.15-0.21 | High | 3.0-6.0 | .28 | .28 | 5 | 4 | 86 |
| | 6-14 | 40-60 | 1.15-1.30 | 0.001-0.2 | 0.10-0.20 | High | 2.0-4.0 | .28 | .28 | | | |
| | 14-21 | 40-70 | 1.35-1.50 | 0.001-0.2 | 0.08-0.18 | High | 1.0-3.0 | .28 | .28 | | | |
| | 21-31 | 40-70 | 1.35-1.50 | 0.001-0.2 | 0.08-0.18 | High | 1.0-2.0 | .28 | .28 | | | |
| | 31-38 | 40-70 | 1.35-1.50 | 0.001-0.2 | 0.08-0.18 | High | 1.0-2.0 | .28 | .28 | | | |
| | 38-44 | 40-70 | 1.35-1.50 | 0.001-0.2 | 0.08-0.18 | High | 0.5-2.0 | .28 | .28 | | | |
| | 44-58 | 40-70 | 1.35-1.50 | 0.001-0.2 | 0.07-0.17 | High | 0.5-2.0 | .28 | .28 | | | |
| | 58-60 | 40-70 | 1.35-1.50 | 0.001-0.2 | 0.07-0.17 | High | 0.5-2.0 | .28 | .28 | | | |
| 1697: | | | | | | | | | | | | |
| Sioux---------- | 0-5 | 14-25 | 1.20-1.30 | 0.6-2 | 0.17-0.20 | Low | 1.0-3.0 | .28 | .28 | 2 | 5 | 56 |
| | 5-8 | 10-20 | 1.20-1.50 | 2-6 | 0.10-0.15 | Low | 0.5-2.0 | .15 | .20 | | | |
| | 8-60 | 0-10 | 1.60-1.70 | 6-40 | 0.03-0.06 | Low | 0.0-0.5 | .10 | .15 | | | |
| Arvilla---------- | 0-10 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 10-16 | 6-18 | 1.20-1.50 | 2-6 | 0.11-0.14 | Low | 1.0-2.0 | .20 | .20 | | | |
| | 16-31 | 2-10 | 1.20-1.50 | 6-40 | 0.02-0.05 | Low | 0.0-0.5 | .05 | .15 | | | |
| | 31-60 | 0-10 | 1.40-1.60 | 6-40 | 0.02-0.05 | Low | 0.0-0.5 | .05 | .15 | | | |
| 1710: | | | | | | | | | | | | |
| Southam---------- | 0-16 | 27-40 | 1.10-1.40 | 0.2-0.6 | 0.18-0.23 | Moderate | 5.0-12 | .37 | .37 | 5 | 4L | 86 |
| | 16-40 | 35-50 | 1.20-1.50 | 0.06-0.2 | 0.14-0.20 | High | 1.0-5.0 | .28 | .28 | | | |
| | 40-60 | 18-50 | 1.20-1.50 | 0.06-0.6 | 0.13-0.17 | High | 0.5-2.0 | .28 | .28 | | | |
| 1762: | | | | | | | | | | | | |
| Svea---------- | 0-10 | 18-27 | 1.10-1.30 | 0.6-2 | 0.20-0.24 | Low | 4.0-7.0 | .28 | .32 | 5 | 6 | 48 |
| | 10-21 | 18-35 | 1.20-1.50 | 0.2-2 | 0.15-0.22 | Moderate | 2.0-5.0 | .28 | .32 | | | |
| | 21-36 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-2.0 | .37 | .37 | | | |
| | 36-60 | 18-35 | 1.30-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| Barnes---------- | 0-7 | 18-27 | 1.10-1.50 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-19 | 18-35 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 2.0-5.0 | .28 | .28 | | | |
| | 19-37 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| 1805: | | | | | | | | | | | | |
| Telfer---------- | 0-6 | 0-8 | 1.40-1.70 | 6-20 | 0.10-0.12 | Low | 1.0-3.0 | .17 | .17 | 5 | 2 | 134 |
| | 6-14 | 0-8 | 1.40-1.70 | 6-20 | 0.06-0.10 | Low | 0.0-2.0 | .17 | .17 | | | |
| | 14-60 | 0-8 | 1.40-1.70 | 6-20 | 0.06-0.10 | Low | 0.0-1.0 | .17 | .17 | | | |
| 1886: | | | | | | | | | | | | |
| Hamerly, saline------- | 0-8 | 18-27 | 1.10-1.30 | 0.6-2 | 0.13-0.16 | Low | 3.0-6.0 | .28 | .28 | 5 | 4L | 86 |
| | 8-35 | 18-35 | 1.20-1.50 | 0.2-2 | 0.10-0.13 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 35-60 | 18-35 | 1.20-1.60 | 0.2-2 | 0.10-0.13 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Vallers, saline------- | 0-12 | 18-27 | 1.20-1.35 | 0.6-2 | 0.22-0.24 | Low | 5.0-8.0 | .28 | .28 | 5 | 4L | 86 |
| | 12-32 | 18-35 | 1.40-1.55 | 0.2-0.6 | 0.15-0.19 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 32-60 | 18-35 | 1.45-1.60 | 0.2-0.6 | 0.17-0.19 | Moderate | 0.0-1.0 | .28 | .28 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Erosion factors Kf | Erosion factors T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 1898: | | | | | | | | | | | | |
| Vebar | 0-5 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 5-26 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 26-32 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 0.0-1.0 | .20 | .20 | | | |
| | 32-60 | 1-10 | 1.45-1.70 | 0.06-2 | 0.02-0.04 | --- | 0.0-0.5 | --- | --- | | | |
| 1978: | | | | | | | | | | | | |
| Water | --- | --- | --- | --- | --- | --- | --- | --- | --- | - | --- | --- |
| 2006: | | | | | | | | | | | | |
| Williams | 0-6 | 15-27 | 1.10-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 2014: | | | | | | | | | | | | |
| Williams | 0-6 | 15-27 | 1.10-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Bowbells | 0-6 | 18-27 | 1.10-1.40 | 0.6-2 | 0.17-0.19 | Low | 2.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 6-14 | 20-35 | 1.20-1.50 | 0.6-2 | 0.16-0.22 | Moderate | 2.0-4.0 | .28 | .28 | | | |
| | 14-23 | 20-35 | 1.20-1.50 | 0.6-2 | 0.16-0.22 | Moderate | 2.0-4.0 | .28 | .28 | | | |
| | 23-36 | 20-35 | 1.30-1.70 | 0.2-0.6 | 0.14-0.18 | Moderate | 1.0-2.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.70 | 0.2-0.6 | 0.14-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 2015: | | | | | | | | | | | | |
| Williams | 0-6 | 15-27 | 1.10-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Bowbells | 0-6 | 18-27 | 1.10-1.40 | 0.6-2 | 0.17-0.19 | Low | 2.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 6-14 | 20-35 | 1.20-1.50 | 0.6-2 | 0.16-0.22 | Moderate | 2.0-4.0 | .28 | .28 | | | |
| | 14-23 | 20-35 | 1.20-1.50 | 0.6-2 | 0.16-0.22 | Moderate | 2.0-4.0 | .28 | .28 | | | |
| | 23-36 | 20-35 | 1.30-1.70 | 0.2-0.6 | 0.14-0.18 | Moderate | 1.0-2.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.70 | 0.2-0.6 | 0.14-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 2031: | | | | | | | | | | | | |
| Williams | 0-6 | 15-27 | 1.10-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Zahl | 0-5 | 18-27 | 1.10-1.40 | 0.6-2 | 0.17-0.22 | Moderate | 1.0-4.0 | .28 | .28 | 5 | 4L | 86 |
| | 5-20 | 20-30 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 20-60 | 20-30 | 1.30-1.60 | 0.2-0.6 | 0.15-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 2037: | | | | | | | | | | | | |
| Williams---------- | 0-6 | 15-27 | 1.10-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Zahl---------- | 0-5 | 18-27 | 1.10-1.40 | 0.6-2 | 0.17-0.22 | Moderate | 1.0-4.0 | .28 | .28 | 5 | 4L | 86 |
| | 5-20 | 20-30 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 20-60 | 20-30 | 1.30-1.60 | 0.2-0.6 | 0.15-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Parnell---------- | 0-15 | 27-40 | 1.10-1.30 | 0.2-0.6 | 0.18-0.22 | Moderate | 6.0-10 | .37 | .37 | 5 | 7 | 38 |
| | 15-22 | 18-40 | 1.10-1.30 | 0.2-0.6 | 0.18-0.22 | Moderate | 6.0-10 | .28 | .28 | | | |
| | 22-32 | 27-60 | 1.20-1.40 | 0.06-0.2 | 0.13-0.19 | High | 3.0-5.0 | .37 | .37 | | | |
| | 32-55 | 27-60 | 1.20-1.40 | 0.06-0.2 | 0.13-0.19 | High | 3.0-5.0 | .28 | .28 | | | |
| | 55-60 | 35-45 | 1.30-1.50 | 0.06-0.2 | 0.11-0.19 | High | 0.5-1.0 | .37 | .37 | | | |
| 2073: | | | | | | | | | | | | |
| Zahl---------- | 0-5 | 18-27 | 1.10-1.40 | 0.6-2 | 0.17-0.22 | Moderate | 1.0-4.0 | .28 | .28 | 5 | 4L | 86 |
| | 5-20 | 20-30 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 20-60 | 20-30 | 1.30-1.60 | 0.2-0.6 | 0.15-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Max---------- | 0-6 | 18-27 | 1.10-1.40 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-16 | 18-27 | 1.20-1.40 | 0.6-2 | 0.20-0.22 | Low | 3.0-5.0 | .28 | .28 | | | |
| | 16-37 | 18-35 | 1.20-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-2.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.20-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 2081: | | | | | | | | | | | | |
| Zahl---------- | 0-5 | 18-27 | 1.10-1.40 | 0.6-2 | 0.17-0.22 | Moderate | 1.0-4.0 | .28 | .28 | 5 | 4L | 86 |
| | 5-20 | 20-30 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 20-60 | 20-30 | 1.30-1.60 | 0.2-0.6 | 0.15-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Williams---------- | 0-6 | 15-27 | 1.10-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 2175: | | | | | | | | | | | | |
| Zahl---------- | 0-5 | 18-27 | 1.10-1.40 | 0.6-2 | 0.17-0.22 | Moderate | 1.0-4.0 | .28 | .28 | 5 | 4L | 86 |
| | 5-20 | 20-30 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 20-60 | 20-30 | 1.30-1.60 | 0.2-0.6 | 0.15-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Williams---------- | 0-6 | 15-27 | 1.10-1.40 | 0.6-2 | 0.18-0.20 | Low | 2.0-6.0 | .28 | .28 | 5 | 6 | 48 |
| | 6-10 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 10-15 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 15-24 | 24-35 | 1.20-1.60 | 0.6-2 | 0.16-0.20 | Moderate | 1.0-4.0 | .28 | .28 | | | |
| | 24-36 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 36-60 | 20-35 | 1.30-1.60 | 0.2-0.6 | 0.15-0.18 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| 2188: | | | | | | | | | | | | |
| Wabek---------- | 0-5 | 5-15 | 1.10-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-2.0 | .15 | .20 | 2 | 3 | 86 |
| | 5-9 | 5-15 | 1.20-1.60 | 2-20 | 0.11-0.15 | Low | 0.0-1.0 | .10 | .17 | | | |
| | 9-60 | 0-10 | 1.30-1.70 | 20-61 | 0.02-0.04 | Low | 0.0-1.0 | .10 | .10 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Erosion factors Kf | Erosion factors T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 2188:(cont.) | | | | | | | | | | | | |
| Lehr | 0-6 | 10-27 | 1.10-1.40 | 0.6-6 | 0.17-0.22 | Low | 1.0-3.0 | .28 | .28 | 3 | 5 | 56 |
| | 6-11 | 18-30 | 1.20-1.50 | 0.6-6 | 0.17-0.20 | Moderate | 1.0-2.0 | .20 | .28 | | | |
| | 11-15 | 18-30 | 1.20-1.50 | 0.6-6 | 0.17-0.20 | Moderate | 1.0-2.0 | .20 | .28 | | | |
| | 15-22 | 0-10 | 1.40-1.70 | 6-60 | 0.09-0.11 | Low | 0.0-1.0 | .10 | .17 | | | |
| | 22-60 | 0-10 | 1.40-1.70 | 6-60 | 0.02-0.04 | Low | 0.0-1.0 | .10 | .17 | | | |
| 2234: | | | | | | | | | | | | |
| Amor | 0-8 | 15-25 | 1.20-1.35 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 3 | 6 | 48 |
| | 8-19 | 18-30 | 1.20-1.40 | 0.6-2 | 0.17-0.19 | Moderate | 1.0-3.0 | .32 | .32 | | | |
| | 19-31 | 18-30 | 1.20-1.60 | 0.6-2 | 0.17-0.19 | Moderate | 0.5-1.0 | .32 | .32 | | | |
| | 31-60 | 1-35 | 1.40-1.70 | 0.06-2 | 0.04-0.08 | --- | 0.0-0.5 | --- | --- | | | |
| Werner | 0-6 | 14-27 | 1.20-1.40 | 0.6-2 | 0.14-0.22 | Moderate | 2.0-4.0 | .28 | .28 | 2 | 4L | 86 |
| | 6-17 | 14-35 | 1.30-1.50 | 0.6-2 | 0.17-0.22 | Moderate | 0.5-2.0 | .28 | .28 | | | |
| | 17-60 | 1-90 | 1.40-1.70 | 0.001-2 | 0.04-0.08 | --- | 0.0-0.5 | .28 | .28 | | | |
| 2235: | | | | | | | | | | | | |
| Arnegard | 0-13 | 15-25 | 1.00-1.40 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 13-36 | 18-30 | 1.20-1.60 | 0.6-2 | 0.16-0.22 | Low | 1.0-4.0 | .28 | .28 | | | |
| | 36-60 | 15-30 | 1.20-1.60 | 0.6-2 | 0.14-0.18 | Low | 0.0-1.0 | .28 | .28 | | | |
| 2240: | | | | | | | | | | | | |
| Bowdle | 0-8 | 10-27 | 1.25-1.35 | 0.6-2 | 0.18-0.20 | Low | 3.0-5.0 | .28 | .28 | 4 | 5 | 56 |
| | 8-16 | 18-30 | 1.25-1.35 | 0.6-2 | 0.18-0.20 | Low | 1.0-3.0 | .28 | .28 | | | |
| | 16-22 | 18-30 | 1.25-1.35 | 0.6-2 | 0.18-0.20 | Low | 1.0-3.0 | .28 | .28 | | | |
| | 22-25 | 18-25 | 1.30-1.60 | 0.6-2 | 0.15-0.18 | Low | 0.0-1.0 | .28 | .32 | | | |
| | 25-30 | 2-7 | 1.50-1.70 | 6-61 | 0.03-0.06 | Low | 0.0-0.5 | .10 | .17 | | | |
| | 30-60 | 2-7 | 1.50-1.70 | 6-61 | 0.03-0.06 | Low | 0.0-0.5 | .10 | .17 | | | |
| Lehr | 0-6 | 10-27 | 1.10-1.40 | 0.6-6 | 0.17-0.22 | Low | 1.0-3.0 | .28 | .28 | 3 | 5 | 56 |
| | 6-11 | 18-30 | 1.20-1.50 | 0.6-6 | 0.17-0.20 | Moderate | 1.0-2.0 | .20 | .28 | | | |
| | 11-15 | 18-30 | 1.20-1.50 | 0.6-6 | 0.17-0.20 | Moderate | 1.0-2.0 | .20 | .28 | | | |
| | 15-22 | 0-10 | 1.40-1.70 | 6-60 | 0.09-0.11 | Low | 0.0-1.0 | .10 | .17 | | | |
| | 22-60 | 0-10 | 1.40-1.70 | 6-60 | 0.02-0.04 | Low | 0.0-1.0 | .10 | .17 | | | |
| 2241: | | | | | | | | | | | | |
| Bryant | 0-8 | 18-27 | 1.10-1.30 | 0.6-2 | 0.18-0.20 | Low | 2.0-4.0 | .28 | .28 | 5 | 6 | 48 |
| | 8-15 | 22-35 | 1.10-1.30 | 0.6-2 | 0.17-0.20 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 15-19 | 18-27 | 1.20-1.35 | 0.2-2 | 0.17-0.20 | Moderate | 1.0-2.0 | .32 | .32 | | | |
| | 19-32 | 18-27 | 1.20-1.40 | 0.2-2 | 0.17-0.20 | Moderate | 0.0-1.0 | .32 | .32 | | | |
| | 32-60 | 18-27 | 1.20-1.45 | 0.2-2 | 0.17-0.20 | Moderate | 0.0-1.0 | .32 | .32 | | | |
| 2242: | | | | | | | | | | | | |
| Cohagen | 0-3 | 10-18 | 1.20-1.60 | 0.6-6 | 0.13-0.18 | Low | 0.5-1.0 | .24 | .24 | 2 | 3 | 86 |
| | 3-17 | 10-18 | 1.20-1.60 | 0.6-6 | 0.13-0.18 | Low | 0.0-0.5 | .24 | .24 | | | |
| | 17-60 | 1-10 | 1.45-1.70 | 0.06-2 | 0.02-0.04 | --- | 0.0-0.5 | .17 | .17 | | | |
| Vebar | 0-5 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 5-26 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 26-32 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 0.0-1.0 | .20 | .20 | | | |
| | 32-60 | 1-10 | 1.45-1.70 | 0.06-2 | 0.02-0.04 | --- | 0.0-0.5 | --- | --- | | | |
| Parshall | 0-12 | 5-20 | 1.10-1.40 | 2-6 | 0.16-0.18 | Low | 1.0-4.0 | .20 | .20 | 5 | 3 | 86 |
| | 12-29 | 5-20 | 1.20-1.50 | 2-6 | 0.13-0.17 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 29-48 | 5-20 | 1.20-1.60 | 2-6 | 0.12-0.16 | Low | 0.0-1.0 | .24 | .24 | | | |
| | 48-60 | 5-18 | 1.40-1.70 | 6-20 | 0.08-0.12 | Low | 0.0-1.0 | .17 | .17 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 2243: | | | | | | | | | | | | |
| Vebar---------- | 0-5 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 5-26 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 26-32 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 0.0-1.0 | .20 | .20 | | | |
| | 32-60 | 1-10 | 1.45-1.70 | 0.06-2 | 0.02-0.04 | --- | 0.0-0.5 | --- | --- | | | |
| Flasher---------- | 0-6 | 2-10 | 1.10-1.50 | 6-20 | 0.08-0.12 | Low | 0.5-1.0 | .17 | .17 | 2 | 2 | 134 |
| | 6-10 | 2-10 | 1.10-1.50 | 6-20 | 0.08-0.12 | Low | 0.0-0.5 | .17 | .17 | | | |
| | 10-60 | 1-10 | 1.45-1.70 | 0.06-2 | 0.02-0.04 | --- | 0.0-0.5 | --- | --- | | | |
| 2244: | | | | | | | | | | | | |
| Daglum---------- | 0-7 | 18-26 | 1.20-1.50 | 0.6-2 | 0.13-0.15 | Low | 2.0-4.0 | .32 | .32 | 2 | 6 | 48 |
| | 7-8 | 18-26 | 1.20-1.50 | 0.6-2 | 0.13-0.15 | Low | 2.0-4.0 | .32 | .32 | | | |
| | 8-18 | 35-60 | 1.30-1.60 | 0.001-0.2 | 0.12-0.14 | Moderate | 1.0-2.0 | .32 | .32 | | | |
| | 18-32 | 35-60 | 1.50-1.70 | 0.001-0.2 | 0.12-0.14 | Moderate | 0.5-1.0 | .32 | .32 | | | |
| | 32-60 | 35-60 | 1.20-1.60 | 0.06-0.6 | 0.12-0.14 | Moderate | 0.0-1.0 | .32 | .32 | | | |
| Belfield---------- | 0-9 | 18-35 | 1.00-1.25 | 0.2-2 | 0.17-0.22 | Moderate | 2.0-6.0 | .37 | .37 | 5 | 6 | 48 |
| | 9-12 | 27-35 | 1.00-1.25 | 0.2-2 | 0.17-0.22 | Moderate | 2.0-6.0 | .37 | .37 | | | |
| | 12-17 | 35-45 | 1.20-1.65 | 0.2-0.6 | 0.14-0.18 | High | 1.0-2.0 | .37 | .37 | | | |
| | 17-24 | 35-40 | 1.35-1.65 | 0.2-0.6 | 0.14-0.18 | High | 1.0-2.0 | .37 | .37 | | | |
| | 24-43 | 18-45 | 1.35-1.60 | 0.06-0.6 | 0.13-0.17 | High | 0.0-0.5 | .43 | .43 | | | |
| | 43-60 | 18-45 | 1.35-1.60 | 0.06-0.6 | 0.13-0.17 | High | 0.0-0.5 | .43 | .43 | | | |
| 2246: | | | | | | | | | | | | |
| Grail---------- | 0-10 | 27-35 | 1.10-1.40 | 0.2-0.6 | 0.20-0.23 | Moderate | 4.0-6.0 | .37 | .37 | 5 | 7 | 38 |
| | 10-24 | 35-45 | 1.20-1.60 | 0.06-0.6 | 0.14-0.17 | High | 2.0-4.0 | .37 | .37 | | | |
| | 24-52 | 27-45 | 1.20-1.60 | 0.06-0.6 | 0.14-0.20 | Moderate | 1.0-3.0 | .37 | .37 | | | |
| | 52-60 | 18-45 | 1.20-1.70 | 0.06-0.6 | 0.13-0.22 | Moderate | 1.0-3.0 | .37 | .37 | | | |
| 2248: | | | | | | | | | | | | |
| Lehr---------- | 0-6 | 10-27 | 1.10-1.40 | 0.6-6 | 0.17-0.22 | Low | 1.0-3.0 | .28 | .28 | 3 | 5 | 56 |
| | 6-11 | 18-30 | 1.20-1.50 | 0.6-6 | 0.17-0.20 | Moderate | 1.0-2.0 | .20 | .28 | | | |
| | 11-15 | 18-30 | 1.20-1.50 | 0.6-6 | 0.17-0.20 | Moderate | 1.0-2.0 | .20 | .28 | | | |
| | 15-22 | 0-10 | 1.40-1.70 | 6-60 | 0.09-0.11 | Low | 0.0-1.0 | .10 | .17 | | | |
| | 22-60 | 0-10 | 1.40-1.70 | 6-60 | 0.02-0.04 | Low | 0.0-1.0 | .10 | .17 | | | |
| Bowdle---------- | 0-8 | 10-27 | 1.25-1.35 | 0.6-2 | 0.18-0.20 | Low | 3.0-5.0 | .28 | .28 | 4 | 5 | 56 |
| | 8-16 | 18-30 | 1.25-1.35 | 0.6-2 | 0.18-0.20 | Low | 1.0-3.0 | .28 | .28 | | | |
| | 16-22 | 18-30 | 1.25-1.35 | 0.6-2 | 0.18-0.20 | Low | 1.0-3.0 | .28 | .28 | | | |
| | 22-25 | 18-25 | 1.30-1.60 | 0.6-2 | 0.15-0.18 | Low | 0.0-1.0 | .28 | .32 | | | |
| | 25-30 | 2-7 | 1.50-1.70 | 6-61 | 0.03-0.06 | Low | 0.0-0.5 | .10 | .17 | | | |
| | 30-60 | 2-7 | 1.50-1.70 | 6-61 | 0.03-0.06 | Low | 0.0-0.5 | .10 | .17 | | | |
| 2249: | | | | | | | | | | | | |
| Makoti---------- | 0-6 | 27-35 | 1.10-1.30 | 0.2-0.6 | 0.18-0.23 | Moderate | 3.0-6.0 | .32 | .32 | 5 | 7 | 38 |
| | 6-14 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.24 | Moderate | 1.0-6.0 | .32 | .32 | | | |
| | 14-19 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.24 | Moderate | 1.0-4.0 | .32 | .32 | | | |
| | 19-26 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.24 | Moderate | 1.0-3.0 | .32 | .32 | | | |
| | 26-34 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.24 | Moderate | 0.5-2.0 | .32 | .32 | | | |
| | 34-46 | 15-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.22 | Moderate | 0.5-1.0 | .43 | .43 | | | |
| | 46-60 | 15-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.22 | Moderate | 0.0-1.0 | .43 | .43 | | | |
| 2250: | | | | | | | | | | | | |
| Makoti---------- | 0-6 | 27-35 | 1.10-1.30 | 0.2-0.6 | 0.18-0.23 | Moderate | 3.0-6.0 | .32 | .32 | 5 | 7 | 38 |
| | 6-14 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.24 | Moderate | 1.0-6.0 | .32 | .32 | | | |
| | 14-19 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.24 | Moderate | 1.0-4.0 | .32 | .32 | | | |
| | 19-26 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.24 | Moderate | 1.0-3.0 | .32 | .32 | | | |
| | 26-34 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.24 | Moderate | 0.5-2.0 | .32 | .32 | | | |
| | 34-46 | 15-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.22 | Moderate | 0.5-1.0 | .43 | .43 | | | |
| | 46-60 | 15-35 | 1.20-1.50 | 0.2-0.6 | 0.16-0.22 | Moderate | 0.0-1.0 | .43 | .43 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Erosion factors Kf | Erosion factors T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 2250:(cont.) | | | | | | | | | | | | |
| Rusklyn | 0-9 | 27-35 | 1.15-1.25 | 0.6-2 | 0.19-0.22 | Moderate | 1.0-4.0 | .32 | .32 | 5 | 4L | 86 |
| | 9-19 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 19-28 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 28-53 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-0.5 | .32 | .32 | | | |
| | 53-60 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-0.5 | .32 | .32 | | | |
| 2252: | | | | | | | | | | | | |
| Max | 0-6 | 18-27 | 1.10-1.40 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .28 | .28 | 5 | 8 | 0 |
| | 6-16 | 18-27 | 1.20-1.40 | 0.6-2 | 0.20-0.22 | Low | 3.0-5.0 | .28 | .28 | | | |
| | 16-37 | 18-35 | 1.20-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-2.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.20-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Zahl | 0-5 | 18-27 | 1.10-1.40 | 0.6-2 | 0.17-0.22 | Moderate | 1.0-4.0 | .28 | .28 | 5 | 8 | 0 |
| | 5-20 | 20-30 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 20-60 | 20-30 | 1.30-1.60 | 0.2-0.6 | 0.15-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Arnegard | 0-13 | 15-25 | 1.00-1.40 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 5 | 8 | 0 |
| | 13-36 | 18-30 | 1.20-1.60 | 0.6-2 | 0.16-0.22 | Low | 1.0-4.0 | .28 | .28 | | | |
| | 36-60 | 10-30 | 1.20-1.60 | 0.6-2 | 0.14-0.18 | Low | 0.0-1.0 | .28 | .28 | | | |
| 2253: | | | | | | | | | | | | |
| Mondamin | 0-6 | 40-60 | 1.10-1.25 | 0.001-0.2 | 0.12-0.21 | High | 2.0-6.0 | .28 | .28 | 5 | 4 | 86 |
| | 6-13 | 40-60 | 1.10-1.25 | 0.001-0.2 | 0.13-0.19 | High | 2.0-4.0 | .28 | .28 | | | |
| | 13-21 | 27-60 | 1.20-1.40 | 0.001-0.2 | 0.15-0.19 | High | 1.0-3.0 | .32 | .32 | | | |
| | 21-35 | 27-60 | 1.20-1.40 | 0.001-0.2 | 0.14-0.18 | High | 1.0-3.0 | .32 | .32 | | | |
| | 35-43 | 27-60 | 1.20-1.40 | 0.001-0.2 | 0.14-0.18 | High | 1.0-3.0 | .32 | .32 | | | |
| | 43-55 | 27-60 | 1.30-1.50 | 0.001-0.2 | 0.12-0.15 | High | 0.0-1.0 | .32 | .32 | | | |
| | 55-60 | 27-60 | 1.30-1.50 | 0.001-0.2 | 0.12-0.15 | High | 0.0-1.0 | .32 | .32 | | | |
| 2254: | | | | | | | | | | | | |
| Overly | 0-10 | 27-35 | 1.20-1.40 | 0.2-0.6 | 0.17-0.23 | Moderate | 4.0-8.0 | .32 | .32 | 5 | 7 | 38 |
| | 10-17 | 27-35 | 1.20-1.40 | 0.2-0.6 | 0.17-0.23 | Moderate | 3.0-8.0 | .32 | .32 | | | |
| | 17-38 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.17-0.22 | Moderate | 2.0-6.0 | .32 | .32 | | | |
| | 38-60 | 18-59 | 1.20-1.50 | 0.2-0.6 | 0.13-0.22 | Moderate | 0.0-1.0 | .32 | .32 | | | |
| 2255: | | | | | | | | | | | | |
| Overly | 0-10 | 27-35 | 1.20-1.40 | 0.2-0.6 | 0.17-0.23 | Moderate | 4.0-8.0 | .32 | .32 | 5 | 7 | 38 |
| | 10-17 | 27-35 | 1.20-1.40 | 0.2-0.6 | 0.17-0.23 | Moderate | 3.0-8.0 | .32 | .32 | | | |
| | 17-38 | 18-35 | 1.20-1.50 | 0.2-0.6 | 0.17-0.22 | Moderate | 2.0-6.0 | .32 | .32 | | | |
| | 38-60 | 18-59 | 1.20-1.50 | 0.2-0.6 | 0.13-0.22 | Moderate | 0.0-1.0 | .32 | .32 | | | |
| Rusklyn | 0-9 | 27-35 | 1.15-1.25 | 0.6-2 | 0.19-0.22 | Moderate | 1.0-4.0 | .32 | .32 | 5 | 4L | 86 |
| | 9-19 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 19-28 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 28-53 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-0.5 | .32 | .32 | | | |
| | 53-60 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-0.5 | .32 | .32 | | | |
| 2257: | | | | | | | | | | | | |
| Reeder | 0-8 | 10-27 | 1.20-1.35 | 0.6-2 | 0.18-0.20 | Low | 3.0-5.0 | .24 | .24 | 3 | 6 | 48 |
| | 8-17 | 18-35 | 1.20-1.40 | 0.6-2 | 0.15-0.19 | Moderate | 1.0-3.0 | .28 | .28 | | | |
| | 17-36 | 15-35 | 1.20-1.50 | 0.6-2 | 0.14-0.17 | Moderate | 0.5-2.0 | .32 | .32 | | | |
| | 36-60 | 1-35 | 1.40-1.70 | 0.06-2 | 0.02-0.10 | --- | 0.0-0.5 | .32 | .32 | | | |
| Arnegard | 0-13 | 15-25 | 1.00-1.40 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 13-36 | 18-30 | 1.20-1.60 | 0.6-2 | 0.16-0.22 | Low | 1.0-4.0 | .28 | .28 | | | |
| | 36-60 | 10-30 | 1.20-1.60 | 0.6-2 | 0.14-0.18 | Low | 0.0-1.0 | .28 | .28 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 2258: | | | | | | | | | | | | |
| Regent | 0-10 | 27-40 | 1.10-1.30 | 0.06-0.2 | 0.17-0.20 | Moderate | 1.0-5.0 | .37 | .37 | 3 | 7 | 38 |
| | 10-26 | 35-50 | 1.30-1.50 | 0.06-0.2 | 0.17-0.20 | High | 0.5-1.0 | .43 | .43 | | | |
| | 26-39 | 35-50 | 1.30-1.50 | 0.06-0.2 | 0.17-0.20 | High | 0.5-1.0 | .43 | .43 | | | |
| | 39-60 | 10-90 | 1.40-1.65 | 0.001-0.6 | 0.04-0.08 | --- | 0.0-0.5 | --- | --- | | | |
| Savage | 0-6 | 27-40 | 1.15-1.35 | 0.6-2 | 0.18-0.23 | Moderate | 1.0-3.0 | .37 | .37 | 5 | 7 | 38 |
| | 6-16 | 35-45 | 1.25-1.50 | 0.06-0.6 | 0.13-0.18 | Moderate | 1.0-2.0 | .37 | .37 | | | |
| | 16-39 | 35-45 | 1.30-1.50 | 0.06-0.6 | 0.13-0.18 | Moderate | 0.5-1.0 | .43 | .43 | | | |
| | 39-60 | 35-45 | 1.30-1.50 | 0.06-0.6 | 0.13-0.18 | Moderate | 0.0-0.5 | .43 | .43 | | | |
| 2259: | | | | | | | | | | | | |
| Rhoades | 0-4 | 18-26 | 1.10-1.30 | 0.6-2 | 0.13-0.15 | Low | 2.0-6.0 | .32 | .32 | 2 | 6 | 48 |
| | 4-11 | 35-50 | 1.20-1.50 | 0.001-0.2 | 0.10-0.12 | High | 0.5-2.0 | .28 | .28 | | | |
| | 11-49 | 20-45 | 1.20-1.50 | 0.2-0.6 | 0.10-0.12 | High | 0.0-0.5 | .32 | .32 | | | |
| | 49-60 | 30-90 | 1.40-1.65 | 0.001-0.2 | 0.06-0.08 | --- | 0.0-0.5 | .32 | .32 | | | |
| Daglum | 0-5 | 18-26 | 1.20-1.50 | 0.6-2 | 0.13-0.15 | Low | 2.0-4.0 | .32 | .32 | 2 | 6 | 48 |
| | 5-8 | 18-35 | 1.20-1.50 | 0.6-2 | 0.13-0.15 | Low | 2.0-4.0 | .32 | .32 | | | |
| | 8-18 | 35-60 | 1.30-1.60 | 0.001-0.2 | 0.12-0.14 | High | 1.0-2.0 | .32 | .32 | | | |
| | 18-26 | 35-60 | 1.50-1.70 | 0.01-0.2 | 0.12-0.14 | High | 0.5-1.0 | .32 | .32 | | | |
| | 26-45 | 35-60 | 1.20-1.60 | 0.2-2 | 0.12-0.14 | High | 0.0-1.0 | .32 | .32 | | | |
| | 45-60 | 30-90 | 1.40-1.65 | 0.001-0.2 | 0.06-0.08 | --- | 0.0-0.5 | .32 | .32 | | | |
| 2260: | | | | | | | | | | | | |
| Rusklyn | 0-9 | 27-35 | 1.15-1.25 | 0.6-2 | 0.19-0.22 | Moderate | 1.0-4.0 | .32 | .32 | 5 | 4L | 86 |
| | 9-19 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 19-28 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-2.0 | .32 | .32 | | | |
| | 28-53 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-0.5 | .32 | .32 | | | |
| | 53-60 | 18-35 | 1.20-1.35 | 0.6-2 | 0.17-0.20 | Moderate | 0.0-0.5 | .32 | .32 | | | |
| 2261: | | | | | | | | | | | | |
| Schaller | 0-9 | 3-10 | 1.10-1.50 | 2-6 | 0.08-0.10 | Low | 1.0-2.0 | .20 | .20 | 3 | 2 | 134 |
| | 9-15 | 3-15 | 1.10-1.50 | 2-6 | 0.02-0.04 | Low | 0.0-2.0 | .20 | .20 | | | |
| | 15-60 | 3-10 | 1.10-1.50 | 6-20 | 0.02-0.04 | Low | 0.0-0.5 | .20 | .20 | | | |
| 2262: | | | | | | | | | | | | |
| Schaller | 0-9 | 3-10 | 1.10-1.50 | 2-6 | 0.08-0.10 | Low | 1.0-2.0 | .20 | .20 | 3 | 2 | 134 |
| | 9-15 | 3-15 | 1.10-1.50 | 2-6 | 0.02-0.04 | Low | 0.0-2.0 | .20 | .20 | | | |
| | 15-60 | 3-10 | 1.10-1.50 | 6-20 | 0.02-0.04 | Low | 0.0-0.5 | .20 | .20 | | | |
| 2263: | | | | | | | | | | | | |
| Sinai | 0-12 | 40-60 | 1.15-1.30 | 0.001-0.2 | 0.17-0.21 | High | 3.0-7.0 | .28 | .28 | 5 | 4 | 86 |
| | 12-23 | 35-60 | 1.20-1.40 | 0.001-0.2 | 0.13-0.19 | High | 2.0-5.0 | .28 | .28 | | | |
| | 23-42 | 35-60 | 1.20-1.40 | 0.001-0.2 | 0.13-0.19 | High | 1.0-3.0 | .28 | .28 | | | |
| | 42-60 | 30-50 | 1.35-1.40 | 0.001-0.2 | 0.12-0.18 | High | 0.0-1.0 | .43 | .43 | | | |
| 2264: | | | | | | | | | | | | |
| Vebar | 0-5 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 5-26 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 26-32 | 10-18 | 1.20-1.60 | 2-6 | 0.15-0.17 | Low | 0.0-1.0 | .20 | .20 | | | |
| | 32-60 | 1-10 | 1.45-1.70 | 0.06-2 | 0.02-0.04 | --- | 0.0-0.5 | --- | --- | | | |
| Cohagen | 0-3 | 10-18 | 1.20-1.60 | 0.6-6 | 0.13-0.18 | Low | 0.5-1.0 | .24 | .24 | 2 | 3 | 86 |
| | 3-17 | 10-18 | 1.20-1.60 | 0.6-6 | 0.13-0.18 | Low | 0.0-0.5 | .24 | .24 | | | |
| | 17-60 | 1-10 | 1.45-1.70 | 0.06-2 | 0.02-0.04 | --- | 0.0-0.5 | .17 | .17 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 2265: | | | | | | | | | | | | |
| Wabek | 0-5 | 5-15 | 1.10-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-2.0 | .15 | .20 | 2 | 3 | 86 |
| | 5-9 | 5-15 | 1.20-1.60 | 2-20 | 0.11-0.15 | Low | 0.0-1.0 | .10 | .17 | | | |
| | 9-60 | 0-10 | 1.30-1.70 | 20-61 | 0.02-0.04 | Low | 0.0-1.0 | .10 | .10 | | | |
| Appam | 0-6 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 6-15 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 15-19 | 6-18 | 1.20-1.50 | 2-6 | 0.12-0.14 | Low | 0.0-0.5 | .20 | .20 | | | |
| | 19-60 | 0-10 | 1.40-1.60 | 6-20 | 0.02-0.10 | Low | 0.0-0.5 | .15 | .17 | | | |
| 2266: | | | | | | | | | | | | |
| Wabek | 0-5 | 5-15 | 1.10-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-2.0 | .15 | .20 | 2 | 3 | 86 |
| | 5-9 | 5-15 | 1.20-1.60 | 2-20 | 0.11-0.15 | Low | 0.0-1.0 | .10 | .17 | | | |
| | 9-60 | 0-10 | 1.30-1.70 | 20-61 | 0.02-0.04 | Low | 0.0-1.0 | .10 | .10 | | | |
| Appam | 0-6 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 6-15 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-3.0 | .20 | .20 | | | |
| | 15-19 | 6-18 | 1.20-1.50 | 2-6 | 0.12-0.14 | Low | 0.0-0.5 | .20 | .20 | | | |
| | 19-60 | 0-10 | 1.40-1.60 | 6-20 | 0.02-0.10 | Low | 0.0-0.5 | .15 | .17 | | | |
| 2267: | | | | | | | | | | | | |
| Werner | 0-6 | 14-27 | 1.20-1.40 | 0.6-2 | 0.14-0.22 | Moderate | 2.0-4.0 | .28 | .28 | 2 | 4L | 86 |
| | 6-17 | 14-35 | 1.30-1.50 | 0.6-2 | 0.17-0.22 | Moderate | 0.5-2.0 | .28 | .28 | | | |
| | 17-60 | 1-90 | 1.40-1.70 | 0.001-2 | 0.02-0.08 | --- | 0.0-0.5 | .28 | .28 | | | |
| Amor | 0-8 | 15-25 | 1.20-1.35 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 3 | 6 | 48 |
| | 8-19 | 18-30 | 1.20-1.40 | 0.6-2 | 0.17-0.19 | Moderate | 1.0-3.0 | .32 | .32 | | | |
| | 19-31 | 18-30 | 1.20-1.60 | 0.6-2 | 0.17-0.19 | Moderate | 0.5-1.0 | .32 | .32 | | | |
| | 31-60 | 1-35 | 1.40-1.70 | 0.06-2 | 0.02-0.10 | --- | 0.0-0.5 | --- | --- | | | |
| Arnegard | 0-13 | 15-25 | 1.00-1.40 | 0.6-2 | 0.18-0.20 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 13-36 | 18-30 | 1.20-1.60 | 0.6-2 | 0.16-0.22 | Low | 1.0-4.0 | .28 | .28 | | | |
| | 36-60 | 10-30 | 1.20-1.60 | 0.6-2 | 0.14-0.18 | Low | 0.0-1.0 | .28 | .28 | | | |
| 2269: | | | | | | | | | | | | |
| Cavour | 0-6 | 18-25 | 1.10-1.25 | 0.6-2 | 0.18-0.20 | Low | 4.0-6.0 | .32 | .32 | 2 | 6 | 48 |
| | 6-8 | 18-25 | 1.10-1.25 | 0.6-2 | 0.18-0.20 | Low | 2.0-4.0 | .37 | .37 | | | |
| | 8-24 | 35-50 | 1.24-1.50 | 0.06-0.2 | 0.10-0.16 | High | 0.0-1.0 | .28 | .28 | | | |
| | 24-60 | 25-35 | 1.50-1.65 | 0.06-0.6 | 0.11-0.15 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| Barnes | 0-7 | 18-27 | 1.10-1.50 | 0.6-2 | 0.20-0.22 | Low | 3.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-19 | 18-35 | 1.20-1.60 | 0.6-2 | 0.15-0.19 | Moderate | 2.0-5.0 | .28 | .28 | | | |
| | 19-37 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 37-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-0.5 | .37 | .37 | | | |
| 2270: | | | | | | | | | | | | |
| Harriet | 0-2 | 12-25 | 1.10-1.40 | 0.6-2 | 0.20-0.24 | Low | 3.0-6.0 | .37 | .37 | 2 | 6 | 48 |
| | 2-18 | 35-50 | 1.20-1.60 | 0.001-0.2 | 0.10-0.15 | High | 1.0-3.0 | .37 | .37 | | | |
| | 18-28 | 18-40 | 1.20-1.60 | 0.2-2 | 0.10-0.15 | Moderate | 0.5-1.0 | .37 | .37 | | | |
| | 28-38 | 10-18 | 1.40-1.60 | 0.6-2 | 0.09-0.15 | Low | 0.0-1.0 | .37 | .37 | | | |
| | 38-40 | 27-35 | 1.35-1.55 | 0.2-2 | 0.09-0.12 | Moderate | 0.0-0.5 | --- | --- | | | |
| | 40-60 | 18-45 | 1.20-1.60 | 0.06-0.2 | 0.09-0.12 | Moderate | 0.0-0.5 | --- | --- | | | |
| Stirum | 0-7 | 10-20 | 1.40-1.50 | 2-6 | 0.10-0.13 | Low | 3.0-5.0 | .24 | .24 | 2 | 3 | 86 |
| | 7-15 | 10-20 | 1.40-1.60 | 0.001-0.2 | 0.12-0.18 | Low | 1.0-3.0 | .32 | .32 | | | |
| | 15-26 | 8-27 | 1.40-1.50 | 0.6-20 | 0.06-0.18 | Low | 0.0-2.0 | .17 | .17 | | | |
| | 26-34 | 8-30 | 1.40-1.50 | 0.6-20 | 0.06-0.18 | Low | 0.0-2.0 | .17 | .17 | | | |
| | 34-44 | 5-27 | 1.40-1.50 | 0.6-20 | 0.06-0.18 | Low | 0.0-1.0 | .17 | .17 | | | |
| | 44-60 | 8-30 | 1.40-1.50 | 0.6-20 | 0.06-0.18 | Low | 0.0-1.0 | .17 | .17 | | | |

Table 20.-Physical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Moist bulk density | Ksat | Available water capacity | Shrink-swell potential | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | | Pct | | | | | |
| 2271: | | | | | | | | | | | | |
| Lohnes | 0-16 | 5-15 | 1.50-1.70 | 6-20 | 0.08-0.10 | Low | 1.0-3.0 | .15 | .15 | 5 | 2 | 134 |
| | 16-30 | 0-10 | 1.50-1.70 | 6-20 | 0.03-0.07 | Low | 0.2-1.0 | .15 | .15 | | | |
| | 30-60 | 0-10 | 1.50-1.70 | 6-20 | 0.03-0.07 | Low | 0.0-0.5 | .15 | .15 | | | |
| 2272: | | | | | | | | | | | | |
| Sioux | 0-5 | 14-25 | 1.20-1.30 | 0.6-2 | 0.17-0.20 | Low | 1.0-3.0 | .28 | .28 | 2 | 5 | 56 |
| | 5-8 | 10-20 | 1.20-1.50 | 2-6 | 0.10-0.15 | Low | 0.5-2.0 | .15 | .20 | | | |
| | 8-60 | 0-10 | 1.60-1.70 | 6-40 | 0.03-0.06 | Low | 0.0-0.5 | .10 | .15 | | | |
| Arvilla | 0-10 | 6-18 | 1.20-1.50 | 2-6 | 0.13-0.15 | Low | 1.0-4.0 | .20 | .20 | 3 | 3 | 86 |
| | 10-16 | 6-18 | 1.20-1.50 | 2-6 | 0.11-0.14 | Low | 1.0-2.0 | .20 | .20 | | | |
| | 16-31 | 2-10 | 1.20-1.50 | 6-40 | 0.02-0.05 | Low | 0.0-0.5 | .05 | .15 | | | |
| | 31-60 | 0-10 | 1.40-1.60 | 6-40 | 0.02-0.05 | Low | 0.0-0.5 | .05 | .15 | | | |
| 2273: | | | | | | | | | | | | |
| Svea | 0-10 | 18-27 | 1.10-1.30 | 0.6-2 | 0.20-0.24 | Low | 4.0-7.0 | .28 | .32 | 5 | 6 | 48 |
| | 10-21 | 18-35 | 1.20-1.50 | 0.2-2 | 0.15-0.22 | Moderate | 2.0-5.0 | .28 | .32 | | | |
| | 21-36 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-2.0 | .37 | .37 | | | |
| | 36-60 | 18-35 | 1.30-1.60 | 0.2-0.6 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .43 | | | |
| Buse | 0-8 | 18-27 | 1.20-1.35 | 0.6-2 | 0.20-0.24 | Low | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 8-40 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 40-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| Parnell | 0-15 | 27-40 | 1.10-1.30 | 0.2-0.6 | 0.18-0.22 | Moderate | 6.0-10 | .37 | .37 | 5 | 7 | 38 |
| | 15-22 | 18-40 | 1.10-1.30 | 0.2-0.6 | 0.18-0.22 | Moderate | 6.0-10 | .28 | .28 | | | |
| | 22-32 | 27-60 | 1.20-1.40 | 0.06-0.2 | 0.13-0.19 | High | 3.0-5.0 | .37 | .37 | | | |
| | 32-55 | 27-60 | 1.20-1.40 | 0.06-0.2 | 0.13-0.19 | Moderate | 3.0-5.0 | .28 | .28 | | | |
| | 55-60 | 35-45 | 1.30-1.50 | 0.06-0.2 | 0.11-0.19 | Moderate | 0.5-1.0 | .37 | .37 | | | |
| 2274: | | | | | | | | | | | | |
| Towner | 0-20 | 5-15 | 1.20-1.40 | 6-20 | 0.13-0.18 | Low | 1.0-3.0 | .20 | .20 | 5 | 3 | 134 |
| | 20-29 | 2-10 | 1.20-1.40 | 6-20 | 0.06-0.13 | Low | 0.0-1.0 | .17 | .17 | | | |
| | 29-36 | 18-40 | 1.30-1.60 | 0.2-2 | 0.14-0.22 | Moderate | 0.0-0.5 | .43 | .43 | | | |
| | 36-60 | 18-40 | 1.30-1.60 | 0.2-2 | 0.14-0.22 | Moderate | 0.0-0.5 | .43 | .43 | | | |
| Maddock | 0-10 | 2-10 | 1.20-1.40 | 6-20 | 0.10-0.12 | Low | 1.0-2.0 | .17 | .17 | 5 | 2 | 134 |
| | 10-14 | 2-8 | 1.30-1.50 | 6-20 | 0.05-0.12 | Low | 0.0-1.0 | .17 | .17 | | | |
| | 14-60 | 2-8 | 1.30-1.50 | 6-20 | 0.05-0.12 | Low | 0.0-0.5 | .17 | .17 | | | |
| 2275: | | | | | | | | | | | | |
| Towner | 0-20 | 5-15 | 1.20-1.40 | 2-20 | 0.13-0.18 | Low | 1.0-3.0 | .20 | .20 | 5 | 3 | 134 |
| | 20-29 | 2-10 | 1.20-1.40 | 6-20 | 0.06-0.13 | Low | 0.0-1.0 | .17 | .17 | | | |
| | 29-36 | 18-40 | 1.30-1.60 | 0.2-2 | 0.14-0.22 | Moderate | 0.0-0.5 | .43 | .43 | | | |
| | 36-60 | 18-40 | 1.30-1.60 | 0.2-2 | 0.14-0.22 | Moderate | 0.0-0.5 | .43 | .43 | | | |
| Maddock | 0-10 | 2-10 | 1.20-1.40 | 6-20 | 0.10-0.12 | Low | 1.0-2.0 | .17 | .17 | 5 | 2 | 134 |
| | 10-14 | 2-8 | 1.30-1.50 | 6-20 | 0.05-0.12 | Low | 0.0-1.0 | .17 | .17 | | | |
| | 14-60 | 2-8 | 1.30-1.50 | 6-20 | 0.05-0.12 | Low | 0.0-0.5 | .17 | .17 | | | |
| Buse | 0-8 | 18-27 | 1.20-1.35 | 0.6-2 | 0.20-0.24 | Low | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 8-40 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |
| | 40-60 | 18-35 | 1.30-1.60 | 0.2-2 | 0.14-0.19 | Moderate | 0.0-1.0 | .37 | .37 | | | |

Table 21.-Chemical Properties of the Soils

(Dashes (--) indicate that data were not available or were not estimated.)

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 30: | | | | | | | | |
| Amor---------- | 0-8 | 15-25 | 15-20 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 8-19 | 18-30 | 15-20 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 19-31 | 18-30 | 10-15 | 7.4-8.4 | 5-30 | 0-2 | 0.0-2.0 | 0-2 |
| | 31-60 | 10-35 | 5-20 | 7.4-8.4 | 0-15 | 0-2 | 0.0-4.0 | 0-4 |
| Arnegard---------- | 0-13 | 15-25 | 15-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 13-36 | 18-30 | 10-20 | 6.1-7.8 | 0 | 0 | 0.0-2.0 | 0 |
| | 36-60 | 15-30 | 5-15 | 7.4-8.4 | 3-20 | 0 | 0.0-2.0 | 0 |
| 40: | | | | | | | | |
| Amor---------- | 0-8 | 15-25 | 15-20 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 8-19 | 18-30 | 15-20 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 19-31 | 18-30 | 10-15 | 7.4-8.4 | 5-30 | 0-2 | 0.0-2.0 | 0-2 |
| | 31-60 | 15-30 | 5-15 | 7.4-8.4 | 1-10 | 0-1 | 0.0-4.0 | 0-4 |
| Werner---------- | 0-6 | 14-27 | 10-20 | 6.6-8.4 | 0-10 | 0 | 0 | 0 |
| | 6-17 | 14-35 | 10-15 | 7.4-8.4 | 1-15 | 0 | 0.0-2.0 | 0 |
| | 17-60 | 5-35 | 5-15 | 6.6-8.4 | 0-5 | 0 | 0.0-4.0 | 0-4 |
| Farnuf---------- | 0-9 | 20-27 | 15-20 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 9-23 | 25-35 | 20-25 | 6.1-7.8 | 0-5 | 0 | 0 | 0 |
| | 23-34 | 25-35 | 15-20 | 7.4-8.4 | 5-15 | 0 | 0.0-2.0 | 0 |
| | 34-60 | 15-35 | 10-15 | 7.4-8.4 | 5-10 | 0 | 0.0-2.0 | 0 |
| 41: | | | | | | | | |
| Amor---------- | 0-8 | 15-25 | 15-20 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 8-19 | 18-30 | 15-20 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 19-31 | 18-30 | 10-15 | 7.4-8.4 | 5-30 | 0-2 | 0.0-2.0 | 0-2 |
| | 31-60 | 15-30 | 5-15 | 7.4-8.4 | 1-10 | 0-2 | 0.0-4.0 | 0-4 |
| Werner---------- | 0-6 | 14-27 | 10-20 | 6.6-8.4 | 0-10 | 0 | 0 | 0 |
| | 6-17 | 14-35 | 10-15 | 7.4-8.4 | 1-15 | 0 | 0.0-2.0 | 0 |
| | 17-60 | 15-35 | 5-15 | 6.6-8.4 | 0-5 | 0 | 0.0-4.0 | 0-4 |
| 76: | | | | | | | | |
| Arvilla---------- | 0-10 | 6-18 | 5-20 | 6.1-8.4 | 0 | 0 | 0 | 0 |
| | 10-16 | 6-18 | 5-15 | 6.6-8.4 | 0 | 0 | 0 | 0 |
| | 16-31 | 2-10 | 1-5 | 7.4-8.4 | 2-15 | 0 | 0 | 0 |
| | 31-60 | 0-10 | 1-5 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 118: | | | | | | | | |
| Barnes---------- | 0-7 | 18-27 | 10-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 7-19 | 18-35 | 10-30 | 6.1-7.8 | 0-3 | 0 | 0 | 0 |
| | 19-37 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 37-60 | 18-35 | 5-25 | 7.4-8.4 | 15-25 | 0-1 | 0.0-4.0 | 0 |
| Buse---------- | 0-8 | 18-27 | 10-30 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 8-40 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 40-60 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0-2 |
| 156: | | | | | | | | |
| Barnes---------- | 0-7 | 18-27 | 10-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 7-19 | 18-35 | 10-30 | 6.1-7.8 | 0-3 | 0 | 0 | 0 |
| | 19-37 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 37-60 | 18-35 | 5-25 | 7.4-8.4 | 15-25 | 0-1 | 0.0-4.0 | 0 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 156:(cont.) | | | | | | | | |
| Svea | 0-10 | 18-27 | 15-30 | 6.1-7.4 | 0 | 0 | 0 | 0 |
| | 10-21 | 18-35 | 10-30 | 6.6-7.8 | 0-3 | 0 | 0 | 0 |
| | 21-36 | 18-35 | 10-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 36-60 | 18-35 | 10-25 | 7.4-8.4 | 3-15 | 0-1 | 0.0-4.0 | 0-2 |
| 313: | | | | | | | | |
| Buse | 0-8 | 18-27 | 10-30 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 8-40 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 40-60 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0-2 |
| Barnes | 0-7 | 18-27 | 10-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 7-19 | 18-35 | 10-30 | 6.1-7.8 | 0-3 | 0 | 0 | 0 |
| | 19-37 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 37-60 | 18-35 | 5-25 | 7.4-8.4 | 15-25 | 0-1 | 0.0-4.0 | 0 |
| 314: | | | | | | | | |
| Buse | 0-8 | 18-27 | 10-30 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 8-40 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 40-60 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0-2 |
| Barnes | 0-7 | 18-27 | 10-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 7-19 | 18-35 | 10-30 | 6.1-7.8 | 0-3 | 0 | 0 | 0 |
| | 19-37 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 37-60 | 18-35 | 5-25 | 7.4-8.4 | 15-25 | 0-1 | 0.0-4.0 | 0 |
| 319: | | | | | | | | |
| Buse | 0-8 | 18-27 | 10-30 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 8-40 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 40-60 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0-2 |
| Barnes | 0-7 | 18-27 | 10-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 7-19 | 18-35 | 10-30 | 6.1-7.8 | 0-3 | 0 | 0 | 0 |
| | 19-37 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 37-60 | 18-35 | 5-25 | 7.4-8.4 | 15-25 | 0-1 | 0.0-4.0 | 0 |
| 450: | | | | | | | | |
| Colvin | 0-10 | 18-34 | 15-30 | 6.6-8.4 | 0-10 | 0-1 | 0.0-4.0 | 0-2 |
| | 10-30 | 18-34 | 5-30 | 7.4-8.4 | 10-35 | 0-1 | 0.0-4.0 | 0-3 |
| | 30-60 | 18-34 | 5-20 | 7.4-8.4 | 5-20 | 0-5 | 0.0-4.0 | 0-10 |
| 511: | | | | | | | | |
| Divide | 0-8 | 18-27 | 15-35 | 7.4-8.4 | 0-10 | 0 | 0 | 0 |
| | 8-12 | 18-30 | 10-25 | 7.4-8.4 | 5-25 | 0 | 0 | 0 |
| | 12-22 | 18-30 | 10-25 | 7.4-8.4 | 15-35 | 0 | 0.0-4.0 | 0 |
| | 22-26 | 0-10 | 2-10 | 7.4-8.4 | 1-10 | 0 | 0 | 0 |
| | 26-60 | 0-10 | 2-10 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 674: | | | | | | | | |
| Farnuf | 0-9 | 20-27 | 15-20 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 9-23 | 25-35 | 20-25 | 6.1-7.8 | 0-5 | 0 | 0 | 0 |
| | 23-34 | 25-35 | 15-20 | 7.4-8.4 | 5-15 | 0 | 0.0-2.0 | 0 |
| | 34-60 | 15-35 | 10-15 | 7.4-8.4 | 5-10 | 0 | 0.0-2.0 | 0 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 712: | | | | | | | | |
| Flaxton | 0-15 | 5-18 | 10-25 | 6.6-7.3 | 0 | 0 | 0 | 0 |
| | 15-22 | 5-18 | 5-15 | 6.6-7.3 | 0 | 0 | 0 | 0 |
| | 22-25 | 18-35 | 5-25 | 6.6-7.8 | 0-10 | 0-1 | 0 | 0 |
| | 25-30 | 18-35 | 5-25 | 6.6-7.8 | 0-10 | 0-1 | 0 | 0 |
| | 30-35 | 18-35 | 5-25 | 6.6-7.8 | 0-10 | 0-1 | 0 | 0 |
| | 35-42 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0 | 0 |
| | 42-60 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0 | 0 |
| Williams | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| 714: | | | | | | | | |
| Flaxton | 0-15 | 5-18 | 10-25 | 6.6-7.3 | 0 | 0 | 0 | 0 |
| | 15-22 | 5-18 | 5-15 | 6.6-7.3 | 0 | 0 | 0 | 0 |
| | 22-25 | 18-35 | 5-25 | 6.6-7.8 | 0-10 | 0-1 | 0 | 0 |
| | 25-30 | 18-35 | 5-25 | 6.6-7.8 | 0-10 | 0-1 | 0 | 0 |
| | 30-35 | 18-35 | 5-25 | 6.6-7.8 | 0-10 | 0-1 | 0 | 0 |
| | 35-42 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0 | 0 |
| | 42-60 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0 | 0 |
| Williams | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| 727: | | | | | | | | |
| Fordville | 0-6 | 18-25 | 15-30 | 6.1-7.3 | 0 | --- | 0.0-2.0 | 0 |
| | 6-12 | 18-30 | 10-25 | 6.1-7.8 | 0 | --- | 0.0-2.0 | 0 |
| | 12-24 | 18-30 | 10-25 | 6.1-7.8 | 0 | --- | 0.0-2.0 | 0 |
| | 24-60 | 0-8 | 0-5 | 7.4-8.4 | 5-20 | --- | 0.0-2.0 | 0-5 |
| 863: | | | | | | | | |
| Hamerly | 0-8 | 18-27 | 15-30 | 6.6-8.4 | 0-10 | 0 | 0.0-2.0 | 0 |
| | 8-35 | 18-35 | 10-20 | 7.4-8.4 | 15-35 | 0-2 | 0.0-4.0 | 0-2 |
| | 35-60 | 18-35 | 10-20 | 7.4-8.4 | 10-30 | 0-2 | 0.0-4.0 | 0-2 |
| 883: | | | | | | | | |
| Hamerly | 0-8 | 18-27 | 15-30 | 6.6-8.4 | 0-10 | 0 | 0.0-2.0 | 0 |
| | 8-35 | 18-35 | 10-20 | 7.4-8.4 | 15-35 | 0-2 | 0.0-4.0 | 0-2 |
| | 35-60 | 18-35 | 10-20 | 7.4-8.4 | 10-30 | 0-2 | 0.0-4.0 | 0-2 |
| Tonka | 0-13 | 18-27 | 10-40 | 5.6-7.4 | 0 | 0 | 0 | 0 |
| | 13-19 | 18-27 | 10-40 | 5.6-7.4 | 0 | 0 | 0 | 0 |
| | 19-34 | 35-45 | 15-25 | 5.6-7.4 | 0 | 0 | 0 | 0 |
| | 34-50 | 18-39 | 5-20 | 6.6-7.8 | 0-3 | 0-2 | 0.0-2.0 | 0-2 |
| | 50-60 | 18-39 | 5-20 | 6.6-8.4 | 1-10 | 0-2 | 0.0-2.0 | 0-2 |
| Parnell | 0-15 | 27-40 | 25-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 15-22 | 18-40 | 25-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 22-32 | 27-60 | 20-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 32-55 | 27-60 | 20-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 55-60 | 35-45 | 15-30 | 6.6-8.4 | 0-3 | 0-2 | 0 | 0 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 1011: | | | | | | | | |
| Karlsruhe---------- | 0-5 | 5-15 | 10-50 | 6.6-8.4 | 3-10 | --- | 0 | 0 |
| | 5-11 | 5-15 | 10-50 | 7.4-8.4 | 5-25 | --- | 0 | 0 |
| | 11-15 | 5-15 | 1-10 | 7.4-8.4 | 10-45 | --- | 0 | 0 |
| | 15-30 | 5-15 | 1-10 | 7.4-8.4 | 10-45 | --- | 0 | 0 |
| | 30-60 | 2-10 | 0-5 | 7.4-8.4 | 3-10 | --- | 0 | 0 |
| 1181: | | | | | | | | |
| Lohnes---------- | 0-16 | 5-15 | 5-10 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 16-30 | 0-10 | 2-5 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 30-60 | 0-10 | 2-5 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 1202: | | | | | | | | |
| Maddock---------- | 0-10 | 2-10 | 3-10 | 6.6-7.8 | 0-3 | 0 | 0.0-2.0 | 0 |
| | 10-14 | 2-8 | 1-9 | 6.6-7.8 | 0-3 | 0 | 0.0-2.0 | 0 |
| | 14-60 | 2-8 | 1-8 | 6.6-8.4 | 0-10 | 0 | 0.0-2.0 | 0 |
| 1249: | | | | | | | | |
| Appam---------- | 0-6 | 6-18 | 5-20 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 6-15 | 6-18 | 5-20 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 15-19 | 6-18 | 5-15 | 7.4-8.4 | 2-15 | 0 | 0 | 0 |
| | 19-60 | 0-10 | 1-5 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 1267: | | | | | | | | |
| Marysland---------- | 0-9 | 18-27 | 15-35 | 7.4-8.4 | 3-15 | 0 | 0 | 0 |
| | 9-12 | 18-27 | 15-35 | 7.9-8.4 | 10-25 | 0 | 0 | 0 |
| | 12-15 | 18-27 | 10-25 | 7.9-8.4 | 15-35 | 0-3 | 0.0-2.0 | 0 |
| | 15-20 | 18-27 | 10-25 | 7.9-8.4 | 15-35 | 0-3 | 0.0-2.0 | 0 |
| | 20-27 | 18-27 | 10-25 | 7.9-8.4 | 15-35 | 0-3 | 0.0-2.0 | 0 |
| | 27-40 | 1-5 | 2-10 | 7.9-8.4 | 5-20 | 0 | 0 | 0 |
| | 40-60 | 1-5 | 2-10 | 7.9-8.4 | 5-20 | 0 | 0 | 0 |
| 1372: | | | | | | | | |
| Noonan---------- | 0-6 | 18-27 | 10-25 | 5.6-7.3 | 0 | 0 | 0 | 0 |
| | 6-9 | 27-35 | 10-20 | 6.6-9.0 | 0-3 | 0 | 0.0-4.0 | 5-16 |
| | 9-12 | 27-35 | 10-20 | 6.6-9.0 | 0-3 | 0 | 0.0-4.0 | 5-16 |
| | 12-20 | 27-35 | 10-20 | 7.4-9.0 | 10-30 | 0-2 | 0.0-4.0 | 5-10 |
| | 20-28 | 20-30 | 10-15 | 7.4-9.0 | 10-30 | 0-2 | 2.0-8.0 | 5-10 |
| | 28-60 | 20-30 | 10-15 | 7.4-9.0 | 10-25 | 0-3 | 2.0-8.0 | 5-10 |
| Williams---------- | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| 1374: | | | | | | | | |
| Nutley---------- | 0-7 | 40-60 | 35-45 | 6.6-8.4 | 0-5 | 0 | 0.0-2.0 | 0 |
| | 7-20 | 35-60 | 30-40 | 7.4-8.4 | 5-10 | 0-1 | 0.0-2.0 | 0 |
| | 20-60 | 35-60 | 30-40 | 7.4-8.4 | 5-10 | 1-3 | 0.0-2.0 | 0-4 |
| 1375: | | | | | | | | |
| Nutley---------- | 0-7 | 40-60 | 35-45 | 6.6-8.4 | 0-5 | 0 | 0.0-2.0 | 0 |
| | 7-20 | 35-60 | 30-40 | 7.4-8.4 | 5-10 | 0-1 | 0.0-2.0 | 0 |
| | 20-60 | 35-60 | 30-40 | 7.4-8.4 | 5-10 | 1-3 | 0.0-2.0 | 0-4 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 1427: | | | | | | | | |
| Parnell---------- | 0-15 | 27-40 | 25-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 15-22 | 18-40 | 25-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 22-32 | 27-60 | 20-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 32-55 | 27-60 | 20-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 55-60 | 35-45 | 15-30 | 6.6-8.4 | 0-3 | 0-2 | 0 | 0 |
| 1437: | | | | | | | | |
| Parshall---------- | 0-12 | 5-20 | 7-15 | 5.6-7.8 | --- | 0 | 0 | 0 |
| | 12-29 | 5-20 | 5-13 | 6.1-8.4 | 0-3 | 0 | 0 | 0 |
| | 29-48 | 5-20 | 5-10 | 7.4-8.4 | 0-10 | 0 | 0 | 0 |
| | 48-60 | 5-15 | 2-5 | 6.6-8.4 | 0-10 | 0 | 0 | 0 |
| 1466: | | | | | | | | |
| Pits, gravel and sand | 0-6 | 5-15 | 2-12 | 6.6-8.4 | 0-3 | 0 | 0 | 0 |
| | 6-60 | 0-15 | 1-10 | 6.6-8.4 | 5-20 | 0 | 0 | 0 |
| 1676: | | | | | | | | |
| Wildrose---------- | 0-6 | 40-60 | 35-45 | 6.6-8.4 | 0-5 | 0 | 0 | 0 |
| | 6-14 | 40-60 | 35-45 | 6.6-8.4 | 0-5 | 0 | 0 | 0 |
| | 14-21 | 40-70 | 35-45 | 7.4-8.4 | 0-5 | 0 | 0 | 0 |
| | 21-31 | 40-70 | 35-45 | 7.4-8.4 | 0-5 | 0 | 0 | 0 |
| | 31-38 | 40-70 | 35-45 | 7.4-8.4 | 0-5 | 0 | 0 | 0 |
| | 38-44 | 40-70 | 30-40 | 7.4-8.4 | 5-10 | 1-3 | 0.0-2.0 | 0-4 |
| | 44-58 | 40-70 | 30-40 | 7.4-8.4 | 5-10 | 1-3 | 0.0-2.0 | 0-4 |
| | 58-60 | 40-70 | 30-40 | 7.4-8.4 | 5-10 | 1-3 | 0.0-2.0 | 0-4 |
| 1697: | | | | | | | | |
| Sioux---------- | 0-5 | 14-25 | 20-25 | 6.6-8.4 | 0 | 0 | 0.0-2.0 | 0 |
| | 5-8 | 10-20 | 15-20 | 7.4-8.4 | 0-15 | 0 | 0.0-2.0 | 0 |
| | 8-60 | 0-10 | 15-20 | 7.4-8.4 | 0-15 | 0 | 0.0-2.0 | 0 |
| Arvilla---------- | 0-10 | 6-18 | 5-20 | 6.1-8.4 | 0 | 0 | 0 | 0 |
| | 10-16 | 6-18 | 5-15 | 6.6-8.4 | 0 | 0 | 0 | 0 |
| | 16-31 | 2-10 | 1-5 | 7.4-8.4 | 2-15 | 0 | 0 | 0 |
| | 31-60 | 0-10 | 1-5 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 1710: | | | | | | | | |
| Southam---------- | 0-16 | 27-40 | 25-50 | 6.6-8.4 | 0-10 | 0-1 | 2.0-8.0 | 0-2 |
| | 16-40 | 35-50 | 25-65 | 6.6-8.4 | 3-25 | 0-1 | 2.0-8.0 | 0-2 |
| | 40-60 | 18-50 | 15-45 | 7.4-8.4 | 10-30 | 0-5 | 2.0-8.0 | 0-2 |
| 1762: | | | | | | | | |
| Svea---------- | 0-10 | 18-27 | 15-30 | 6.1-7.4 | 0 | 0 | 0 | 0 |
| | 10-21 | 18-35 | 10-30 | 6.6-7.8 | 0-3 | 0 | 0 | 0 |
| | 21-36 | 18-35 | 10-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 36-60 | 18-35 | 10-25 | 7.4-8.4 | 3-15 | 0-1 | 0.0-4.0 | 0-2 |
| Barnes---------- | 0-7 | 18-27 | 10-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 7-19 | 18-35 | 10-30 | 6.1-7.8 | 0-3 | 0 | 0 | 0 |
| | 19-37 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 37-60 | 18-35 | 5-25 | 7.4-8.4 | 15-25 | 0-1 | 0.0-4.0 | 0 |
| 1805: | | | | | | | | |
| Telfer---------- | 0-6 | 0-8 | 4-10 | 6.1-7.3 | 0-1 | 0 | 0 | 0 |
| | 6-14 | 0-8 | 2-8 | 6.1-7.8 | 0-3 | 0 | 0 | 0 |
| | 14-60 | 0-8 | 2-5 | 6.6-7.8 | 0-3 | 0 | 0 | 0 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 1886: | | | | | | | | |
| Hamerly, saline------ | 0-8 | 18-27 | 15-30 | 7.4-8.4 | 1-15 | 0-3 | 4.0-16.0 | 0 |
| | 8-35 | 18-35 | 10-30 | 7.4-8.4 | 15-35 | 0-5 | 4.0-16.0 | 0-2 |
| | 35-60 | 18-35 | 10-25 | 7.4-8.4 | 10-30 | 0-5 | 4.0-16.0 | 0-4 |
| Vallers, saline------ | 0-12 | 18-27 | 20-40 | 7.4-8.4 | 5-10 | 0-1 | 4.0-16.0 | 0 |
| | 12-32 | 18-35 | 10-30 | 7.4-8.4 | 15-30 | 0-2 | 4.0-16.0 | 0-5 |
| | 32-60 | 18-35 | 10-20 | 7.4-8.4 | 15-30 | 0-2 | 4.0-16.0 | 0-10 |
| 1898: | | | | | | | | |
| Vebar---------- | 0-5 | 10-18 | 10-15 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 5-26 | 10-18 | 10-15 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 26-32 | 10-18 | 5-10 | 7.4-8.4 | 1-10 | 0 | 0 | 0 |
| | 32-60 | 1-10 | 0-5 | 7.4-8.4 | 0-10 | 0-1 | 0.0-2.0 | 0 |
| 1978: | | | | | | | | |
| Water---------- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2006: | | | | | | | | |
| Williams---------- | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| 2014: | | | | | | | | |
| Williams---------- | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| Bowbells---------- | 0-6 | 18-27 | 15-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 6-14 | 20-35 | 15-25 | 6.1-7.8 | 0-5 | 0 | 0 | 0 |
| | 14-23 | 20-35 | 15-25 | 6.1-7.8 | 0-5 | 0 | 0 | 0 |
| | 23-36 | 20-35 | 15-25 | 7.4-8.4 | 5-30 | 0-1 | 0 | 0 |
| | 36-60 | 20-35 | 15-25 | 7.4-8.4 | 5-20 | 0-1 | 0.0-2.0 | 0-1 |
| 2015: | | | | | | | | |
| Williams---------- | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| Bowbells---------- | 0-6 | 18-27 | 15-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 6-14 | 20-35 | 15-25 | 6.1-7.8 | 0-5 | 0 | 0 | 0 |
| | 14-23 | 20-35 | 15-25 | 6.1-7.8 | 0-5 | 0 | 0 | 0 |
| | 23-36 | 20-35 | 15-25 | 7.4-8.4 | 5-30 | 0-1 | 0 | 0 |
| | 36-60 | 20-35 | 15-25 | 7.4-8.4 | 5-20 | 0-1 | 0.0-2.0 | 0-1 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 2031: | | | | | | | | |
| Williams---------- | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| Zahl---------- | 0-5 | 18-27 | 10-20 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 5-20 | 20-30 | 10-15 | 7.4-8.4 | 15-35 | 0-2 | 0 | 0 |
| | 20-60 | 20-30 | 10-15 | 7.4-8.4 | 5-25 | 0-2 | 0.0-2.0 | 0-1 |
| 2037: | | | | | | | | |
| Williams---------- | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| Zahl---------- | 0-5 | 18-27 | 10-20 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 5-20 | 20-30 | 10-15 | 7.4-8.4 | 15-35 | 0-2 | 0 | 0 |
| | 20-60 | 20-30 | 10-15 | 7.4-8.4 | 5-25 | 0-2 | 0.0-2.0 | 0-1 |
| Parnell---------- | 0-15 | 27-40 | 25-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 15-22 | 18-40 | 25-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 22-32 | 27-60 | 20-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 32-55 | 27-60 | 20-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 55-60 | 35-45 | 15-30 | 6.6-8.4 | 0-3 | 0-2 | 0 | 0 |
| 2073: | | | | | | | | |
| Zahl---------- | 0-5 | 18-27 | 10-20 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 5-20 | 20-30 | 10-15 | 7.4-8.4 | 15-35 | 0-2 | 0 | 0 |
| | 20-60 | 20-30 | 10-15 | 7.4-8.4 | 5-25 | 0-2 | 0.0-2.0 | 0-1 |
| Max---------- | 0-6 | 18-27 | 15-26 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-16 | 18-27 | 15-26 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 16-37 | 18-35 | 11-16 | 7.4-8.4 | 10-35 | 0 | 0 | 0 |
| | 37-60 | 18-35 | 11-16 | 7.4-8.4 | 10-20 | 0-2 | 0.0-2.0 | 0-1 |
| 2081: | | | | | | | | |
| Zahl---------- | 0-5 | 18-27 | 10-20 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 5-20 | 20-30 | 10-15 | 7.4-8.4 | 15-35 | 0-2 | 0 | 0 |
| | 20-60 | 20-30 | 10-15 | 7.4-8.4 | 5-25 | 0-2 | 0.0-2.0 | 0-1 |
| Williams---------- | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| 2175: | | | | | | | | |
| Zahl---------- | 0-5 | 18-27 | 10-20 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 5-20 | 20-30 | 10-15 | 7.4-8.4 | 15-35 | 0-2 | 0 | 0 |
| | 20-60 | 20-30 | 10-15 | 7.4-8.4 | 5-25 | 0-2 | 0.0-2.0 | 0-1 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 2175:(cont.) | | | | | | | | |
| Williams | 0-6 | 15-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-10 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 10-15 | 24-35 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-24 | 24-35 | 10-30 | 7.4-8.4 | 15-30 | 0 | 0 | 0 |
| | 24-36 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| | 36-60 | 20-35 | 10-25 | 7.4-8.4 | 5-20 | 0-2 | 0.0-2.0 | 0-5 |
| 2188: | | | | | | | | |
| Wabek | 0-5 | 5-15 | 5-10 | 6.6-8.4 | 0-5 | 0 | 0 | 0 |
| | 5-9 | 5-15 | 1-5 | 7.4-8.4 | 1-15 | 0 | 0 | 0 |
| | 9-60 | 0-10 | 0-5 | 7.4-8.4 | 1-15 | 0 | 0 | 0 |
| Lehr | 0-6 | 10-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-11 | 18-30 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 11-15 | 18-30 | 10-30 | 6.6-8.4 | 0-15 | 0 | 0 | 0 |
| | 15-22 | 0-10 | 0-5 | 7.4-8.4 | 0-10 | 0 | 0 | 0 |
| | 22-60 | 0-10 | 0-5 | 7.4-8.4 | 0-10 | 0 | 0 | 0 |
| 2234: | | | | | | | | |
| Amor | 0-8 | 15-25 | 15-20 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 8-19 | 18-30 | 15-20 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 19-31 | 18-30 | 10-15 | 7.4-8.4 | 5-30 | 0-2 | 0.0-2.0 | 0-2 |
| | 31-60 | 1-35 | 0-20 | 7.4-8.4 | 0-15 | 0-2 | 0.0-4.0 | 0-4 |
| Werner | 0-6 | 14-27 | 10-20 | 6.6-8.4 | 0-10 | 0 | 0 | 0 |
| | 6-17 | 14-35 | 10-15 | 7.4-8.4 | 1-15 | 0 | 0.0-2.0 | 0 |
| | 17-60 | 1-90 | 0-40 | 7.4-8.4 | 0-15 | 0-5 | 0.0-8.0 | 0-4 |
| 2235: | | | | | | | | |
| Arnegard | 0-13 | 15-25 | 15-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 13-36 | 18-30 | 10-20 | 6.1-7.8 | 0 | 0 | 0.0-2.0 | 0 |
| | 36-60 | 15-30 | 5-15 | 7.4-8.4 | 3-20 | 0 | 0.0-2.0 | 0 |
| 2240: | | | | | | | | |
| Bowdle | 0-8 | 10-27 | 10-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 8-16 | 18-30 | 10-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 16-22 | 18-30 | 10-25 | 6.1-7.8 | 0 | 0 | 0.0-2.0 | 0 |
| | 22-25 | 18-25 | 5-15 | 7.4-8.4 | 0-5 | 0 | 0.0-2.0 | 0 |
| | 25-30 | 2-7 | 1-5 | 7.4-8.4 | 0-10 | 0 | 0 | 0 |
| | 30-60 | 2-7 | 1-5 | 7.4-8.4 | 0-10 | 0 | 0 | 0 |
| Lehr | 0-6 | 10-27 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-11 | 18-30 | 10-30 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 11-15 | 18-30 | 10-30 | 6.6-8.4 | 0-15 | 0 | 0 | 0 |
| | 15-22 | 0-10 | 0-5 | 7.4-8.4 | 0-10 | 0 | 0 | 0 |
| | 22-60 | 0-10 | 0-5 | 7.4-8.4 | 0-10 | 0 | 0 | 0 |
| 2241: | | | | | | | | |
| Bryant | 0-8 | 18-27 | 15-20 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 8-15 | 22-35 | 15-25 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 15-19 | 18-27 | 10-20 | 7.4-8.4 | 5-25 | 0-1 | 0 | 0 |
| | 19-32 | 18-27 | 10-20 | 7.4-8.4 | 5-20 | 0-1 | 0 | 0 |
| | 32-60 | 18-27 | 10-20 | 7.4-8.4 | 5-15 | 0-1 | 0.0-2.0 | 0-2 |
| 2242: | | | | | | | | |
| Cohagen | 0-3 | 10-18 | 5-10 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 3-17 | 10-18 | 5-10 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 17-60 | 1-10 | 0-5 | 7.4-8.4 | 0-10 | 0-1 | 0.0-2.0 | 0 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 2242:(cont.) | | | | | | | | |
| Vebar---------- | 0-5 | 10-18 | 10-15 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 5-26 | 10-18 | 10-15 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 26-32 | 10-18 | 5-10 | 7.4-8.4 | 1-10 | 0 | 0 | 0 |
| | 32-60 | 1-10 | 0-5 | 7.4-8.4 | 0-10 | 0-1 | 0.0-2.0 | 0 |
| Parshall-------\| | 0-5 | 10a | exchange | reat . | 0-5 | 7T | e1 0 | |
| | | | | xchl o-29 | 0-5 | 7 3 | -2.0 | 3 0 |
| | 26-32 | 10-18 | 5-10 | 7.4-8.49-48 | 0-5 | 7 0 | 0.0-2.0 | 0 |
| | 26-32 | 10-18 | 5-10 | 7.4-8.48 | 0-15 | 0 2 | 6 0 | |
| | 26- | | | | | | | |
| Parshall-------\| | 0-5 | 3: | | | | | | |
| Parshall-------\| | 0-5 | 0-5 | 10-18 | 10-15 | 6.1-7.8 | 0 | 0 | 0 |
| | | 5-26 | 10-18 | 10-15 | 6.6-7.8 | 0 | 0 | 0 |
| | | 26-32 | 10-18 | 5-10 | 7.4-8.4 | 1-10 | 0 | 0 |
| | | 32-60 | 1-10 | 0-5 | 7.4-8.4 | 0-10 | 0-1 | 0.0-2.0 | 0 |
| Parshall-------\| | 0-5 | 0-5 | 1Flasher | 10-15 | 6.1-7.8 | 64-8.4 | 0-1 3 | 6 0 | |
| | | 5-26 | 10-18 | 10-15 | 6.6-7.86 | 0-4 | 0-1 2 | 6 0 | |
| | | 32-60 | 1-10 | 0-5 | 7.4-8.10 | 0-10 | 0-1 | 0.0-2.0 | 0 |
| Parshall-------\| | 0-5 | 4: | | | | | | |

T* ( 0-206.6-7.8 25 5-26 |10-18 | 10-15 | 6.6-7. 8| 1-35 0-1 2Tj50| 0.09.00 3 || * ( -20-16.| 0)T0-5 32
T* (4 4 |5 5-26 |10-18 | 10-15 | 6.6-7. 7-240-35 400-1 2Tj30 e1 0)Tj 0.00 |5 0
T* (4 5 |5 5-26 |10-18 | 10-15 | 6.6-7.24-43 0 8|4 || 15 25| 0.0-2.0 3 || * ( 420-16.| 0)T0-|5 5-26

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 2249: | | | | | | | | |
| Makoti---------- | 0-6 | 27-35 | 15-20 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 6-14 | 18-35 | 15-25 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 14-19 | 18-35 | 15-25 | 6.1-7.8 | 0-5 | 0 | 0 | 0 |
| | 19-26 | 18-35 | 10-20 | 7.4-8.4 | 5-30 | 0 | 0 | 0 |
| | 26-34 | 18-35 | 10-20 | 7.4-8.4 | 5-30 | 0 | 0 | 0 |
| | 34-46 | 15-35 | 10-20 | 7.4-8.4 | 2-15 | 0-2 | 0.0-2.0 | 0 |
| | 46-60 | 15-35 | 10-20 | 7.4-8.4 | 2-15 | 0-2 | 0.0-2.0 | 0 |
| 2250: | | | | | | | | |
| Makoti---------- | 0-6 | 27-35 | 15-20 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 6-14 | 18-35 | 15-25 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 14-19 | 18-35 | 15-25 | 6.1-7.8 | 0-5 | 0 | 0 | 0 |
| | 19-26 | 18-35 | 10-20 | 7.4-8.4 | 5-30 | 0 | 0 | 0 |
| | 26-34 | 18-35 | 10-20 | 7.4-8.4 | 5-30 | 0 | 0 | 0 |
| | 34-46 | 15-35 | 10-20 | 7.4-8.4 | 2-15 | 0-2 | 0.0-2.0 | 0 |
| | 46-60 | 15-35 | 10-20 | 7.4-8.4 | 2-15 | 0-2 | 0.0-2.0 | 0 |
| Rusklyn---------- | 0-9 | 27-35 | 25-30 | 6.6-8.4 | 5-10 | 0 | 0 | 0 |
| | 9-19 | 18-35 | 20-30 | 7.4-8.4 | 15-40 | 0 | 0 | 0 |
| | 19-28 | 18-35 | 20-30 | 7.4-8.4 | 15-40 | 0 | 0 | 0 |
| | 28-53 | 18-35 | 20-30 | 7.4-8.4 | 15-25 | 0 | 0.0-2.0 | 0 |
| | 53-60 | 18-35 | 20-30 | 7.9-8.4 | 10-20 | 0-3 | 0.0-2.0 | 0 |
| 2252: | | | | | | | | |
| Max---------- | 0-6 | 18-27 | 15-26 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 6-16 | 18-27 | 15-26 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 16-37 | 18-35 | 11-16 | 7.4-8.4 | 10-35 | 0 | 0 | 0 |
| | 37-60 | 18-35 | 11-16 | 7.4-8.4 | 10-20 | 0-2 | 0.0-2.0 | 0-1 |
| Zahl---------- | 0-5 | 18-27 | 10-20 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 5-20 | 20-30 | 10-15 | 7.4-8.4 | 15-35 | 0-2 | 0 | 0 |
| | 20-60 | 20-30 | 10-15 | 7.4-8.4 | 5-25 | 0-2 | 0.0-2.0 | 0-1 |
| Arnegard---------- | 0-13 | 15-25 | 15-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 13-36 | 18-30 | 10-20 | 6.1-7.8 | 0 | 0 | 0.0-2.0 | 0 |
| | 36-60 | 10-30 | 5-15 | 7.4-8.4 | 3-20 | 0 | 0.0-2.0 | 0 |
| 2253: | | | | | | | | |
| Mondamin---------- | 0-6 | 40-60 | 35-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 6-13 | 40-60 | 35-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 13-21 | 27-60 | 35-45 | 7.4-8.4 | 10-30 | 0 | 0 | 0 |
| | 21-35 | 27-60 | 35-45 | 7.4-8.4 | 10-30 | 0 | 0 | 0 |
| | 35-43 | 27-60 | 35-45 | 7.4-8.4 | 10-30 | 0 | 0 | 0 |
| | 43-55 | 27-60 | 30-40 | 7.4-8.4 | 5-10 | 1-3 | 0.0-2.0 | 0-4 |
| | 55-60 | 27-60 | 30-40 | 7.4-8.4 | 5-10 | 1-3 | 0.0-2.0 | 0-4 |
| 2254: | | | | | | | | |
| Overly---------- | 0-10 | 27-35 | 20-35 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 10-17 | 27-35 | 20-35 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 17-38 | 18-35 | 15-30 | 7.9-8.4 | 10-35 | 0 | 0 | 0 |
| | 38-60 | 18-59 | 15-30 | 7.9-8.4 | 10-20 | 0 | 0 | 0 |
| 2255: | | | | | | | | |
| Overly---------- | 0-10 | 27-35 | 20-35 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 10-17 | 27-35 | 20-35 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 17-38 | 18-35 | 15-30 | 7.9-8.4 | 10-35 | 0 | 0 | 0 |
| | 38-60 | 18-59 | 15-30 | 7.9-8.4 | 10-20 | 0 | 0 | 0 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 2255:(cont.) | | | | | | | | |
| Rusklyn---------- | 0-9 | 27-35 | 25-30 | 6.6-8.4 | 5-10 | 0 | 0 | 0 |
| | 9-19 | 18-35 | 20-30 | 7.4-8.4 | 15-40 | 0 | 0 | 0 |
| | 19-28 | 18-35 | 20-30 | 7.4-8.4 | 15-40 | 0 | 0 | 0 |
| | 28-53 | 18-35 | 20-30 | 7.4-8.4 | 15-25 | 0 | 0.0-2.0 | 0 |
| | 53-60 | 18-35 | 20-30 | 7.9-8.4 | 10-20 | 0-3 | 0.0-2.0 | 0 |
| 2257: | | | | | | | | |
| Reeder---------- | 0-8 | 10-27 | 20-30 | 6.1-7.8 | 0 | 0 | 0 | 0-1 |
| | 8-17 | 18-35 | 15-30 | 6.6-7.8 | 0 | 0 | 0 | 0-5 |
| | 17-36 | 15-35 | 15-30 | 7.4-8.4 | 10-20 | 0-1 | 0 | 0-5 |
| | 36-60 | 1-35 | 0-20 | 7.4-8.4 | 0-15 | 0-2 | 0.0-4.0 | 0-4 |
| Arnegard---------- | 0-13 | 15-25 | 15-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 13-36 | 18-30 | 10-20 | 6.1-7.8 | 0 | 0 | 0.0-2.0 | 0 |
| | 36-60 | 10-30 | 5-15 | 7.4-8.4 | 3-20 | 0 | 0.0-2.0 | 0 |
| 2258: | | | | | | | | |
| Regent---------- | 0-10 | 27-40 | 15-30 | 6.1-7.8 | 0 | 0 | 0.0-2.0 | 0 |
| | 10-26 | 35-50 | 20-35 | 7.4-8.4 | 1-3 | 0-4 | 0.0-4.0 | 0-4 |
| | 26-39 | 35-50 | 20-40 | 7.4-8.4 | 3-15 | 0-4 | 0.0-8.0 | 0-4 |
| | 39-60 | 10-90 | 5-40 | 7.4-8.4 | 0-15 | 0-5 | 0.0-8.0 | 0-4 |
| Savage---------- | 0-6 | 27-40 | 20-25 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 6-16 | 35-45 | 25-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 16-39 | 35-45 | 20-25 | 7.4-8.4 | 5-15 | 0 | 0.0-4.0 | 0 |
| | 39-60 | 35-45 | 20-25 | 7.4-8.4 | 5-15 | 0 | 0.0-8.0 | 0-2 |
| 2259: | | | | | | | | |
| Rhoades---------- | 0-4 | 18-26 | 20-35 | 5.6-7.3 | 0 | 0 | 0 | 0 |
| | 4-11 | 35-50 | 20-45 | 6.6-9.0 | 1-15 | 0-5 | 2.0-16.0 | 13-25 |
| | 11-49 | 20-45 | 15-35 | 7.4-9.0 | 3-15 | 0-5 | 8.0-16.0 | 5-15 |
| | 49-60 | 30-90 | 10-40 | 7.4-8.4 | 0-15 | 0-5 | 0.0-8.0 | 0-4 |
| Daglum---------- | 0-5 | 18-26 | 10-30 | 5.6-7.3 | 0 | 0 | 0 | 0-5 |
| | 5-8 | 18-35 | 10-30 | 5.6-7.3 | 0 | 0 | 0 | 0-5 |
| | 8-18 | 35-60 | 20-50 | 6.1-9.0 | 0-3 | 0-2 | 2.0-8.0 | 10-25 |
| | 18-26 | 35-60 | 20-50 | 7.4-9.0 | 3-15 | 5-10 | 8.0-16.0 | 5-20 |
| | 26-45 | 35-60 | 10-40 | 7.4-9.0 | 3-15 | 0-2 | 8.0-16.0 | 5-15 |
| | 45-60 | 30-90 | 10-40 | 7.4-8.4 | 0-15 | 0-5 | 0.0-8.0 | 0-4 |
| 2260: | | | | | | | | |
| Rusklyn---------- | 0-9 | 27-35 | 25-30 | 6.6-8.4 | 5-10 | 0 | 0 | 0 |
| | 9-19 | 18-35 | 20-30 | 7.4-8.4 | 15-40 | 0 | 0 | 0 |
| | 19-28 | 18-35 | 20-30 | 7.4-8.4 | 15-40 | 0 | 0 | 0 |
| | 28-53 | 18-35 | 20-30 | 7.4-8.4 | 15-25 | 0 | 0.0-2.0 | 0 |
| | 53-60 | 18-35 | 20-30 | 7.9-8.4 | 10-20 | 0-3 | 0.0-2.0 | 0 |
| 2261: | | | | | | | | |
| Schaller---------- | 0-9 | 3-10 | 5-10 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 9-15 | 3-15 | 2-8 | 6.6-8.4 | 1-15 | 0 | 0 | 0 |
| | 15-60 | 3-10 | 2-5 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| 2262: | | | | | | | | |
| Schaller---------- | 0-9 | 3-10 | 5-10 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 9-15 | 3-15 | 2-8 | 6.6-8.4 | 1-15 | 0 | 0 | 0 |
| | 15-60 | 3-10 | 2-5 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 2263: | | | | | | | | |
| Sinai---------- | 0-12 | 40-60 | 35-45 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 12-23 | 35-60 | 30-40 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 23-42 | 35-60 | 20-40 | 7.4-8.4 | 10-30 | 0-1 | 0.0-2.0 | 0 |
| | 42-60 | 30-50 | 30-40 | 7.4-8.4 | 5-15 | 1-3 | 0.0-2.0 | 0-4 |
| 2264: | | | | | | | | |
| Vebar---------- | 0-5 | 10-18 | 10-15 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 5-26 | 10-18 | 10-15 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 26-32 | 10-18 | 5-10 | 7.4-8.4 | 1-10 | 0 | 0 | 0 |
| | 32-60 | 1-10 | 0-5 | 7.4-8.4 | 0-10 | 0-1 | 0.0-2.0 | 0 |
| Cohagen---------- | 0-3 | 10-18 | 5-10 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 3-17 | 10-18 | 5-10 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 17-60 | 1-10 | 0-5 | 7.4-8.4 | 0-10 | 0-1 | 0.0-2.0 | 0 |
| 2265: | | | | | | | | |
| Wabek---------- | 0-5 | 5-15 | 5-10 | 6.6-8.4 | 0-5 | 0 | 0 | 0 |
| | 5-9 | 5-15 | 1-5 | 7.4-8.4 | 1-15 | 0 | 0 | 0 |
| | 9-60 | 0-10 | 0-5 | 7.4-8.4 | 1-15 | 0 | 0 | 0 |
| Appam---------- | 0-6 | 6-18 | 5-20 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 6-15 | 6-18 | 5-20 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 15-19 | 6-18 | 5-15 | 7.4-8.4 | 2-15 | 0 | 0 | 0 |
| | 19-60 | 0-10 | 1-5 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 2266: | | | | | | | | |
| Wabek---------- | 0-5 | 5-15 | 5-10 | 6.6-8.4 | 0-5 | 0 | 0 | 0 |
| | 5-9 | 5-15 | 1-5 | 7.4-8.4 | 1-15 | 0 | 0 | 0 |
| | 9-60 | 0-10 | 0-5 | 7.4-8.4 | 1-15 | 0 | 0 | 0 |
| Appam---------- | 0-6 | 6-18 | 5-20 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 6-15 | 6-18 | 5-20 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 15-19 | 6-18 | 5-15 | 7.4-8.4 | 2-15 | 0 | 0 | 0 |
| | 19-60 | 0-10 | 1-5 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 2267: | | | | | | | | |
| Werner---------- | 0-6 | 14-27 | 10-20 | 6.6-8.4 | 0-10 | 0 | 0 | 0 |
| | 6-17 | 14-35 | 10-15 | 7.4-8.4 | 1-15 | 0 | 0.0-2.0 | 0 |
| | 17-60 | 1-90 | 0-40 | 7.4-8.4 | 0-15 | 0-5 | 0.0-8.0 | 0-4 |
| Amor---------- | 0-8 | 15-25 | 15-20 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 8-19 | 18-30 | 15-20 | 6.6-7.8 | 0-5 | 0 | 0 | 0 |
| | 19-31 | 18-30 | 10-15 | 7.4-8.4 | 5-30 | 0-2 | 0.0-2.0 | 0-2 |
| | 31-60 | 1-35 | 0-20 | 7.4-8.4 | 0-15 | 0-2 | 0.0-4.0 | 0-4 |
| Arnegard---------- | 0-13 | 15-25 | 15-25 | 6.1-7.3 | 0 | 0 | 0 | 0 |
| | 13-36 | 18-30 | 10-20 | 6.1-7.8 | 0 | 0 | 0.0-2.0 | 0 |
| | 36-60 | 10-30 | 5-15 | 7.4-8.4 | 3-20 | 0 | 0.0-2.0 | 0 |
| 2269: | | | | | | | | |
| Cavour---------- | 0-6 | 18-25 | 20-28 | 6.1-7.8 | 0 | 0 | 0.0-2.0 | 0-3 |
| | 6-8 | 18-25 | 20-28 | 6.6-7.8 | 0 | 0 | 0.0-2.0 | 0-3 |
| | 8-24 | 35-50 | 20-32 | 7.4-9.0 | 8-25 | 1-3 | 8.0-16.0 | 16-21 |
| | 24-60 | 25-35 | 17-25 | 7.4-9.0 | 5-15 | 1-5 | 8.0-16.0 | 8-16 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 2269:(cont.) | | | | | | | | |
| Barnes | 0-7 | 18-27 | 10-30 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 7-19 | 18-35 | 10-30 | 6.1-7.8 | 0-3 | 0 | 0 | 0 |
| | 19-37 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 37-60 | 18-35 | 5-25 | 7.4-8.4 | 15-25 | 0-1 | 0.0-4.0 | 0 |
| 2270: | | | | | | | | |
| Harriet | 0-2 | 12-25 | 13-23 | 6.6-8.4 | 0 | 0 | 0.0-2.0 | 0 |
| | 2-18 | 35-50 | 17-26 | 7.4-9.0 | 1-25 | 0-5 | 4.0-16.0 | 13-25 |
| | 18-28 | 18-40 | 12-17 | 7.9-9.0 | 10-25 | 0-5 | 4.0-16.0 | 5-20 |
| | 28-38 | 10-18 | 5-15 | 7.9-9.0 | 3-15 | 1-5 | 8.0-16.0 | 2-15 |
| | 38-40 | 27-35 | 15-30 | 7.9-9.0 | 3-15 | 0 | 8.0-16.0 | 2-10 |
| | 40-60 | 18-45 | 13-19 | 7.9-9.0 | 10-25 | 0-5 | 4.0-16.0 | 2-10 |
| Stirum | 0-7 | 10-20 | 10-20 | 7.4-8.4 | 1-10 | 0 | 2.0-8.0 | 0-2 |
| | 7-15 | 10-20 | 5-15 | 7.9-9.0 | 10-25 | 0-2 | 2.0-16.0 | 10-20 |
| | 15-26 | 8-27 | 5-10 | 7.9-9.0 | 10-35 | 0-4 | 2.0-16.0 | 5-15 |
| | 26-34 | 8-30 | 5-10 | 7.9-9.0 | 5-20 | 0-4 | 2.0-16.0 | 5-15 |
| | 34-44 | 5-27 | 5-10 | 7.9-9.0 | 10-35 | 0-4 | 2.0-16.0 | 5-15 |
| | 44-60 | 8-30 | 5-10 | 7.9-9.0 | 5-25 | 0-4 | 2.0-16.0 | 5-15 |
| 2271: | | | | | | | | |
| Lohnes | 0-16 | 5-15 | 5-10 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 16-30 | 0-10 | 2-5 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 30-60 | 0-10 | 2-5 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 2272: | | | | | | | | |
| Sioux | 0-5 | 14-25 | 20-25 | 6.6-8.4 | 0 | 0 | 0.0-2.0 | 0 |
| | 5-8 | 10-20 | 15-20 | 7.4-8.4 | 0-15 | 0 | 0.0-2.0 | 0 |
| | 8-60 | 0-10 | 15-20 | 7.4-8.4 | 0-15 | 0 | 0.0-2.0 | 0 |
| Arvilla | 0-10 | 6-18 | 5-20 | 6.1-8.4 | 0 | 0 | 0 | 0 |
| | 10-16 | 6-18 | 5-15 | 6.6-8.4 | 0 | 0 | 0 | 0 |
| | 16-31 | 2-10 | 1-5 | 7.4-8.4 | 2-15 | 0 | 0 | 0 |
| | 31-60 | 0-10 | 1-5 | 7.4-8.4 | 1-5 | 0 | 0 | 0 |
| 2273: | | | | | | | | |
| Svea | 0-10 | 18-27 | 15-30 | 6.1-7.4 | 0 | 0 | 0 | 0 |
| | 10-21 | 18-35 | 10-30 | 6.6-7.8 | 0-3 | 0 | 0 | 0 |
| | 21-36 | 18-35 | 10-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 36-60 | 18-35 | 10-25 | 7.4-8.4 | 3-15 | 0-1 | 0.0-4.0 | 0-2 |
| Buse | 0-8 | 18-27 | 10-30 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 8-40 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 40-60 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0-2 |
| Parnell | 0-15 | 27-40 | 25-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 15-22 | 18-40 | 25-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 22-32 | 27-60 | 20-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 32-55 | 27-60 | 20-45 | 6.1-7.8 | 0 | 0 | 0 | 0 |
| | 55-60 | 35-45 | 15-30 | 6.6-8.4 | 0-3 | 0-2 | 0 | 0 |
| 2274: | | | | | | | | |
| Towner | 0-20 | 5-15 | 3-10 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 20-29 | 2-10 | 1-10 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 29-36 | 18-40 | 5-25 | 7.4-8.4 | 10-30 | 0-2 | 0.0-2.0 | 0 |
| | 36-60 | 18-40 | 5-25 | 7.4-8.4 | 10-30 | 0-2 | 0.0-2.0 | 0 |

Table 21.-Chemical Properties of the Soils--Continued

| Map symbol and soil name | Depth | Clay | Cation exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum | Salinity | Sodium adsorp-tion ratio |
|---|---|---|---|---|---|---|---|---|
| | In | Pct | meq/100 g | pH | Pct | Pct | mmhos/cm | |
| 2274:(cont.) | | | | | | | | |
| Maddock---------- | 0-10 | 2-10 | 3-10 | 6.6-7.8 | 0-3 | 0 | 0.0-2.0 | 0 |
| | 10-14 | 2-8 | 1-9 | 6.6-7.8 | 0-3 | 0 | 0.0-2.0 | 0 |
| | 14-60 | 2-8 | 1-8 | 6.6-8.4 | 0-10 | 0 | 0.0-2.0 | 0 |
| 2275: | | | | | | | | |
| Towner---------- | 0-20 | 5-15 | 3-10 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 20-29 | 2-10 | 1-10 | 6.6-7.8 | 0 | 0 | 0 | 0 |
| | 29-36 | 18-40 | 5-25 | 7.4-8.4 | 10-30 | 0-2 | 0.0-2.0 | 0 |
| | 36-60 | 18-40 | 5-25 | 7.4-8.4 | 10-30 | 0-2 | 0.0-2.0 | 0 |
| Maddock---------- | 0-10 | 2-10 | 3-10 | 6.6-7.8 | 0-3 | 0 | 0.0-2.0 | 0 |
| | 10-14 | 2-8 | 1-9 | 6.6-7.8 | 0-3 | 0 | 0.0-2.0 | 0 |
| | 14-60 | 2-8 | 1-8 | 6.6-8.4 | 0-10 | 0 | 0.0-2.0 | 0 |
| Buse---------- | 0-8 | 18-27 | 10-30 | 6.6-8.4 | 1-10 | 0 | 0 | 0 |
| | 8-40 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0 |
| | 40-60 | 18-35 | 5-25 | 7.4-8.4 | 10-30 | 0-1 | 0.0-4.0 | 0-2 |

Table 22.-Water Features

(Dashes (--) indicate that an assignment has not been made. Depths of layers are in feet)

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 30: | | | | | | | | | |
| Amor | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Arnegard | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 40: | | | | | | | | | |
| Amor | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Werner | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Farnuf | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 41: | | | | | | | | | |
| Amor | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Werner | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 76: | | | | | | | | | |
| Arvilla | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 118: | | | | | | | | | |
| Barnes | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| Buse | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 156: | | | | | | | | | |
| Barnes | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| Svea | B | | | | | | | | |
| | | January | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 313: | | | | | | | | | |
| Buse | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Barnes | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 314: | | | | | | | | | |
| Buse | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Barnes | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 319: | | | | | | | | | |
| Buse | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Barnes | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 450: | | | | | | | | | |
| Colvin | C/D | | | | | | | | |
| | | January | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| 511: | | | | | | | | | |
| Divide | C | | | | | | | | |
| | | January | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| 674: | | | | | | | | | |
| Farnuf | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 712: | | | | | | | | | |
| Flaxton | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 712:(cont.) | | | | | | | | | |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 714: | | | | | | | | | |
| Flaxton | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 727: | | | | | | | | | |
| Fordville | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 863: | | | | | | | | | |
| Hamerly | C | | | | | | | | |
| | | January | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| 883: | | | | | | | | | |
| Hamerly | C | | | | | | | | |
| | | January | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| Tonka | C/D | | | | | | | | |
| | | January | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 0.0 | 1.0-1.5 | 0.0-1.0 | Long | Frequent | --- | --- |
| | | | 1.5-2.0 | > 6.0 | | | | | |
| | | April | 0.0 | 1.0-1.5 | 0.0-1.0 | Long | Frequent | --- | --- |
| | | | 1.5-2.0 | > 6.0 | | | | | |
| | | May | 0.0-1.5 | > 6.0 | 0.0-1.0 | Long | Frequent | --- | --- |
| | | June | 0.0-1.5 | > 6.0 | 0.0-1.0 | Long | Frequent | --- | --- |
| | | July | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 883:(cont.) | | | | | | | | | |
| Parnell | D | | | | | | | | |
| | | January | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | February | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | March | 0.0 | > 6.0 | 0.0-2.0 | Long | Frequent | --- | --- |
| | | April | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | May | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | June | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | July | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | August | 0.0-1.0 | > 6.0 | 0.0-2.0 | Brief | Occasional | --- | --- |
| | | September | 0.0-1.0 | > 6.0 | 0.0-2.0 | Brief | Occasional | --- | --- |
| | | October | 0.0-1.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | November | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | December | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| 1011: | | | | | | | | | |
| Karlsruhe | A | | | | | | | | |
| | | January | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| | | February | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| | | March | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| | | April | 1.5-3.5 | > 6.0 | --- | --- | None | --- | --- |
| | | May | 1.5-3.5 | > 6.0 | --- | --- | None | --- | --- |
| | | June | 1.5-3.5 | > 6.0 | --- | --- | None | --- | --- |
| | | July | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| | | August | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| | | September | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| | | October | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| | | November | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| | | December | 3.0-5.0 | > 6.0 | --- | --- | None | --- | --- |
| 1181: | | | | | | | | | |
| Lohnes | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1202: | | | | | | | | | |
| Maddock | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1249: | | | | | | | | | |
| Appam | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1267: | | | | | | | | | |
| Marysland | B/D | | | | | | | | |
| | | January | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 1372: | | | | | | | | | |
| Noonan | D | | | | | | | | |
| | | April | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1374: | | | | | | | | | |
| Nutley | D | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 1375: | | | | | | | | | |
| Nutley | D | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 1427: | | | | | | | | | |
| Parnell | D | | | | | | | | |
| | | January | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | February | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | March | 0.0 | > 6.0 | 0.0-2.0 | Long | Frequent | --- | --- |
| | | April | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | May | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | June | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | July | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | August | 0.0-1.0 | > 6.0 | 0.0-2.0 | Brief | Occasional | --- | --- |
| | | September | 0.0-1.0 | > 6.0 | 0.0-2.0 | Brief | Occasional | --- | --- |
| | | October | 0.0-1.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | November | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | December | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| 1437: | | | | | | | | | |
| Parshall | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1466: | | | | | | | | | |
| Pits, gravel and sand | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1676: | | | | | | | | | |
| Wildrose | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1697: | | | | | | | | | |
| Sioux | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Arvilla | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 1710: | | | | | | | | | |
| Southam | D | | | | | | | | |
| | | January | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| | | February | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| | | March | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| | | April | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| | | May | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| | | June | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| | | July | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| | | August | 0.0-1.0 | > 6.0 | 0.0-5.0 | Long | Frequent | --- | --- |
| | | September | 0.0-1.0 | > 6.0 | 0.0-5.0 | Long | Frequent | --- | --- |
| | | October | 0.0-1.0 | > 6.0 | 0.0-5.0 | Long | Frequent | --- | --- |
| | | November | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| | | December | 0.0 | > 6.0 | 0.0-5.0 | Very long | Frequent | --- | --- |
| 1762: | | | | | | | | | |
| Svea | B | | | | | | | | |
| | | January | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| Barnes | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 1805: | | | | | | | | | |
| Telfer | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1886: | | | | | | | | | |
| Hamerly, saline | C | | | | | | | | |
| | | January | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydrologic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 1886:(cont.) | | | | | | | | | |
| Vallers, saline | C/D | | | | | | | | |
| | | January | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| 1898: | | | | | | | | | |
| Vebar | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 1978: | | | | | | | | | |
| Water | --- | | | | | | | | |
| | | January | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | February | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | March | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | April | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | May | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | June | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | July | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | August | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | September | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | October | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | November | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| | | December | 0.0 | > 6.0 | 5.0-6.1 | Very long | Frequent | --- | --- |
| 2006: | | | | | | | | | |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2014: | | | | | | | | | |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Bowbells | B | | | | | | | | |
| | | April | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| 2015: | | | | | | | | | |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Bowbells | B | | | | | | | | |
| | | April | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 3.5-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| 2031: | | | | | | | | | |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Zahl | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 2037: | | | | | | | | | |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Zahl | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Parnell | D | | | | | | | | |
| | | January | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | February | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | March | 0.0 | > 6.0 | 0.0-2.0 | Long | Frequent | --- | --- |
| | | April | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | May | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | June | 0.0 | > 6.0 | 0.0-2.0 | Very long | Frequent | --- | --- |
| | | July | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | August | 0.0-1.0 | > 6.0 | 0.0-2.0 | Brief | Occasional | --- | --- |
| | | September | 0.0-1.0 | > 6.0 | 0.0-2.0 | Brief | Occasional | --- | --- |
| | | October | 0.0-1.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | November | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| | | December | 0.0 | > 6.0 | 0.0-2.0 | Long | Occasional | --- | --- |
| 2073: | | | | | | | | | |
| Zahl | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Max | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2081: | | | | | | | | | |
| Zahl | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2175: | | | | | | | | | |
| Zahl | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Williams | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2188: | | | | | | | | | |
| Wabek | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Lehr | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2234: | | | | | | | | | |
| Amor | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Werner | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2235: | | | | | | | | | |
| Arnegard | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 2240: | | | | | | | | | |
| Bowdle | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Lehr | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2241: | | | | | | | | | |
| Bryant | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2242: | | | | | | | | | |
| Cohagen | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Vebar | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Parshall | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2243: | | | | | | | | | |
| Vebar | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Flasher | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2244: | | | | | | | | | |
| Daglum | D | | | | | | | | |
| | | April | 4 | -wil L -wi | --- | --- | --- | --- | --- |
| | | May | | -wil L -wi | --- | --- | --- | --- | --- |
| | | June | | -wil L -wi | --- | --- | --- | --- | --- |
| Belfield | DC | | | | | | | | |
| | | pril | 4 | -wil L -wi | --- | --- | --- | --- | --- |
| | | May | | -wil L -wi | --- | --- | --- | --- | --- |
| | | June | | -wil L -wi | --- | --- | --- | --- | --- |
| 2446 | | | | | | | | | |
| DGrai | DC | | | | | | | | |
| | | pl months | --- | --- | --- | --- | --- | --- | --- |
| 22448 | | | | | | | | | |
| DLeh | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Bowdle | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 22449 | | | | | | | | | |
| DMakoti | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 22450 | | | | | | | | | |
| DMakoti | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2 Rusklyn | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 2252: | | | | | | | | | |
| Max | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Zahl | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Arnegard | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2253: | | | | | | | | | |
| Mondamin | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2254: | | | | | | | | | |
| Overly | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 2255: | | | | | | | | | |
| Overly | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| Rusklyn | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 2257: | | | | | | | | | |
| Reeder | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Arnegard | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2258: | | | | | | | | | |
| Regent | C | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Savage | C | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2259: | | | | | | | | | |
| Rhoades | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Daglum | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2260: | | | | | | | | | |
| Rusklyn | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 2261: | | | | | | | | | |
| Schaller | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 2262: | | | | | | | | | |
| Schaller | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2263: | | | | | | | | | |
| Sinai | D | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| 2264: | | | | | | | | | |
| Vebar | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Cohagen | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2265: | | | | | | | | | |
| Wabek | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Appam | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2266: | | | | | | | | | |
| Wabek | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Appam | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2267: | | | | | | | | | |
| Werner | D | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Amor | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Arnegard | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2269: | | | | | | | | | |
| Cavour | D | | | | | | | | |
| | | January | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| Barnes | B | | | | | | | | |
| | | April | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |

Table 22.-Water Features--Continued

| Map symbol and soil name | Hydro-logic group | Month | Water Table: Upper limit | Water Table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| 2270: | | | | | | | | | |
| Harriet | D | | | | | | | | |
| | | January | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 0.0-1.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 0.0-1.5 | > 6.0 | --- | --- | --- | Long | Occasional |
| | | May | 0.0-1.5 | > 6.0 | --- | --- | --- | Long | Occasional |
| | | June | 0.0-1.5 | > 6.0 | --- | --- | --- | Long | Occasional |
| | | July | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| Stirum | B/D | | | | | | | | |
| | | January | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 0.0-1.5 | > 6.0 | --- | --- | --- | Long | Occasional |
| | | April | 0.0-1.5 | > 6.0 | --- | --- | --- | Long | Occasional |
| | | May | 0.0-1.5 | > 6.0 | --- | --- | --- | Long | Occasional |
| | | June | 0.0-1.5 | > 6.0 | --- | --- | --- | Long | Occasional |
| | | July | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 1.5-3.5 | > 6.0 | --- | --- | --- | --- | --- |
| 2271: | | | | | | | | | |
| Lohnes | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2272: | | | | | | | | | |
| Sioux | A | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| Arvilla | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |
| 2273: | | | | | | | | | |
| Svea | B | | | | | | | | |
| | | January | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | February | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | March | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | April | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | May | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | June | 3.0-5.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | July | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | August | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | September | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | October | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | November | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| | | December | 4.0-6.0 | > 6.0 | --- | --- | --- | --- | --- |
| Buse | B | | | | | | | | |
| | | All months | --- | --- | --- | --- | --- | --- | --- |

Table 23.-Soil Features

(Dashes (--) indicate that an assignment has not been made.)

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thickness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| 30: | | | | | | | |
| Amor | Bedrock (paralithic) | 20-40 | --- | --- | Moderate | High | Moderate |
| Arnegard | --- | --- | --- | --- | Moderate | High | Low |
| 40: | | | | | | | |
| Amor | Bedrock (paralithic) | 20-40 | --- | --- | Moderate | High | Moderate |
| Werner | Bedrock (paralithic) | 7-20 | --- | --- | Moderate | High | Low |
| Farnuf | --- | --- | --- | --- | Moderate | High | Low |
| 41: | | | | | | | |
| Amor | Bedrock (paralithic) | 20-40 | --- | --- | Moderate | High | Moderate |
| Werner | Bedrock (paralithic) | 7-20 | --- | --- | Moderate | High | Low |
| 76: | | | | | | | |
| Arvilla | Strongly contrasting textural stratification | 14-25 | --- | --- | Low | Moderate | Low |
| 118: | | | | | | | |
| Barnes | --- | --- | --- | --- | Moderate | Moderate | Low |
| Buse | --- | --- | --- | --- | Moderate | Moderate | Low |
| 156: | | | | | | | |
| Barnes | --- | --- | --- | --- | Moderate | Moderate | Low |
| Svea | --- | --- | --- | --- | Moderate | High | Low |
| 313: | | | | | | | |
| Buse | --- | --- | --- | --- | Moderate | Moderate | Low |
| Barnes | --- | --- | --- | --- | Moderate | Moderate | Low |
| 314: | | | | | | | |
| Buse | --- | --- | --- | --- | Moderate | Moderate | Low |
| Barnes | --- | --- | --- | --- | Moderate | Moderate | Low |
| 319: | | | | | | | |
| Buse | --- | --- | --- | --- | Moderate | Moderate | Low |
| Barnes | --- | --- | --- | --- | Moderate | Moderate | Low |
| 450: | | | | | | | |
| Colvin | --- | --- | --- | --- | High | High | Low |

Table 23.-Soil Features--Continued

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thickness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| 511: | | | | | | | |
| Divide | Strongly contrasting textural stratification | 20-40 | --- | --- | Moderate | High | Low |
| 674: | | | | | | | |
| Farnuf | --- | --- | --- | --- | Moderate | High | Low |
| 712: | | | | | | | |
| Flaxton | --- | --- | --- | --- | Moderate | High | Low |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| 714: | | | | | | | |
| Flaxton | --- | --- | --- | --- | Moderate | High | Low |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| 727: | | | | | | | |
| Fordville | Strongly contrasting textural stratification | 20-40 | --- | --- | Low | Moderate | Low |
| 863: | | | | | | | |
| Hamerly | --- | --- | --- | --- | High | High | Low |
| 883: | | | | | | | |
| Hamerly | --- | --- | --- | --- | High | High | Low |
| Tonka | --- | --- | --- | --- | High | High | Low |
| Parnell | --- | --- | --- | --- | High | High | Low |
| 1011: | | | | | | | |
| Karlsruhe | --- | --- | --- | --- | Moderate | High | Low |
| 1181: | | | | | | | |
| Lohnes | --- | --- | --- | --- | Low | Moderate | Low |
| 1202: | | | | | | | |
| Maddock | --- | --- | --- | --- | Low | Low | Low |
| 1249: | | | | | | | |
| Appam | --- | --- | --- | --- | Low | Moderate | Low |
| 1267: | | | | | | | |
| Marysland | Strongly contrasting textural stratification | 20-40 | --- | --- | High | High | Low |
| 1372: | | | | | | | |
| Noonan | Natric | 5-10 | --- | --- | Moderate | High | Moderate |
| Williams | --- | --- | --- | --- | Moderate | High | Low |

Table 23.-Soil Features--Continued

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thickness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| 1374: | | | | | | | |
| Nutley | --- | --- | --- | --- | Moderate | High | Low |
| 1375: | | | | | | | |
| Nutley | --- | --- | --- | --- | Moderate | High | Low |
| 1427: | | | | | | | |
| Parnell | --- | --- | --- | --- | High | High | Low |
| 1437: | | | | | | | |
| Parshall | --- | --- | --- | --- | Moderate | Moderate | Low |
| 1466: | | | | | | | |
| Pits, gravel and sand | --- | --- | --- | --- | None | Low | Low |
| 1676: | | | | | | | |
| Wildrose | --- | --- | --- | --- | Moderate | High | Low |
| 1697: | | | | | | | |
| Sioux | Strongly contrasting textural stratification | 6-14 | --- | --- | Low | Low | Low |
| Arvilla | Strongly contrasting textural stratification | 14-25 | --- | --- | Low | Moderate | Low |
| 1710: | | | | | | | |
| Southam | --- | --- | --- | --- | High | High | Low |
| 1762: | | | | | | | |
| Svea | --- | --- | --- | --- | Moderate | High | Low |
| Barnes | --- | --- | --- | --- | Moderate | Moderate | Low |
| 1805: | | | | | | | |
| Telfer | --- | --- | --- | --- | Low | Moderate | Low |
| 1886: | | | | | | | |
| Hamerly, saline | --- | --- | --- | --- | High | High | Moderate |
| Vallers, saline | --- | --- | --- | --- | High | High | Low |
| 1898: | | | | | | | |
| Vebar | Bedrock (paralithic) | 20-40 | --- | --- | Low | Moderate | Low |
| 1978: | | | | | | | |
| Water | --- | --- | --- | --- | --- | --- | --- |
| 2006: | | | | | | | |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| 2014: | | | | | | | |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| Bowbells | --- | --- | --- | --- | Moderate | High | Low |

Table 23.-Soil Features--Continued

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thickness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| 2015: | | | | | | | |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| Bowbells | --- | --- | --- | --- | Moderate | High | Low |
| 2031: | | | | | | | |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| Zahl | --- | --- | --- | --- | Moderate | Moderate | Low |
| 2037: | | | | | | | |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| Zahl | --- | --- | --- | --- | Moderate | Moderate | Low |
| Parnell | --- | --- | --- | --- | High | High | Low |
| 2073: | | | | | | | |
| Zahl | --- | --- | --- | --- | Moderate | Moderate | Low |
| Max | --- | --- | --- | --- | Moderate | High | Low |
| 2081: | | | | | | | |
| Zahl | --- | --- | --- | --- | Moderate | Moderate | Low |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| 2175: | | | | | | | |
| Zahl | --- | --- | --- | --- | Moderate | Moderate | Low |
| Williams | --- | --- | --- | --- | Moderate | High | Low |
| 2188: | | | | | | | |
| Wabek | --- | --- | --- | --- | Low | Moderate | Low |
| Lehr | Strongly contrasting textural stratification | 14-20 | --- | --- | Low | Moderate | Low |
| 2234: | | | | | | | |
| Amor | Bedrock (paralithic) | 20-40 | --- | --- | Moderate | High | Moderate |
| Werner | Bedrock (paralithic) | 7-20 | --- | --- | Moderate | High | Low |
| 2235: | | | | | | | |
| Arnegard | --- | --- | --- | --- | Moderate | High | Low |
| 2240: | | | | | | | |
| Bowdle | Strongly contrasting textural stratification | 20-40 | --- | --- | Low | Moderate | Low |
| Lehr | Strongly contrasting textural stratification | 14-20 | --- | --- | Low | Moderate | Low |

Table 23.-Soil Features--Continued

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thickness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| 2241: | | | | | | | |
| Bryant | --- | --- | --- | --- | Moderate | High | Low |
| 2242: | | | | | | | |
| Cohagen | Bedrock (paralithic) | 4-20 | --- | --- | Moderate | Moderate | Low |
| Vebar | Bedrock (paralithic) | 20-40 | --- | --- | Low | Moderate | Low |
| Parshall | --- | --- | --- | --- | Moderate | Moderate | Low |
| 2243: | | | | | | | |
| Vebar | Bedrock (paralithic) | 20-40 | --- | --- | Low | Moderate | Low |
| Flasher | Bedrock (paralithic) | 7-20 | --- | --- | Low | Moderate | Low |
| 2244: | | | | | | | |
| Daglum | Natric | 4-20 | --- | --- | Moderate | High | Moderate |
| Belfield | Natric | 7-21 | --- | --- | Low | High | Moderate |
| 2246: | | | | | | | |
| Grail | --- | --- | --- | --- | Moderate | High | Low |
| 2248: | | | | | | | |
| Lehr | Strongly contrasting textural stratification | 14-20 | --- | --- | Low | Moderate | Low |
| Bowdle | Strongly contrasting textural stratification | 20-40 | --- | --- | Low | Moderate | Low |
| 2249: | | | | | | | |
| Makoti | --- | --- | --- | --- | Moderate | High | Low |
| 2250: | | | | | | | |
| Makoti | --- | --- | --- | --- | Moderate | High | Low |
| Rusklyn | --- | --- | --- | --- | High | Moderate | Low |
| 2252: | | | | | | | |
| Max | --- | --- | --- | --- | Moderate | High | Low |
| Zahl | --- | --- | --- | --- | Moderate | Moderate | Low |
| Arnegard | --- | --- | --- | --- | Moderate | High | Low |
| 2253: | | | | | | | |
| Mondamin | --- | --- | --- | --- | Moderate | High | Low |
| 2254: | | | | | | | |
| Overly | --- | --- | --- | --- | High | High | Low |

Table 23.-Soil Features--Continued

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thickness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| 2255: | | | | | | | |
| Overly | --- | --- | --- | --- | High | High | Low |
| Rusklyn | --- | --- | --- | --- | High | Moderate | Low |
| 2257: | | | | | | | |
| Reeder | Bedrock (paralithic) | 20-40 | --- | --- | Moderate | High | Moderate |
| Arnegard | --- | --- | --- | --- | Moderate | High | Low |
| 2258: | | | | | | | |
| Regent | Bedrock (paralithic) | 20-40 | --- | --- | Low | High | Moderate |
| Savage | --- | --- | --- | --- | Low | High | Low |
| 2259: | | | | | | | |
| Rhoades | Natric | 1-5 | --- | --- | Low | High | Moderate |
| Daglum | Natric | 4-20 | --- | --- | Moderate | High | Moderate |
| 2260: | | | | | | | |
| Rusklyn | --- | --- | --- | --- | High | Moderate | Low |
| 2261: | | | | | | | |
| Schaller | --- | --- | --- | --- | Low | Moderate | Low |
| 2262: | | | | | | | |
| Schaller | --- | --- | --- | --- | Low | Moderate | Low |
| 2263: | | | | | | | |
| Sinai | --- | --- | --- | --- | Low | High | High |
| 2264: | | | | | | | |
| Vebar | Bedrock (paralithic) | 20-40 | --- | --- | Low | Moderate | Low |
| Cohagen | Bedrock (paralithic) | 4-20 | --- | --- | Moderate | Moderate | Low |
| 2265: | | | | | | | |
| Wabek | --- | --- | --- | --- | Low | Moderate | Low |
| Appam | --- | --- | --- | --- | Low | Moderate | Low |
| 2266: | | | | | | | |
| Wabek | --- | --- | --- | --- | Low | Moderate | Low |
| Appam | --- | --- | --- | --- | Low | Moderate | Low |
| 2267: | | | | | | | |
| Werner | Bedrock (paralithic) | 7-20 | --- | --- | Moderate | High | Low |
| Amor | Bedrock (paralithic) | 20-40 | --- | --- | Moderate | High | Moderate |
| Arnegard | --- | --- | --- | --- | Moderate | High | Low |

Table 23.-Soil Features--Continued

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thickness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| 2269: | | | | | | | |
| Cavour | Natric | 4-14 | --- | --- | Moderate | High | Moderate |
| Barnes | --- | --- | --- | --- | Moderate | Moderate | Low |
| 2270: | | | | | | | |
| Harriet | Natric | 0-5 | --- | --- | High | High | Moderate |
| Stirum | Natric | 3-13 | --- | --- | Moderate | High | Moderate |
| 2271: | | | | | | | |
| Lohnes | --- | --- | --- | --- | Low | Moderate | Low |
| 2272: | | | | | | | |
| Sioux | Strongly contrasting textural stratification | 6-14 | --- | --- | Low | Low | Low |
| Arvilla | Strongly contrasting textural stratification | 14-25 | --- | --- | Low | Moderate | Low |
| 2273: | | | | | | | |
| Svea | --- | --- | --- | --- | Moderate | High | Low |
| Buse | --- | --- | --- | --- | Moderate | Moderate | Low |
| Parnell | --- | --- | --- | --- | High | High | Low |
| 2274: | | | | | | | |
| Towner | --- | --- | --- | --- | Moderate | High | Low |
| Maddock | --- | --- | --- | --- | Low | Low | Low |
| 2275: | | | | | | | |
| Towner | --- | --- | --- | --- | Moderate | High | Low |
| Maddock | --- | --- | --- | --- | Low | Low | Low |
| Buse | --- | --- | --- | --- | Moderate | Moderate | Low |

Table 24.-Hydric Soils List

See end of table for criteria codes and definitions.

There may be small areas of included soils or miscellaneous areas that are significant to use and management of the soil; yet are too small to delineate on the soil map at the map's original scale. These may be designated as spot symbols and are described on the conventional and special symbols legend.

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 30: | | | | | | | |
| Amor-Arnegard loams, 0 to 3 percent slopes | Amor | No | rise | --- | --- | --- | --- |
| | Reeder | No | rise | --- | --- | --- | --- |
| | Arnegard | No | alluvial flat, swale | --- | --- | --- | --- |
| | Farnuf | No | alluvial fan | --- | --- | --- | --- |
| | Daglum | No | flat | --- | --- | --- | --- |
| | Stady | No | flat | --- | --- | --- | --- |
| | Vebar | No | rise | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Cabba | No | rise | --- | --- | --- | --- |
| 40: | | | | | | | |
| Amor-Werner-Farnuf loams, 6 to 9 percent slopes | Amor | No | knoll, ridge | --- | --- | --- | --- |
| | Werner | No | knoll, ridge | --- | --- | --- | --- |
| | Farnuf | No | flat, terrace | --- | --- | --- | --- |
| | Amor, gently sloping | No | rise | --- | --- | --- | --- |
| | Vebar | No | rise | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Tally | No | alluvial fan | --- | --- | --- | --- |
| | Cohagen | No | ridge | --- | --- | --- | --- |
| | Regent | No | rise | --- | --- | --- | --- |
| 41: | | | | | | | |
| Amor-Werner loams, 9 to 15 percent slopes | Amor | No | ridge | --- | --- | --- | --- |
| | Werner | No | ridge | --- | --- | --- | --- |
| | Amor, moderately sloping | No | ridge | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Chama | No | ridge | --- | --- | --- | --- |
| | Farnuf | No | alluvial fan | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Werner, moderately sloping | No | ridge | --- | --- | --- | --- |
| | Cohagen | No | ridge | --- | --- | --- | --- |
| | Vebar | No | ridge | --- | --- | --- | --- |
| 76: | | | | | | | |
| Arvilla sandy loam, 0 to 6 percent slopes | Arvilla | No | rise | --- | --- | --- | --- |
| | Lohnes | No | rise | --- | --- | --- | --- |
| | Sioux | No | knoll | --- | --- | --- | --- |
| | 0sakis | No | flat | --- | --- | --- | --- |
| | Claire | No | rise | --- | --- | --- | --- |
| | Divide | No | drainageway | --- | --- | --- | --- |
| | Fordville | No | flat | --- | --- | --- | --- |
| | Renshaw | No | rise | --- | --- | --- | --- |
| | Wyrene | No | flat | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 118: | | | | | | | |
| Barnes-Buse loams, 3 to 6 percent slopes | Barnes | No | knoll, moraine | --- | --- | --- | --- |
| | Buse | No | moraine, ridge | --- | --- | --- | --- |
| | Svea | No | swale | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Nutley | No | flat | --- | --- | --- | --- |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Cavour | No | flat | --- | --- | --- | --- |
| | Parnell | Yes | depression | 3,2B3 | Yes | No | Yes |
| 156: | | | | | | | |
| Barnes-Svea loams, 3 to 6 percent slopes | Barnes | No | rise | --- | --- | --- | --- |
| | Svea | No | swale | --- | --- | --- | --- |
| | Buse | No | knoll | --- | --- | --- | --- |
| | Cresbard | No | flat | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Cavour | No | flat | --- | --- | --- | --- |
| | Vallers | Yes | flat | 2B3 | Yes | No | No |
| 313: | | | | | | | |
| Buse-Barnes loams, 6 to 9 percent slopes | Buse | No | moraine, knoll, ridge | --- | --- | --- | --- |
| | Barnes | No | knoll, moraine | --- | --- | --- | --- |
| | Svea | No | swale | --- | --- | --- | --- |
| | Langhei | No | knoll | --- | --- | --- | --- |
| | Parnell | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Tonka | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Sioux | No | knoll | --- | --- | --- | --- |
| 314: | | | | | | | |
| Buse-Barnes loams, 9 to 15 percent slopes | Buse | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Barnes | No | knoll, moraine | --- | --- | --- | --- |
| | Svea | No | swale | --- | --- | --- | --- |
| | Langhei | No | ridge | --- | --- | --- | --- |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Southam | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Vallers | Yes | flat | 2B3 | Yes | No | No |
| 319: | | | | | | | |
| Buse-Barnes loams, 15 to 35 percent slopes | Buse | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Barnes | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Langhei | No | ridge | --- | --- | --- | --- |
| | Svea | No | swale | --- | --- | --- | --- |
| | Sioux | No | ridge | --- | --- | --- | --- |
| | Darnen | No | alluvial fan | --- | --- | --- | --- |
| | Vallers | Yes | flat | 2B3 | Yes | No | No |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 450: | | | | | | | |
| Colvin silt loam | Colvin | Yes | drainageway, flat, lake plain | 2B3 | Yes | No | No |
| | Marysland | Yes | flat | 2B3 | Yes | No | No |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Regan | Yes | flat | 4,2B3 | Yes | Yes | No |
| | Bearden | No | flat | --- | --- | --- | --- |
| | Divide | No | flat | --- | --- | --- | --- |
| | Southam | Yes | depression | 3,2B3 | Yes | No | Yes |
| 511: | | | | | | | |
| Divide loam, 0 to 3 percent slopes | Divide | No | flat, outwash plain, terrace | --- | --- | --- | --- |
| | Karlsruhe | No | rise | --- | --- | --- | --- |
| | Marysland | Yes | flat | 2B3 | Yes | No | No |
| | Hamerly | No | rise | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Vallers | Yes | flat | 2B3 | Yes | No | No |
| | Wabek | No | rise | --- | --- | --- | --- |
| 674: | | | | | | | |
| Farnuf loam, 0 to 2 percent slopes | Farnuf | No | flat, terrace | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Farland | No | flat | --- | --- | --- | --- |
| | Parshall | No | flat, terrace | --- | --- | --- | --- |
| | Shambo | No | flat | --- | --- | --- | --- |
| | Belfield | No | rise, terrace | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Felor | No | rise | --- | --- | --- | --- |
| | Lehr | No | rise | --- | --- | --- | --- |
| | Reeder | No | rise | --- | --- | --- | --- |
| 712: | | | | | | | |
| Flaxton-Williams complex, 1 to 6 percent slopes | Flaxton | No | flat, rise | --- | --- | --- | --- |
| | Williams | No | rise | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Appam | No | rise | --- | --- | --- | --- |
| | Lihen | No | rise | --- | --- | --- | --- |
| | Zahl | No | ridge | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| 714: | | | | | | | |
| Flaxton-Williams complex, 6 to 9 percent slopes | Flaxton | No | swale | --- | --- | --- | --- |
| | Williams | No | rise | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Zahl | No | ridge | --- | --- | --- | --- |
| | Appam | No | rise | --- | --- | --- | --- |
| | Tally | No | rise | --- | --- | --- | --- |
| | Parnell | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Telfer | No | rise | --- | --- | --- | --- |
| | Wabek | No | ridge | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 727: | | | | | | | |
| Fordville loam, 0 to 3 percent slopes | Fordville | No | flat | --- | --- | --- | --- |
| | Renshaw | No | flat | --- | --- | --- | --- |
| | Spottswood | No | swale | --- | --- | --- | --- |
| | Divide | No | swale | --- | --- | --- | --- |
| | Svea | No | swale | --- | --- | --- | --- |
| | Sioux | No | knoll | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Swenoda | No | knoll | --- | --- | --- | --- |
| | Barnes | No | rise | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| 863: | | | | | | | |
| Hamerly loam, 0 to 3 percent slopes | Hamerly | No | flat, till plain | --- | --- | --- | --- |
| | Vallers, saline | No | flat, till plain | --- | --- | --- | --- |
| | Svea | No | rise | --- | --- | --- | --- |
| | Colvin | Yes | drainageway, flat, lake plain | 2B3 | Yes | No | No |
| | Overly | No | flat, lake plain | --- | --- | --- | --- |
| | Divide | No | flat | --- | --- | --- | --- |
| | Tonka | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Parnell | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Hamerly, saline | Yes | flat | 2B3 | Yes | No | No |
| 883: | | | | | | | |
| Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes | Hamerly | No | flat, till plain | --- | --- | --- | --- |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Vallers | Yes | swale | 2B3 | Yes | No | No |
| | Svea | No | swale | --- | --- | --- | --- |
| | Cavour | No | flat | --- | --- | --- | --- |
| | Barnes | No | rise | --- | --- | --- | --- |
| | Wyard | No | flat | --- | --- | --- | --- |
| | Miranda | No | flat | --- | --- | --- | --- |
| 1011: | | | | | | | |
| Karlsruhe coarse sandy loam | Karlsruhe | No | flat | --- | --- | --- | --- |
| | Wyrene | No | flat | --- | --- | --- | --- |
| | Marysland | Yes | flat | 2B3 | Yes | No | No |
| | Arveson | Yes | flat | 2B3 | Yes | No | No |
| | Divide | No | flat | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Stirum | Yes | flat | 2B3,3 | Yes | No | Yes |
| 1181: | | | | | | | |
| Lohnes loamy coarse sand, 0 to 6 percent slopes | Lohnes | No | rise | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Claire | No | ridge | --- | --- | --- | --- |
| | Maddock | No | rise | --- | --- | --- | --- |
| | Falsen | No | flat | --- | --- | --- | --- |
| | Sioux | No | ridge | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 1202: | | | | | | | |
| Maddock loamy fine sand, 0 to 6 percent slopes | Maddock | No | rise | --- | --- | --- | --- |
| | Lohnes | No | rise | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Embden | No | rise | --- | --- | --- | --- |
| | Rusklyn | No | ridge | --- | --- | --- | --- |
| 1249: | | | | | | | |
| Appam sandy loam, 0 to 6 percent slopes | Appam | No | outwash plain, rise | --- | --- | --- | --- |
| | Wabek | No | escarpment | --- | --- | --- | --- |
| | Ruso | No | rise | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Rusklyn | No | flat | --- | --- | --- | --- |
| | Lohnes | No | rise | --- | --- | --- | --- |
| | Lehr | No | rise | --- | --- | --- | --- |
| 1267: | | | | | | | |
| Marysland loam | Marysland | Yes | drainageway, flat, outwash plain | 2B3 | Yes | No | No |
| | Divide | No | rise | --- | --- | --- | --- |
| | Harriet | Yes | flat, flood plain | 2B3 | Yes | No | No |
| | Colvin | Yes | flat | 2B3 | Yes | No | No |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Hamerly | No | rise | --- | --- | --- | --- |
| | Karlsruhe | No | rise | --- | --- | --- | --- |
| | Southam | Yes | depression | 3,2B3 | Yes | No | Yes |
| 1372: | | | | | | | |
| Noonan-Williams loams, 1 to 6 percent slopes | Noonan | No | swale | --- | --- | --- | --- |
| | Williams | No | rise | --- | --- | --- | --- |
| | Niobell | No | flat | --- | --- | --- | --- |
| | Harriet | Yes | flat | 2B3 | Yes | No | No |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Zahl | No | knoll | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Tonka | Yes | depression | 3,2B3 | Yes | No | Yes |
| 1374: | | | | | | | |
| Nutley silty clay, 0 to 3 percent slopes | Nutley | No | flat, lake plain | --- | --- | --- | --- |
| | Sinai | No | flat | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Buse | No | knoll | --- | --- | --- | --- |
| | Bryant | No | flat | --- | --- | --- | --- |
| | Fargo | Yes | flat | 2B3 | Yes | No | No |
| | Overly | No | rise | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 1375: | | | | | | | |
| Nutley silty clay, 3 to 6 percent slopes | Nutley | No | lake plain, rise | --- | --- | --- | --- |
| | Sinai | No | flat | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Great Bend | No | rise | --- | --- | --- | --- |
| | Barnes | No | knoll, moraine | --- | --- | --- | --- |
| | Bearden | No | flat | --- | --- | --- | --- |
| | Overly | No | swale | --- | --- | --- | --- |
| | Hegne | Yes | flat | 2B3 | Yes | No | No |
| 1427: | | | | | | | |
| Parnell silty clay loam | Parnell | Yes | depression, moraine | 3,2B3 | Yes | No | Yes |
| | Vallers | Yes | flat | 2B3 | Yes | No | No |
| | Southam | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Marysland | Yes | flat | 2B3 | Yes | No | No |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Colvin | Yes | flat | 2B3 | Yes | No | No |
| 1437: | | | | | | | |
| Parshall fine sandy loam, 0 to 3 percent slopes | Parshall | No | flat, terrace | --- | --- | --- | --- |
| | Tally | No | flat | --- | --- | --- | --- |
| | Arnegard | No | flat | --- | --- | --- | --- |
| | Bryant | No | flat | --- | --- | --- | --- |
| | Flaxton | No | flat, rise | --- | --- | --- | --- |
| | Telfer | No | rise | --- | --- | --- | --- |
| | Bowdle | No | rise | --- | --- | --- | --- |
| | Appam | No | rise | --- | --- | --- | --- |
| | Niobell | No | flat | --- | --- | --- | --- |
| 1466: | | | | | | | |
| Pits, gravel and sand | Pits, gravel and sand | No | --- | --- | --- | --- | --- |
| | Parnell | Yes | depression, moraine | 2B3,3 | Yes | No | Yes |
| | Wabek | --- | escarpment | --- | --- | --- | --- |
| 1676: | | | | | | | |
| Wildrose silty clay | Wildrose | No | flat, lake plain | --- | --- | --- | --- |
| | Mondamin | No | lake plain, rise | --- | --- | --- | --- |
| | Bearden | No | flat, lake plain | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Aberdeen | No | flat | --- | --- | --- | --- |
| | Bryant | No | rise | --- | --- | --- | --- |
| | Makoti | No | flat, lake plain | --- | --- | --- | --- |
| | Parnell | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Williams | No | rise | --- | --- | --- | --- |
| | Zahl | No | knoll, moraine, ridge | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 1697: | | | | | | | |
| Sioux-Arvilla complex, 0 to 6 percent slopes | Sioux | No | rise | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Fordville | No | flat | --- | --- | --- | --- |
| | Divide | No | drainageway, flat, terrace | --- | --- | --- | --- |
| | Heimdal | No | rise | --- | --- | --- | --- |
| | Renshaw | No | rise | --- | --- | --- | --- |
| 1710: | | | | | | | |
| Southam silty clay loam | Southam | Yes | depression, lake plain, till plain | 2B3,3 | Yes | No | Yes |
| | Vallers | Yes | flat | 2B3 | Yes | No | No |
| | Lallie | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Arveson | Yes | flat | 2B3 | Yes | No | No |
| | Marysland | Yes | flat | 2B3 | Yes | No | No |
| | Minnewaukan | Yes | flat | 2B2 | Yes | No | No |
| 1762: | | | | | | | |
| Svea-Barnes loams, 0 to 3 percent slopes | Svea | No | swale | --- | --- | --- | --- |
| | Barnes | No | rise | --- | --- | --- | --- |
| | Buse | No | knoll | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Cresbard | No | flat | --- | --- | --- | --- |
| 1805: | | | | | | | |
| Telfer loamy fine sand, 0 to 6 percent slopes | Telfer | No | lake plain, rise | --- | --- | --- | --- |
| | Lihen | No | alluvial fan | --- | --- | --- | --- |
| | Krem | No | rise | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Flaxton | No | rise | --- | --- | --- | --- |
| | Tally | No | alluvial fan | --- | --- | --- | --- |
| 1886: | | | | | | | |
| Hamerly and Vallers loams, saline, 0 to 3 percent slopes | Vallers, saline | Yes | flat, till plain | 2B3 | Yes | No | No |
| | Hamerly, saline | No | flat | --- | --- | --- | --- |
| | Colvin, saline | Yes | flat | 2B3 | Yes | No | No |
| | Colvin, slightly saline | Yes | flat | 2B3 | Yes | No | No |
| | Hamerly, slightly saline | No | flat | --- | --- | --- | --- |
| | Vallers, slightly saline | Yes | flat, till plain | 2B3 | Yes | No | No |
| | Divide | No | flat | --- | --- | --- | --- |
| | Harriet | Yes | flat | 2B3 | Yes | No | No |
| | Parnell | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Arveson, slightly saline | Yes | flat | 2B3 | Yes | No | No |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 1898: | | | | | | | |
| Vebar fine sandy loam, 0 to 6 percent slopes | Vebar | No | rise | --- | --- | --- | --- |
| | Vebar, level and nearly level | No | rise | --- | --- | --- | --- |
| | Amor | No | rise | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Cohagen | No | knoll | --- | --- | --- | --- |
| | Tally | No | alluvial fan | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Ruso | No | alluvial fan | --- | --- | --- | --- |
| 1978: | | | | | | | |
| Water | Water | Yes | depression | 2B3,3 | Yes | No | Yes |
| 2006: | | | | | | | |
| Williams loam, 6 to 9 percent slopes | Williams | No | knoll, till plain | --- | --- | --- | --- |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Zahl | No | knoll | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Lehr | No | knoll | --- | --- | --- | --- |
| | Vida | No | knoll | --- | --- | --- | --- |
| | Wilton | No | swale | --- | --- | --- | --- |
| 2014: | | | | | | | |
| Williams-Bowbells loams, 0 to 3 percent slopes | Williams | No | rise | --- | --- | --- | --- |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Lehr | No | rise | --- | --- | --- | --- |
| | Niobell | No | flat | --- | --- | --- | --- |
| | Zahl | No | rise | --- | --- | --- | --- |
| 2015: | | | | | | | |
| Williams-Bowbells loams, 3 to 6 percent slopes | Williams | No | rise | --- | --- | --- | --- |
| | Bowbells | No | swale, till plain | --- | --- | --- | --- |
| | Lehr | No | swale | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Zahl | No | flat | --- | --- | --- | --- |
| | Arnegard | No | terrace, swale | --- | --- | --- | --- |
| | Vida | No | rise | --- | --- | --- | --- |
| 2031: | | | | | | | |
| Williams-Zahl loams, 3 to 6 percent slopes | Williams | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Zahl | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Zahill | No | ridge | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Wabek | No | ridge | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 2037: | | | | | | | |
| Williams-Zahl-Parnell complex, 0 to 15 percent slopes | Williams | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Zahl | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Parnell | Yes | depression, moraine | 2B3,3 | Yes | No | Yes |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Southam | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Tonka | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Vallers | Yes | flat | 2B3 | Yes | No | No |
| 2073: | | | | | | | |
| Zahl-Max loams, 15 to 45 percent slopes | Zahl | No | moraine, ridge | --- | --- | --- | --- |
| | Max | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Zahill | No | ridge | --- | --- | --- | --- |
| | Williams | No | knoll | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Wabek | No | ridge | --- | --- | --- | --- |
| | Bearpaw | No | knoll | --- | --- | --- | --- |
| | Vida | No | knoll | --- | --- | --- | --- |
| 2081: | | | | | | | |
| Zahl-Williams loams, 9 to 15 percent slopes | Zahl | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Williams | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Parnell | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Wabek | No | ridge | --- | --- | --- | --- |
| | Zahill | No | ridge | --- | --- | --- | --- |
| 2175: | | | | | | | |
| Zahl-Williams loams, 6 to 9 percent slopes | Zahl | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Williams | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Wabek | No | knoll | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Krem | No | knoll | --- | --- | --- | --- |
| | Parnell | Yes | depression | 3,2B3 | Yes | No | Yes |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 2188: | | | | | | | |
| Wabek-Lehr complex, 1 to 6 percent slopes | Wabek | No | collapsed, outwash plain, outwash plain, ridge | --- | --- | --- | --- |
| | Lehr | No | collapsed, outwash plain, outwash plain, rise | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Stady | No | flat | --- | --- | --- | --- |
| | Appam | No | outwash plain, swale | --- | --- | --- | --- |
| | Rusklyn | No | lake plain, rise | --- | --- | --- | --- |
| | Zahl | No | knoll, moraine, ridge | --- | --- | --- | --- |
| 2234: | | | | | | | |
| Amor-Werner loams, 3 to 6 percent slopes | Amor | No | knoll | --- | --- | --- | --- |
| | Amor, level and nearly level | No | knoll | --- | --- | --- | --- |
| | Werner | No | knoll, ridge | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Shambo | No | alluvial fan | --- | --- | --- | --- |
| | Vebar | No | rise | --- | --- | --- | --- |
| | Flasher | No | rise | --- | --- | --- | --- |
| | Grail | No | swale | --- | --- | --- | --- |
| | Belfield | No | rise, terrace | --- | --- | --- | --- |
| | Manning | No | rise | --- | --- | --- | --- |
| 2235: | | | | | | | |
| Arnegard loam, 0 to 6 percent slopes | Arnegard | No | terrace, swale | --- | --- | --- | --- |
| | Arnegard, gently sloping | No | terrace, swale | --- | --- | --- | --- |
| | Farnuf | No | flat, terrace | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Grail | No | swale | --- | --- | --- | --- |
| | Peta | No | swale | --- | --- | --- | --- |
| | Reeder | No | rise | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| 2240: | | | | | | | |
| Bowdle-Lehr loams, 0 to 3 percent slopes | Bowdle | No | flat, terrace | --- | --- | --- | --- |
| | Lehr | No | rise, terrace | --- | --- | --- | --- |
| | Wabek | No | escarpment | --- | --- | --- | --- |
| | Stady | No | flat | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Falkirk | No | flat | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 2241: | | | | | | | |
| Bryant loam, 0 to 6 percent slopes | Bryant | No | lake plain, rise | --- | --- | --- | --- |
| | Makoti | No | flat | --- | --- | --- | --- |
| | Bearpaw | No | rise | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Telfer | No | rise | --- | --- | --- | --- |
| 2242: | | | | | | | |
| Cohagen-Vebar-Parshall fine sandy loams, 15 to 50 percent slopes | Cohagen | No | ridge | --- | --- | --- | --- |
| | Vebar | No | ridge | --- | --- | --- | --- |
| | Flasher | No | ridge | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Beisigl | No | ridge | --- | --- | --- | --- |
| | Rock Outcrop | No | ridge | --- | --- | --- | --- |
| | Telfer | No | ridge | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Harriet | Yes | flat | 2B3 | Yes | No | No |
| | Wabek | No | ridge | --- | --- | --- | --- |
| | Werner | No | ridge | --- | --- | --- | --- |
| 2243: | | | | | | | |
| Vebar-Flasher complex, 9 to 15 percent slopes | Vebar | No | ridge | --- | --- | --- | --- |
| | Flasher | No | ridge | --- | --- | --- | --- |
| | Cohagen | No | ridge | --- | --- | --- | --- |
| | Beisigl | No | ridge | --- | --- | --- | --- |
| | Amor | No | ridge | --- | --- | --- | --- |
| | Telfer | No | ridge | --- | --- | --- | --- |
| | Cabba | No | ridge | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Regent | No | rise | --- | --- | --- | --- |
| 2244: | | | | | | | |
| Daglum-Belfield loams, 0 to 2 percent slopes | Daglum | No | swale, terrace | --- | --- | --- | --- |
| | Belfield | No | rise, terrace | --- | --- | --- | --- |
| | Rhoades | No | flat | --- | --- | --- | --- |
| | Grail | No | swale | --- | --- | --- | --- |
| | Harriet | Yes | flat | 2B3 | Yes | No | No |
| | Stirum | Yes | flat | 2B3,3 | Yes | No | Yes |
| 2246: | | | | | | | |
| Grail silty clay loam, 0 to 6 percent slopes | Grail | No | flat, swale | --- | --- | --- | --- |
| | Grail, gently sloping | No | flat, swale | --- | --- | --- | --- |
| | Savage | No | flat | --- | --- | --- | --- |
| | Felor | No | flat, terrace | --- | --- | --- | --- |
| | Belfield | No | flat | --- | --- | --- | --- |
| | Reeder | No | rise | --- | --- | --- | --- |
| | Bowdle | No | flat, terrace | --- | --- | --- | --- |
| | Lawther | No | flat | --- | --- | --- | --- |
| | Rhoades | No | knoll, swale | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 2248: | | | | | | | |
| Lehr-Bowdle loams, 3 to 6 percent slopes | Lehr | No | rise, terrace | --- | --- | --- | --- |
| | Bowdle | No | swale, terrace | --- | --- | --- | --- |
| | Wabek | No | escarpment | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Stady | No | flat | --- | --- | --- | --- |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Falkirk | No | flat | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| 2249: | | | | | | | |
| Makoti silty clay loam, 0 to 3 percent slopes | Makoti | No | flat | --- | --- | --- | --- |
| | Bryant | No | flat | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Flaxton | No | rise | --- | --- | --- | --- |
| | Noonan | No | flat | --- | --- | --- | --- |
| | Tally | No | rise | --- | --- | --- | --- |
| | Wildrose | No | flat | --- | --- | --- | --- |
| 2250: | | | | | | | |
| Makoti-Rusklyn silty clay loams, 3 to 6 percent slopes | Makoti | No | swale | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Bryant | No | flat | --- | --- | --- | --- |
| 2252: | | | | | | | |
| Max-Zahl-Arnegard loams, 9 to 35 percent slopes, very stony | Zahl | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Max | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Williams | No | ridge | --- | --- | --- | --- |
| | Arnegard | No | moraine, swale | --- | --- | --- | --- |
| | Bowbells | No | swale | --- | --- | --- | --- |
| | Vida | No | ridge | --- | --- | --- | --- |
| | Wabek | No | ridge | --- | --- | --- | --- |
| 2253: | | | | | | | |
| Mondamin silty clay, 1 to 6 percent slopes | Mondamin | No | rise | --- | --- | --- | --- |
| | Wildrose | No | flat | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Bryant | No | flat | --- | --- | --- | --- |
| | Makoti | No | flat | --- | --- | --- | --- |
| | Zahl | No | rise | --- | --- | --- | --- |
| | Hamerly | No | flat | --- | --- | --- | --- |
| | Williams | No | rise | --- | --- | --- | --- |
| 2254: | | | | | | | |
| Overly silty clay loam, 0 to 3 percent slopes | Overly | No | flat | --- | --- | --- | --- |
| | Great Bend | No | rise | --- | --- | --- | --- |
| | Sinai | No | flat | --- | --- | --- | --- |
| | Bearden | No | flat | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Nutley | No | flat, lake plain | --- | --- | --- | --- |
| | Aberdeen | No | flat | --- | --- | --- | --- |
| | Renshaw | No | rise | --- | --- | --- | --- |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 2255: | | | | | | | |
| Overly-Rusklyn silty clay loams, 3 to 6 percent slopes | Overly | No | swale | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Great Bend | No | rise | --- | --- | --- | --- |
| | Svea | No | swale | --- | --- | --- | --- |
| | Barnes | No | rise | --- | --- | --- | --- |
| | Sinai | No | flat | --- | --- | --- | --- |
| | Swenoda | No | rise | --- | --- | --- | --- |
| | Bearden | No | flat | --- | --- | --- | --- |
| | Renshaw | No | rise | --- | --- | --- | --- |
| | Tonka | Yes | depression | 2B3,3 | Yes | No | Yes |
| 2257: | | | | | | | |
| Reeder-Arnegard loams, 3 to 6 percent slopes | Reeder | No | rise | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Farnuf | No | alluvial fan | --- | --- | --- | --- |
| | Grail | No | swale | --- | --- | --- | --- |
| | Regent | No | rise | --- | --- | --- | --- |
| | Shambo | No | alluvial fan | --- | --- | --- | --- |
| | Janesburg | No | rise | --- | --- | --- | --- |
| | Stady | No | rise | --- | --- | --- | --- |
| | Wabek | No | rise | --- | --- | --- | --- |
| | Werner | No | rise | --- | --- | --- | --- |
| 2258: | | | | | | | |
| Regent-Savage silty clay loams, 0 to 6 percent slopes | Regent, level and nearly level | No | rise | --- | --- | --- | --- |
| | Regent | No | rise | --- | --- | --- | --- |
| | Grail | No | flat, swale | --- | --- | --- | --- |
| | Farnuf | No | flat, terrace | --- | --- | --- | --- |
| | Reeder | No | rise | --- | --- | --- | --- |
| | Savage, level and nearly level | No | flat | --- | --- | --- | --- |
| | Savage | No | flat | --- | --- | --- | --- |
| | Belfield | No | flat | --- | --- | --- | --- |
| | Daglum | No | flat | --- | --- | --- | --- |
| | Lehr | No | outwash plain, rise, terrace | --- | --- | --- | --- |
| | Werner | No | knoll, ridge | --- | --- | --- | --- |
| 2259: | | | | | | | |
| Rhoades-Daglum loams, 3 to 9 percent slopes | Rhoades | No | knoll, swale | --- | --- | --- | --- |
| | Daglum | No | knoll, rise | --- | --- | --- | --- |
| | Grail | No | swale | --- | --- | --- | --- |
| | Rhoades, moderately sloping | No | knoll, swale | --- | --- | --- | --- |
| | Belfield | No | flat | --- | --- | --- | --- |
| | Daglum, moderately sloping | No | knoll, rise | --- | --- | --- | --- |
| | Dogtooth | No | knoll | --- | --- | --- | --- |
| | Cohagen | No | knoll, ridge | --- | --- | --- | --- |
| | Regent | No | knoll | --- | --- | --- | --- |
| | Stirum | Yes | flat | 3,2B3 | Yes | No | Yes |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 2260: | | | | | | | |
| Rusklyn silty clay loam, 1 to 6 percent slopes | Rusklyn | No | lake plain, rise | --- | --- | --- | --- |
| | Makoti | No | flat | --- | --- | --- | --- |
| | Bryant | No | flat | --- | --- | --- | --- |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Williams | No | rise | --- | --- | --- | --- |
| | Overly | No | swale | --- | --- | --- | --- |
| | Wabek | No | outwash plain, ridge | --- | --- | --- | --- |
| | Nutley | No | flat | --- | --- | --- | --- |
| 2261: | | | | | | | |
| Schaller loamy sand, 0 to 6 percent slopes | Schaller | No | escarpment, rise | --- | --- | --- | --- |
| | Arvilla | No | flat | --- | --- | --- | --- |
| | Claire | No | rise | --- | --- | --- | --- |
| | Maddock | No | rise | --- | --- | --- | --- |
| | Fordville | No | flat | --- | --- | --- | --- |
| | Karlsruhe | No | swale | --- | --- | --- | --- |
| | Sioux | No | knoll, ridge | --- | --- | --- | --- |
| 2262: | | | | | | | |
| Schaller loamy sand, 6 to 15 percent slopes | Schaller | No | esker, ridge | --- | --- | --- | --- |
| | Maddock | No | rise | --- | --- | --- | --- |
| | Sioux | No | escarpment, knoll, ridge | --- | --- | --- | --- |
| | Claire | No | ridge | --- | --- | --- | --- |
| | Rusklyn | No | ridge | --- | --- | --- | --- |
| | Buse | No | moraine, knoll, ridge | --- | --- | --- | --- |
| | Arvilla | No | knoll | --- | --- | --- | --- |
| 2263: | | | | | | | |
| Sinai silty clay | Sinai | No | flat | --- | --- | --- | --- |
| | Nutley | No | flat | --- | --- | --- | --- |
| | Great Bend | No | rise | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Fargo | Yes | flat | 2B3 | Yes | No | No |
| 2264: | | | | | | | |
| Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes | Vebar | No | knoll, ridge | --- | --- | --- | --- |
| | Cohagen | No | knoll, ridge | --- | --- | --- | --- |
| | Vebar | No | knoll, ridge | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Flasher | No | knoll | --- | --- | --- | --- |
| | Lihen | No | knoll | --- | --- | --- | --- |
| | Beisigl | No | knoll | --- | --- | --- | --- |
| | Cabba | No | ridge | --- | --- | --- | --- |
| | Shambo | No | knoll | --- | --- | --- | --- |
| 2265: | | | | | | | |
| Wabek-Appam sandy loams, 0 to 6 percent slopes | Wabek | No | ridge | --- | --- | --- | --- |
| | Appam | No | swale | --- | --- | --- | --- |
| | Lehr | No | rise | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| | Schaller | No | rise | --- | --- | --- | --- |
| | Ruso | No | rise | --- | --- | --- | --- |
| | Stady | No | flat | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 2266: | | | | | | | |
| Wabek-Appam sandy loams, 6 to 25 percent slopes | Wabek | No | escarpment, ridge | --- | --- | --- | --- |
| | Appam | No | swale | --- | --- | --- | --- |
| | Parshall | No | swale | --- | --- | --- | --- |
| | Lehr | No | collapsed outwash plain, outwash plain, rise | --- | --- | --- | --- |
| | Bowdle | No | flat | --- | --- | --- | --- |
| 2267: | | | | | | | |
| Werner-Amor-Arnegard loams, 15 to 50 percent slopes | Werner | No | knoll, ridge | --- | --- | --- | --- |
| | Amor | No | knoll, ridge | --- | --- | --- | --- |
| | Arnegard | No | swale | --- | --- | --- | --- |
| | Cohagen | No | ridge | --- | --- | --- | --- |
| | Vebar | No | ridge | --- | --- | --- | --- |
| | Wabek | No | ridge | --- | --- | --- | --- |
| | Dogtooth | No | rise | --- | --- | --- | --- |
| | Rauville | Yes | oxbow | 2B3,4 | Yes | Yes | No |
| | Rock Outcrop | No | ridge | --- | --- | --- | --- |
| 2269: | | | | | | | |
| Cavour-Barnes loams, 1 to 6 percent slopes | Cavour | No | swale | --- | --- | --- | --- |
| | Barnes | No | rise | --- | --- | --- | --- |
| | Cresbard | No | flat, moraine | --- | --- | --- | --- |
| | Svea | No | moraine, swale | --- | --- | --- | --- |
| | Bearden | No | flat, moraine | --- | --- | --- | --- |
| | Hamerly | No | flat, moraine | --- | --- | --- | --- |
| | Parnell | Yes | depression | 2B3,3 | Yes | No | Yes |
| 2270: | | | | | | | |
| Harriet and Stirum soils | Harriet | Yes | flat, flood plain | 2B3 | Yes | No | No |
| | Stirum | Yes | depression, flood plain | 2B3 | Yes | No | No |
| | Heil | Yes | depression, flood plain | 3,2B3 | Yes | No | Yes |
| | Manfred | Yes | depression | 2B3,3 | Yes | No | Yes |
| | Noonan | No | flat | --- | --- | --- | --- |
| | Marysland | Yes | drainageway, flat | 2B3 | Yes | No | No |
| | Desart | No | alluvial fan, alluvial flat | --- | --- | --- | --- |
| | Hamerly | No | flat, moraine | --- | --- | --- | --- |
| | Lehr | No | rise | --- | --- | --- | --- |
| | Minnewaukan | Yes | depression | 2B2 | Yes | No | No |
| 2271: | | | | | | | |
| Lohnes loamy coarse sand, 6 to 15 percent slopes | Lohnes | No | ridge | --- | --- | --- | --- |
| | Maddock | No | rise | --- | --- | --- | --- |
| | Sioux | No | ridge | --- | --- | --- | --- |
| | Buse | No | ridge | --- | --- | --- | --- |
| | Embden | No | rise | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Rusklyn | No | rise | --- | --- | --- | --- |
| | Vebar | No | rise | --- | --- | --- | --- |

Table 24.-Hydric Soils List--Continued

| Map symbol and map unit name | Component | Hydric | Local landform | Hydric soils criteria: Hydric criteria code | Meets saturation criteria | Meets flooding criteria | Meets ponding criteria |
|---|---|---|---|---|---|---|---|
| 2272: | | | | | | | |
| Sioux-Arvilla complex, 6 to 25 percent slopes | Sioux | No | ridge | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Buse | No | ridge | --- | --- | --- | --- |
| | Renshaw | No | flat | --- | --- | --- | --- |
| | Fordville | No | flat | --- | --- | --- | --- |
| 2273: | | | | | | | |
| Svea-Buse-Parnell complex, 0 to 15 percent slopes | Svea | No | moraine, swale | --- | --- | --- | --- |
| | Buse | No | knoll, moraine, ridge | --- | --- | --- | --- |
| | Parnell | Yes | depression, moraine | 2B3,3 | Yes | No | Yes |
| | Barnes | No | rise | --- | --- | --- | --- |
| | Southam | Yes | depression | 3,2B3 | Yes | No | Yes |
| | Vallers | Yes | flat | 2B3 | Yes | No | No |
| | Hamerly | No | flat | --- | --- | --- | --- |
| 2274: | | | | | | | |
| Towner-Maddock complex, 3 to 6 percent slopes | Towner | No | rise | --- | --- | --- | --- |
| | Maddock | No | swale | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Cavour | No | swale | --- | --- | --- | --- |
| | Barnes | No | rise | --- | --- | --- | --- |
| | Buse | No | knoll | --- | --- | --- | --- |
| | Fordville | No | flat | --- | --- | --- | --- |
| | Sioux | No | ridge | --- | --- | --- | --- |
| 2275: | | | | | | | |
| Towner-Maddock-Buse complex, 6 to 15 percent slopes | Towner | No | ridge | --- | --- | --- | --- |
| | Maddock | No | ridge | --- | --- | --- | --- |
| | Svea | No | swale | --- | --- | --- | --- |
| | Buse | No | ridge | --- | --- | --- | --- |
| | Arvilla | No | rise | --- | --- | --- | --- |
| | Nutley | No | rise | --- | --- | --- | --- |
| | Sioux | No | ridge | --- | --- | --- | --- |

## HYDRIC SOILS CRITERIA CODES AND DEFINITIONS

1. All Histosols except Folists, or

2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Aquisalids, Pachic subgroups, or Cumulic subgroups that are:

   a. Somewhat poorly drained with a water table equal to 0.0 foot (ft) from the surface during the growing season, or

   b. poorly drained or very poorly drained and have either:

      (1) water table equal to 0.0 ft during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches (in),

or for other soils

(2) water table at less than or equal to 0.5 ft from the surface during the growing season if permeability is equal to or greater than 6.0 in/hour (h) in all layers within 20 in, or

(3) water table at less than or equal to 1.0 ft from the surface during the growing season if permeability is less than 6.0 in/h in any layer within 20 in, or

3. Soils that are frequently ponded for long duration or very long duration during the growing season, or

4. Soils that are frequently flooded for long duration or very long duration during the growing season.

# References

# Glossary

**ABC soil.**

**Ablation till.**

**AC soil.**

**Aeration, soil.**

**Aggregate, soil.**

**Alkali (sodic) soil.**

**Alluvial fan.**

**Alluvium.**

**Alpha, alpha-dipyridyl.**

**Animal-unit month (AUM).**

**Aquic conditions.**

**Area reclaim**

**Argillic horizon.**

**Aspect.**

**Association, soil.**

**Atterberg Limits.**

**Available water capacity (available moisture capacity).**

**Badland.**

**Basal till.**

**Base saturation.**

**Bedrock.**

**lithic**

**paralithic**

**Blowout.**

**Bottom land.**

**Boulders.**

**Breaks.**

**Brush management.**

**Butte.**

**$CaCO_3$ Equivalent.**

**Calcareous soil.**

**Capillary water.**

**Catena.**

**Cation.**

**Cation-exchange capacity.**

**Channery soil material.**

**Chemical treatment.**

**Chiseling.**

**Clay.**

**Clay depletions.**

**Clay film.**

**Claypan.**

**Climax plant community.**

**Coarse textured soil.**
**Cobble (or cobblestone).**

**Cobbly soil material.**

**Collapsed lake plain.**

**Collapsed outwash plain.**

**Colluvium.**

**Complex slope.**

**Complex, soil.**

**Concretions.**

**Conglomerate.**

**Conservation cropping system.**

**Conservation tillage.**

**Consistence, soil.**

**Contour stripcropping.**

**Contrasting soils (Dissimilar soils).**

**Control section.**

**Corrosion.**

**Cover crop.**

**Cropping system.**

**Crop residue management.**

**Cutbanks cave (in tables).**

**Decreasers.**

**Deferred grazing.**

**Delta.**

**Dense layer (in tables).**

**Depth, soil.**

**Depth to rock (in tables).**

**Diversion (or diversion terrace).**

**Divided-slope farming.**

**Drainage class (natural).**

**Ephemeral stream.**

**Episaturation.**

**Erosion.**

**Erosion (geologic).**

**Erosion (accelerated).**

**Escarpment.**

**Esker.**

**Excess fines (in tables).**

**Excess lime (in tables).**

**Excess salts (in tables).**

**Excess sodium (in tables).**

**Excess sulfur (in tables).**

**Fallow.**

**Fan terrace.**

**Fast intake (in tables).**

**Fertility, soil.**

**Fibric soil material (peat).**

**Field moisture capacity.**

**Fill slope.**

**Fine textured soil.**
**Flaggy soil material.**

**Flagstone.**

**Flooding.**

**Flood plain.**

**Fluvial.**

**Foothill.**

**Foot slope.**

**Forb.**
**Forest cover.**

**Forest type.**

**Fragile (in tables).**

**Fragipan.**

**Frost action (in tables).**

**Genesis, soil.**

**Gilgai.**

**Glacial drift.**

**Glacial outwash.**

**Glacial till.**

**Glaciofluvial deposits.**

**Glaciolacustrine deposits.**

**Gleyed soil.**

**Graded stripcropping.**

**Grassed waterway.**

**Gravel.**

**Gravelly soil material.**

**Green manure crop (agronomy).**

**Ground water.**

**Gully.**

**Hard bedrock.**

**Hardpan.**

**Hemic soil material (mucky peat).**

**High-residue crops.**

**Hill.**

**Horizon, soil.**

**Igneous rock.**

**Illuviation.**

**Impervious soil.**

**Increasers.**

**Infiltration.**

**Infiltration capacity.**

**Infiltration rate.**

**Intermittent stream.**

**Hummock.**

**Humus.**

**Invaders.**

**Hydric soil.**

**Iron depletions.**

**Hydrologic soil groups.**

**Irrigation.**

**K Factor.**

**Kame.**

**Knoll.**

**Ksat.**
**Lacustrine deposit.**

**Lake plain.**

**Landslide.**

**Large stones (arki0dkle).7.6 djacsedmitt)dge mos aaow sentd(Large stoon.)Tj0.0001 Tc -170219 Tw TadUnivloseaffdirwet t**

**Mottling, soil.**

**Mountain.**

**Muck.**

**Mudstone.**

**Munsell notation.**

**Natric horizon.**

**Neutral soil.**

**Nodules.**

**Nutrient, plant.**

**Organic matter.**

**Outwash, glacial.**

**Outwash plain.**

**Pan.**

**Parent material.**

**Peat.**

**Ped.**

**Pedon.**

**Percolation.**

**Percs slowly (in tables).**

**Permeability.**

**Phase, soil.**

**pH value.**

**Piping (in tables).**

**Plasticity index.**

**Plastic limit.**

**Plateau.**

**Plowpan.**

**Ponding.**

**Poor filter (in tables).**

**Poorly graded.**

**Poor outlets (in tables).**

**Porcelanite (scoria).**

**Potential native plant community.**

**Potential rooting depth (effective rooting depth).**

**Prescribed burning.**

**Productivity, soil.**

**Profile, soil.**

**Proper grazing use.**

**Range condition.**

**Rangeland.**

**Range site.**

**Reaction, soil.**

**Red beds.**

**Redoximorphic concentrations.**

**Redoximorphic depletions.**

**Redoximorphic features.**

**Reduced matrix.**

**Regolith.**

**Relief.**

**Residuum (residual soil material).**

**Retrogression.**

**Revised Universal Soil Loss Equation (RUSLE).**

**Rill.**

**Rock fragments.**

**Rock outcrop.**

**Root shearing.**

**Rooting depth (in tables).**

**Root zone.**

**Runoff.**

**Saline seep.**

**Saline soil.**

**Saline-sodic soil.**

**Salty water (in tables).**

**Sand.**

**Sandstone.**

**Sapric soil material (muck).**

**Saturation.**

**Saturated hydraulic conductivity (Ksat).**

**Scarification.**

**Sedimentary rock.**

**Seepage (in tables).**

**Sequum.**

**Series, soil.**

**Shale.**

**Sheet erosion.**

**Shoulder slope.**

**Shrink-swell (in tables).**

**Silt.**

**Siltstone.**

**Similar soils.**

**Slickensides.**

**Slick spot.**

**Slippage (in tables).**

**Slope.**

**Slope (in tables).**

**Slow intake (in tables).**

**Small stones (in tables).**

**Sodic (alkali) soil.**

**Sodicity.**

**Soft bedrock.**

**Soil.**

**Soil depth class.**

**Soil separates.**

**Solum.**

**Stones.**

**Stony.**

**Stripcropping.**

**Structure, soil.**

**Stubble mulch.**

**Subsoil.**

**Subsoiling.**

**Substratum.**
**Subsurface layer.**

**Summer fallow.**

**Surface layer.**

**Surface soil.**

**Talus.**

**Taxadjuncts.**

**Terminal moraine.**

**Terrace.**

**Terrace (geologic).**

**Texture, soil.**

**Thin layer (in tables).**

**Till plain.**

**Tilth, soil.**

**Toeslope.**

**Too arid (in tables).**

**Topsoil.**

**Toxicity (in tables).**

**Trace elements.**

**Universal Soil Loss Equation (USLE).**

**A—**

**RKLSPC A**

**R K**

**L S**

**P**

**C**

**Unstable fill (in tables).**

**Upland.**

**Valley.**

**Valley fill.**

**Variegation.**

**Varve.**

**Very deep soil.**

**Very shallow soil.**

**Water table.**

**Weathering.**

**Well graded.**

**Wilting point (or permanent wilting point).**

**Windsculptured.**

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